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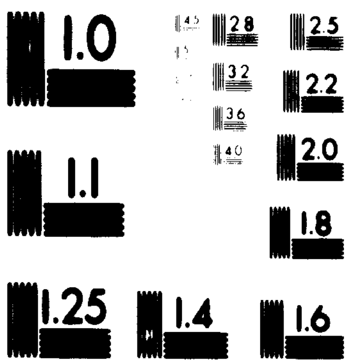

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(SPECIAL FUND PROJECT / INS - 71/531)

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INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report No. 1

REHABILITATION OF TEXIN SPINNING, WEAVING & FINISHING FACTORY

Djakarta, May 5, 1972

EL-SAYED M. OWEISS
Project Manager.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

Djakarta, May 5, 1972

S. O.

EL-SAYED M. OWEISS
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ABSTRACT

Toxin is an integrated unit of 37,000 spindles, 1254 looms and a finishing unit of a capacity to finish about 7,000,000 meters per annum.
The object of our feasibility study and recommendations is to improve the quality and to cut down the cost of production.

1. SPINNING

a. Building : Although it is old but it can live for another 40 to 50 years more. Because the roof is too high and constructed on saw system without any atmospheric control so it needs another low ceiling in case of adopting air conditioning system.
The span is short and not convinient to store the recommended ring frames.
Comparison has been made in case of replacing the existing machines by new ones between using the existing building after modernization and putting on in a new building and the result is in favour of the new building if financing is not an obstacle.

b. Machines : All spinning machines of this factory are old and obsolete and cannot be run for a long time with the exception of II twist frames which can be modernized. Recommendation is given to replace the old and obsolete machines with new modern ones in a period not longer than 4 years otherwise this factory will face difficulty from the local competition.

2. WEAVING

a. Building : About 1100 looms are equipped in a similar building like that of the spinning and 120 looms are equipped in a new building but also without air conditioning system.

b. Machines : Although all machines, preparation equipments and looms with the exception of the 120 new automatic looms are old but it can run for another number of years on condition that the spare-parts needed and some of them are urgently required will be provided. The factory has only 2 Franz Muller old and obsolete winding machines which have to be replaced by new ones. It has also an old system wooden sizing mixing equipment which has to be scrapped.

3. FINISHING

a. Building : Is new and up to date.

b. Machines : Mostly are new and modern. The remain part either old and needs modernization or old and obsolete and needs replacement. The factory is not balancing and the flow is not satisfactory. It was, before our assistant, in trial condition but now it starts production.

4. The main problem in this factory besides the old obsolete machinery as described in the previous paragraphs is the shorted in knowledge of all levels of labour forces in particular the managerial levels.
A complete programme of training and upgrading is required.

5. For the same reason the maintenance is not adequate, parts are short so that the conditions of machinery are unsatisfactory.

6. The technological principles are not followed so our technical assistance and the stock of parts are of great importance.

7. The result of all the above mentioned problems is low quality, high cost and low sales prices of the factory products.

INTRODUCTION

1. The purpose and the scope of the present report covers spinning, weaving and finishing units for the purpose of :

   I. to follow up the implementation and the result of the previous rehabilitation programme drawn by the ex UNIDO textile advisor on management in 1969

   II. to study the conditions and the problems which have been created since the previous investigations, see the new problems which have been appeared specially those due to the conditions of the machines and to give the necessary recommendations.

2. Summary description of previous investigations.
   As mentioned in the previous paragraphs some technical and managerial recommendations have been given by the ex UNIDO textile advisor in management in Indonesia. The most important of them are :

   I. to provide the factories with adequate stock of parts.

   II. to put a maintenance programme for the different machinery (both I and II to overcome partially the problems created by the old and obsolete machinery specially in the spinning and preparation of weaving).

   III. a little increase in the revolution per minute of the spindles of the ring frames which scope with the condition of the factory machines.

   IV. to increase the working hours in the ring frames to 168 hours a week instead of 120 hours which were prevailing at that time and keep the preparation of the spinning as it was because its production was enough to feed the ring frames after increasing the working hours.

   V. to change the construction of some of their material products which have a finer count in weft and coarser count in warp by adopting the contrary in order to increase the production.

   VI. to unify some of their similar articles to decrease the number of their products.

   VII. to bleach the black jean before dyeing to improve the quality and to benefit from the increase in length by using some of their jigs which were idle.

3. Description of the present investigation.
   The present investigation as it is described below shows that although many of the previous recommendations have been fulfilled but there are some of them still suspended.

Among these the shortage of the parts which causes more deterioration in the conditions of the machines so the quality specially in spinning becomes worst and creating production problems in both the weaving and finishing.
Some recommendations and some technological advices with recommendations of replacing the old and obsolete machinery which not enable the factory to compete in the local market to be replaced by new ones. The details of these investigations and recommendations will be seen in the main text as drawn by the three members of our Special Fund Project team of experts.

Grateful thanks are due to the Government Officials, Ministry of Industry Textile Department, Institute of Textile Technology Bandung as well as the Board of Directors of Pinda Sandang with the management and the staff of Texin factory who assisted by providing information, advice and facilities in preparing this report.

4. Main Text.

The following are the reports drawn by the three members of the UNIDO team of experts in the UNDP Special Fund Project INS-71/531.

They are : 1. Mr. A.E.Curran, the Spinning technologist expert. His report is on page 9 to 32

2. Mr. T.Hoshiyama, the Weaving technologist expert. His report is on page 33 to 54

3. Mr. J.E.H. Bennett, the Finishing technologist expert. His report is on page 55 to 76

S P I N N I N G

1-0 SUMMARY OF GENERAL CONDITIONS

This report is the result of observations made during my visit to Tegal 17th March 1972 to 22th March 1972.

1-1 History of the Mill

The plant was established in 1938 by an independent Dutch company. Two notable extensions to the original plant took place, on in 1941 and the other in 1952.
During early 1960 the plant was handed over to the Provincial Government and is under the authority of the Textile Corporation of Central Java, Pinda Sandang Djatong.

1-2 Type of Mill

The plant, being one of the largest factories in Indonesia, is a fully integrated unit consisting of Spinning, Weaving and Finishing plants.
The spinning mill has a total of 37,000 Ring spindles, producing yarn of 20s, 32s and 40s English counts, part for weaving and part for outside sales.
The Weaving mill has 1,330 looms producing cloth for processing in their own Finishing plant i.e. bleaching, dyeing or printing.

Financial condition

The profit for the financial year 1970 was Rp.97,533,621,-- ($235,027) which was equal to 6.8% of the total cost Rp.1,015,496,930,-- which considered very low investment in Indonesia.

1-3 Location of the Mill

Tegal is a small town on the north coast of Java, situated in a central position 72 kilometers from Tjirebon and 165 kilometers from Semarang. The site of the plant is just outside the town and about 1 kilometer from the sea.
The estate is quite large and in addition to the plant buildings, contains a number of staff dwelling houses, together with guest house and club house, with outside facilities for staff recreation.

1-4 Atmospheric Conditions

As Java is a tropical island, it has a climate which tends to be warm and humid. Consequently the closer a plant is situated to the sea, the higher tends to be the moisture content of the atmosphere. In addition, Java has rather a long rain period and therefore the tendency is for the humidity to be up in the 80% R.H. region for long periods of time, whilst daytime temperatures tend to be between 80° and 90°F.

1-5 In such conditions air conditioning with regrigeration could be considered to be essential, but even without this, better processing of textiles can take place under the conditions which appertain in these coastal districts by improving the other working conditions.

2-0 PRODUCTION

2-1 The plant at present is working on a four-shift system for seven days per week. This is quite recent innovation recommended by ex UNIDO textile advisor on management, but results already show quite an appreciable increase in productivity.

2-2 The counts (English system) produced are 20s, 32s and 40s in both warp and weft, whilst 42s and 24s have been produced in the past to provite a twofold yarn for warp in the hand weaving industry.

2-3 Production in equivalent 20s Ne yarn counts (mr.Curran's conversion from productions given by the mill of each type of count)

1968	-	12,900	bales	(each	181	kgs.)
1969	-	13,678	"	"	"	"
1970	-	15,331	"	"	"	"
1971	-	17,864	"	"	"	"

3-0 BUILDINGS

3-1 Spinning mill constructed in 1937/8 - in quite good sound condition. Walls constructed of brick to a height of 3 1/2 meters, above which is a line of corrugated asbestos sheet. Above this, to a height of 6 meters is a line of windows and above this again is an incline section of roof which is broken by a second line of windows in vertical plane, followed by a second of roof rising to the apex, which is 15 meters above floor level, giving a good air space within the building.

3-2 The roof girder structure is of steel and timber in very sound condition, easily lending itself to the support of a false ceiling, which would be necessary if air conditioning were to be considered at some future date.

3-3 **Floors**, which are cement, are quite good in general, except for some parts around the Carding area, where the sliding of sliver cans has caused shallow depressions to be made. Dividing walls separate the various stages of process, although the Card room is in the same open area as the spinning frames, this area being only partially divided.

3-4 **Lighting** does not conform to normal spinning mill standards, there being insufficient lights over the work areas on the flyer and ring frames. The wiring appears to be a temporary nature.

3-5 **Air Conditioning.** There is no air conditioning in the building and consequently no control over temperature and humidity. The space inside the building is so large that atmospheric changes will be slow and also because the building is high, heat generated by the plant will rise away from the processing levels.
As stated above, the building will readily lend itself to the fitting of a false ceiling and this can be positioned in such a way and at such a height that one line of windows could be left below it. But it has a problem that the span is only 15 meters which will not allow to erect one ring frame much more than 380 spindles what is consider short for the ring diameter of 1 3/4" which is generally this case.

3-6 **Fire Equipment** and Sprinkler Installation is of a very good standard. Sprinklers are fitted and follow the roof line, whilst a fire pump and sprinkler supply pump are primed and ready for instant use, being automatically activated by any drop in pressure on the sprinkler lines.

3-7 **Work Flow.** To some extent there are restrictions to free movement of material caused by the old low draft systems in use on the machines. Crossing of flowpaths also takes place due to the same reason.
Slubber 0.6 Hk is restricted to 1.9 and 1.75 Hk.

3-8 Intermediate frames; whilst slubbing 0.55 Hk is restricted to 1.25Hk intermediate.

3-9 From intermediate frames to Ring frames there are three hanks, 1.9 Hk to 40s counts; 1.75 Hk to 32s, and 1.25 Hk going to 20s counts, all English count system.
Normally the range of counts could be done from one common hank, which would prevent mixed roving and the crossing and extra transportation within the process.
Plant Description - see Mr. Curran's report dated April 1st 1972, section 13 paragraphs 1 to 27.

4-0 P R O B L E M S

4-1 These are caused mainly by old machines which have been badly maintained, especially cards and speed frames (flyer), and which can be described as in a run-down condition. Some of the fault here is due to a shortage of spare parts.
The quality of the work is far from satisfactory; too much nep and very irregular roving, having thin places and making a weak yarn.
Maintenance is not satisfactory.
Operatives in some cases lack a sufficient knowledge of their jobs, and much more training is necessary.

4-2 Training and augmentation of the staff is necessary to develop the full potential of the department. There is an insufficient number of capable staff on the plant.

4-3 **Plant**

The greater part of this is obsolete. Some conversion work could take place, particularly in the Blowing Room and Cards. However, the recommendation would be for new machinery.

4-4 Cards are in very poor condition; some would be converted to Semi-High production conditions, but this would be expensive. It would be better to think in terms of new cards.

4-5 **Drawing frames** are of very old design and quite definitely obsolete. They have old drafting systems, small dimension sliver cans, run at slow speeds and are in poor condition.

4-6 **Speed frames** also have old drafting systems, although their bobbin size are reasonable. The frames are in poor condition and require a great deal of work; advice would be for new frames.

4-7 **Ring Spinning frames** 91 machines, half of which have small spindles and rings for the spinning of direct weft to the loom shuttle. This system is now obsolete and as the frames have old drafting systems and are in poor condition, replacement should be seriously considered.
At the same time, it should be remembered that any replacement here would also involve the purchase of Weft winding machines, but these would give better conditions at the loom so gains would be observed in both spinning and weaving.

4-8 **The remaining warp spinning frames** are also in poor condition and have obsolete drafting systems, small rings and short lifts.
It would require large capital expenditure to put them in good order. So it is recommended to think of their replacement.

5-0 CONCLUSIONS

5-1 Air Conditioning

The best advice would be for replacement of all the plant and the equipping of the building with air conditioning. A false ceiling could easily be suspended at a height of 3.50 meters. This would leave one line of windows below the ceiling. Lighting could be fitted into the ceiling but protruding by about 40 mm. Air conditioning distribution trunks would be above the ceiling, with the diffusers only protruding below the ceiling. It should be noted that additional sprinklers would be required for the area below the ceiling. Here again piping would be above and only the nozzles protruding below the ceiling.

5-2 Bay Widths and Ring Frames

A point to be noted : the bay widths are 15.50 meters (50 ft.). This means that the ring frames would only have a 44 ft. front roller, whilst the textile machinery makers allow a maximum of 50 ft. This means that with a 1 3/4" diameter ring 2 3/4" gauge the frame will be restricted to 384 spindles per machine (instead of a maximum of 436 spindles). For a mill of 37,000 spindles 96 frames would be required. At present the mill has 91 frames. However this is no problem, for with a complete new modern plant it is estimated that the building could contain 50,000 to 60,000 spindles of ring spinning and its preparation machinery.
This means an extra cost for the ring frames has to be calculated with extra cost processing cost for this section.
This leads to restrictly the cost of repairing the existing building with the additional amount to be paid for the ring frames due to it shorten in largest and additional processing cost for the same reason and the result is in favour of recommending but on new suitable building of the finance of the building will not be on obstical. If such recommendation approved parts of the present running building can be used as laboratories.

6-0 LABORATORY

6-1 The laboratory should receive and be located in a better position than that which it occupies at present. There is insufficient control work done. More equipment is required and some control over the atmospheric conditions to give some firm and dependable measure of control on tests. Both Spinning and Weaving laboratories could be combined in one building adjacent to both those sections and to the Preparation Department. It would then be worthy of an air-conditioned room to be in the charge of a technologist and where the new young graduates could receive mill training before being placed in supervisory and management positions.
(See Mr.Curran's report dated 1st April, 1972, section 4-0 Paragraphs 1 to 5).

7-0 **DETAILS OF PROJECT**

7-1 The building was erected to house the various sections of the spinning plant. As it was not intended to air condition or give other mechanical aids to the atmosphere, it was given very spacious proportions, particularly in regard to height.

7-2 The machinery is old, especially with regard to technology (See Appendix for detailed lists of machinery).

7-3 The main problems are as follows :

1. The quality of the work is not satisfactory.
2. The development of the available machinery to improve processing.
3. The maintenance of the plant is not satisfactory and in some cases the operatives lack knowledge of their jobs.
4. Training of some operatives' skills is necessary.
5. Training and augmentation of staff is required in order to develop the full potential of the department.

7-4 These problems will be discussed during the course of this report, together with our recommendations.

7-5 We recommend that the future development be divided into phases.

6. Phase 1. To work to improve the condition of the existing machines and to obtain maximum production consistent with yarn quality.

7-6 7. Phase 2. This will of necessity involve capital, expenditure.

1. Changes in the Blowing Room plant to improve.
   (a). Blending.
   (b). Quality of opening.

7-7 2. Changes in the Carding Section to Semi High Production Carding, or direct High Production Carding (the choice being a matter of cost).

7-8 3. Changes in the Drawing Section by replacement of old technically out-dated machines.

7-9 4. Replacement of old two-passage Flyer frames with modern frames.

7-10 5. Replacement of old small package Ring frames with modern high draft machines.

7-11 6. This would involve the installation of pirn winding machines in the Preparation Department to replace the Direct Weft spinning frames.

Phase 2 will be subdivided to take place over two or three years in planned phases.

7-12 8. Phase 3. To install an air conditioning system in the building for atmospheric control. Cost requires a quotation from a suitable engineering company.

7-13 9. Finally there are the various appendices concerning machinery, production, technical procedures and quality control.

PROBLEMS DISCUSSED

8-0 **YARN QUALITY**

8-1 10. There is a general complaint that the quality of the yarn is poor, very neppy, dirty, too hairy, and weak, due to thin places.

8-2 These in my opinion have been substantiated and emanate from the condition of the following :

1. Blowing room plant.
2. Blending of waste with cotton.
3. Poor condition of Carding.
4. Poor Drafting.
5. Other technical considerations i.e. theory of hooked fibres, condensing of fibres in drafting systems, clearances of yarn and travellers, lack of control of atmospheric conditions.

8-3 11. Organisation of Department.
It would appear that this is not done to the best advantage. The systems in use are old-fashioned and do not take any advantage of modern techniques, i.e. such methods as block creeling, organisation of operatives into group working, etc.

9-0 **DEVELOPMENT OF EXISTING PLANT**

9-1 The problem in the Blowing Room is stringy laps. This is mainly due to over-beating, particularly on the Platt line, but also due to feeding too much waste into the mixing and, further, by high moisture content of material.

9-2 Action can be taken to reduce the waste feed down to about 5%. It is suggested that a good pre-mixing be made on the floor, or alternatively a creel be made to unroll bad or rejected laps directly on to the lattice. The raw cotton is then fed on to the lattice and waste sliver and other types of waste placed on the top of raw cotton. Waste to be used in this way should be strictly controlled by the Supervisor so that equal and even amounts are fed.

9-3 To cut down the number of striker cylinders in the Howard & Bullough triple opener the centre section could be removed and the first and last sections then connected.

9-4 On looking into Beater settings it was found these were too wide. Standard settings were given to the mill staff and these should be strictly adhered to - too wide settings cause stringy laps.

9-5 It was noted that the moisture content of the raw cotton after test was about 9 to 10%. This is too high and I would suggest that during the wet season the bales be kept fastened up until required; in the dry season the bales could be opened for twelve hours before use. Beating on this plant would be better at moisture contents of about 7%. The fibres would be lively and open more easily, whereas they now lie "dead" and inert.

9-6 Kirshner beater in the Platt scutcher would give a combing action and make a smoother lap. These could be purchased "reconditioned" from England.

C A R D I N G

9-7 "To card well is to spin well" - an old Lancashire maxim for all staff to remember and put into practice.

9-8 Here much can be done by the staff which has been left undone for a long time, i.e. Grinding of wire and care of cards in general.

9-9 Much of the wire is damaged and apart from those recently re-covered all is in poor condition.

9-10 A concentrated effort must be made by a skilled operative Grinder to get all the wire back into condition. Both Quick Traverse and Dead roller grinders must at all times be covered with sharp emery fillet. Quick traverse rollers require the fillet to be changed between 140 to 160 hours of use. A long or Dead roller grinder requires the fillet to be changed after four months.

9-11 I stress the above because on examination of Quick travers rollers working on a Cards during my visit I found these were not grinding at all. They were badly set and the emery fillet was both worn and loaded with dirt. I asked the operative grinder to examine the rollers and listen to the sound from the roller, which is the way to set the rollers to the cylinder doffer and flats. He, however, bad no idea of his job. It will be essential for a good technical man to show and train these Grinders.

9-12 General Condition of Cards

Attention should be given to all the settings and a check made by the staff to see that the Card Setter is doing his work correctly. Doffer combs, Flat combs and Phillipson brush combs all require attention. It will take at least six months of concerned effort to get these cards into condition, and many will have to be recovered.

9-13 **Note for the Staff** : The metallic wire requires to be ground very lightly by a special stone after periods of about 9 months' working.

D r a w f r a m e s

9-14 Some advantage here can be gained by converting the drafting system from its present three-zone gearing to one of two zone, the middle rollers being neutral. This will give more even draft to the sliver. Back zone draft will be 1.5, front zone 4.0, total 6. Slight variations can be made to this by the back being a little higher, if necessary say 1.8.

9-16 All top rollers should be checked so that their surfaces are level and true. Weighting should be checked to see that all weights are being used. If found necessary, a little more weight can be applied, but this loads up the bearings and will take more horse-power to drive the frame.

F l y e r f r a m e s

9-17 **S l u b b e r s**

The biggest fault here is soft bobbins, caused by insufficient warps round flyer presser.

9-18 A point to note - a soft bobbin has an uneven surface and thus tension on roving is always varying, varies between bobbins and on every bobbin. A hard bobbin has an even surface and therefore the tension bobbins is even and in this way a standard lifter wheel and a standard builder wheel can be used. It is a mistake to think that a soft bobbin eases tension - the reverse is the case.

9-18 Try six spindles working on one frame, two each end and two in the middle. Put three turns on presser arm and then after your lifter and builder wheels until the correct winding is found.

9-19 The machines are old but can be run much better by little extra care.

I n t e r m e d i a t e s

9-20 Here again is the same problem - soft bobbins.
To assist in making a hard bobbin try 6 spindles as above. You will note the hole on the top of the flyer is small - drill this out smooth and make as big a hole as the flyer will take. Then, with three turns round the presser arm, change the builder and lifter wheels to give the correct winding tensions. You will note the twist is all put into the roving from the nip of the rollers to the top of the flyer, thus the roving is stronger at that place and will not break.

9-21 Drafting : this is 4 over 4 rollers 3-zone - again try two-zone drafting as at the Draw Frames.

9-22 These changes require courage on the part of the technical man, but if only six spindles are run on a frame until everything runs satisfactorily, then no harm is done or waste accumulated.

Ring Frames

9-23 There appears to be very little which can be done on these machines as they, like the speed frames, are old and well-worn. Only attention to maintainance, spindle and ring centreing, polishing of rings, changing of travellers at the end of their life, etc. will ensure getting the best out of the plant.

10-0 T R A I N I N G

10-1 In my opinion, more training is required at operative, mandur staff levels. Remarks have already been made regarding the neglect some plant. This, I feel sure, is mainly due to lack of training and knowledge. Also in this connection I think there is a shortage of skilled staff and a lack of aportunity for the staff to increase their skills and knowledge.

10-2 In a large mill it is a good thing to have a department for the training of operatives and also staff. This can be done by amalgamating the Technical Department with a Training Department. One section of this would have short machines available to train operative skills and would consist of a Card, two passages of Draw Frame (each of only two deliveries), a 20 or 30 spindle speed frame, with both a sliver and a bobbin creel but of intermediate frame gauge, and also a 40-spindle Ring Frame. Here, under the care of instructor, the operatives can be taught their skills. Here also the mandurs can be trained to know the machine mechanism and what is required of them in their duties. Also in such a section technical training can be given to the Supervisory staff. In a saparate section the Department could also contain all the testing equipment for the spinning and weaving departments.

10-3 The whole Department would be under the care of a trained technologist. He would set up the programme of training and of testing and be under the direct control of the General Manager. (Note: The same department could also be training and testing for the Weaving mill).

10-4 The man in charge would have his staff of permanent instructors for both spinning and weaving and in addition to this would have an intake of student trainees direct from Technical College. They would have two lines of training - one being technical development on the machines in the centre, together with testing equipment, and the other to be sent into the mill with definite objects in view, i.e.

checking of settings, Blowing and Cards, settings on drafting systems on the various frames, etc. Supervisory routine tests, carrying out special investigations for the Manager, and other projects which would be devised for them. They would also be the main force in dealing with quality control within the mill (but not dealing with day-to-day routine records). I have emphasised this point as it is essential that young men entering the mill receive a definite training and not be merely thrust into a position of supervision without any experience or opportunity to gain experience of the technical aspects of a spinning (or Weaving) plant. I considere the lack of such facilities to be one of the major causes of inefficient plants and staff who, because of their lack of knowledge, fear to give their best personality to their work.

10-5 A training and testing department as envisaged would be set up in a separate building close to and easily accessible from both the spinning and weaving departments.

11-0 BALANCE OF PLANT

11-1 At the time of my visit, the plant was running with counts 40s,32s and 20s warp yarns and 32s, 20s weft, with a yarn production of approximately 6,100 warp and 4,160 kgs. weft in 24 hours. Whilst the Draw Frames are in reasonable balance, it is noted that there is quite a lot of unused capacity from both the Slubbers and Intermediate Frames. In actual running fact, the speed frames do balance, but with improved running conditions, as suggested in a previous paragraph, the efficiency of the speed frames would improve and they would then have an excess production.

11-2 The efficiency of the mill is generally low, which is to be expected with the direct weft spinning and the general conditions, i.e. see Blowing Room and Card reports.

12-0 WORK FLOW

12-1 In general this is quite good. Due to the restrictions imposed by the drafting systems in use there is a fair amount of movement,as for example Slubber 0.6 Hk. is restricted to 1.9 and 1.75 Hk. on Intermediate, whilst the 0.55 Hk. Slubbing flows to 1.25 Hk. on Intermediate frames. Between Intermediate and Ring frames we have three hanks - 1.9 Hk. going to 40s counts; 1.75 to 32s and 1.25 going to 20s Ne count. This applies to both warp and weft spinning frames.

13-0 MAINTENANCE

13-1 On the Blowing Room plant and on the Cards the maintenance was not satisfactory. On the Opening plant twelve months' running should be divided so that every machine has a major overhaul every four months, i.e. 3 times per year, whilst every two months all bearings, particularly ball bearings, are cleaned and repacked with grease. At the same time beater settings, etc. to be checked and re-set if necessary. Card maintenace is even more critical - the flexible clothing requires far more care and it is essential that the Grinders really do their work. I find the periods between grinding too long and in addition the work is not being done effectively.

13-2 Maintenance on Draw Frames, Speed frames and Ring frames is done at reasonable intervals, but such things as flyer straightening and resetting of spindles on Ring frames is not up to standard.

14-0 FUTURE DEVELOPMENT OF TEGAL MILL

14-1 Probably every technically-trained person who has been to Tegal has been of the opinion that very little can be done with the existing machinery and that the whole plant should be replaced with modern machines. I am of the same view and consider the whole spinning plant should be replaced within the next four years; therefore under this section my suggestions for such a programme will be made.

14-2 The buildings are in good condition and would readily lend themselves to the installation of an air-conditioning system. The ceiling would need to be under-drawn and a convenient position for this false ceiling would be at a height of approximately 4 metres from the floor level, which would leave part of the lower line of glass windows within the room. The sprinkler system which is now following the line of the roof would remain, but would require an additional system set so that the nozzles protrude through the ceiling to protect the plant and material.

14-2 Lighting which can now be considered as insufficient would need to be replaced, and this could be conveniently set flush or protruding from the ceiling, but should be set as to provide lint - free surfaces.

14-3 Trunking for air distribution would be above the ceiling, whilst the air diffusers protruded to the room below.

14-4 Some form of insulation would be necessary and this would be placed on top of the false ceiling.

14-5 It is suggested that the Blowing Room also be included in any plans for air-conditioning, as the correct conditioning of the raw stock before processing is of some importance.

14-7 The following conditions are those generally sought for in Cotton Spinning -

Blowing Room	50 to 55%	R.H.
Card "	50 to 55%	R.H.
Spinning "	55 to 65%	R.H.

14-8 With the present uncontrolled conditions, the raw stock and the yarn process have quite high variations in moisture content. These can result in weakness of the yarn, poor weavability and finally a failure in the processing department to obtain the correct cloth dimensions.

14-9 **Spinning Plant**

During the past few years the textile machinery manufactures have made considerable technical progress and can offer high production machines which, whilst requiring a minimum of operators, require high technical skills, both electrical and mechanical. On the other hand, they have also developed good plant of a conventional design which, whilst being capable of high productions, is also capable of giving very good level yarns and high regularity and quality. It is this latter type of plant on which Tegal should concentrate.

14-10 **Blowing Room**

The opening plant is out of date, particularly in the blending section and the Scutcher & Lap Forming section. Some machines, such as the Porcupine Openers and Hopper Feeders, could be retained, but the remainder are outdated and should be replaced. To give a composite plant, all would be replaced.

14-11 **Cards**

These are out of date production-wise, whilst the small patters Rolter Cards are in a poor condition. However, the Platt Cards, and some Ingolstadt, are capable of being converted to Semi High Production conditions. To do this the following would be necessary:

14-12 1. New wire on cylinders, doffer, flats and taker-ins of metallic or self-stripping flexible wire.

14-13 2. Dynamic balancing of Cylinder and Doffer.

14-14 3. Ball or Roller Rearing fitted to Cylinder, Doffer and Taker-In.

14-15 4. New Steel shafts to be fitted to cylinders.

14-16 5. Flat seating to be re-ground; flexible bends to be examined and re-ground if necessary.

14-17 6. New lightweight balanced doffer combs with ball bearing boxes. Alternatively, roller stripping for doffer web, or the Varga stripping system, including Cross Rolls.

14-18 7. New Coilers for 18, 20 or 24 inch diameter silver cans, 42 inches high.

14-19 8. New motor for increased speeds.

14-20 9. Fitting of slow doffer motion for piecing up, (incorporated in Varga system).

14-21 10. New undercasings (or existing, if in good condition) to be treated to give improved smooth surfaces.

14-22 11. Fitting of dust removel system to all cards, with a central station section and filtration plant.

14-23 Such conversion will enable productions of high quality silver at a rate of 12 to 13 kilos per hour, Varga system 16 to 17 kilos per hour.

14-24 At the list is long the work is costly, but no more than 40 Cards would be required - 32 Cards with the Varga system.

14-25 However, it will probably be found that the difference in the cost of converting 40 or 32 Cards is very little in difference to the cost of new High Production Cards, which are capable of productions in the region of 28 or more kilos per hour, requiring only 22 Cards to meet the present productions.

Draw Frames

14-26 Here machines are available with one delivery or two, running at speeds of up to 460 metres per minute on one delivery, or 250 metres per minute each delivery on two-delivery machines. To meet the production required only 12 first and 12 second passage deliveries would be necessary, i.e. 6 machines 1st passage and 6 machines 2nd passage.

Speed Frames

14-27 Again, one can only advise replacing the Slubbers and Intermediate frames with new machines. Very little progress has been made in this section by the machinery manufacturer, but it is the practice, by the use of high draft systems, to use only one passage of speed frame, i.e. can-fed intermediate machines. There are a number of refinements in the engineering, including improved flyers, easier doffing, single shaft bobbin and spindle drives, all of which add up to a more efficient productive machine, giving a good quality, regular and level roving.

Ring Frames

14-28 It is here that the maximum advantage can be gained over the existing plant. A ring frame of 1 3/4 inch diameter ring, with a 7 or 8 inch lift, would be capable of handling the full range of counts at a spindle speed of 10,500 rpm. to 13,500.

15-0 THE FOLLOWING SPINNING PRODUCTION PLANS ARE ENCLOSED

15-1 1. Production of the existing mill.
15-2 2. Modern plant showing an equal production to that of the existing mill but using only 50 ring frames against 91 at present.

15-3 1. Production of existing mill

This is 10260 kgs in 24 hours.
92 Cards are used
24 Draw frames
10 Slubbers (Platts double driven 12)
23 Intermediate frames
91 Ring frames

The total number of operatives are approximately 750.
End breaks on spinning frames are very high varying from 36 to 142 per 1000 spindle hours, this of course due to weak places & nep.

15-4 2. Modern plant same production as the present spin plan 10260 kgs in 24 hours.

22 High Production Cards
12 Draw Frames 2 passages 6 First passage, 6 Second passage
8 Speed Frames each 90 spindles
50 Ring Frames each 436 spindles.

Operatives could be out by 1/3 whilst the yarn would be of high quality, low end breaks good regularity & minimum of nep.

15-5 The above machine specifications are suggested as they will cover economically both semi automatic and automatic cone winding and yet are ideally suited for the Roto Coner type of winding.

15-6 The bay sizes in the mill will not allow machines of a maximum length of Ring frame. Generally the machinery manufacturer will allow a fifty feet length front roller, 1 3/4 inch ring will be on a 2 3/4 inch gauge 50 ft. is 200 spindles each side. Your bay width is 15.45 metres, i.e. 50 feet. Allowing 3 ft. "off end alley", 3 ft. headstock and Pneumafil box, comes down to a 44 ft. front roller. 192 spindles each side, 384 spindles per frame.

15-7 With a 2" inch diameter ring, the textile machinist will require a 3 inch gauge for the maximum speeds, so this would limit the frames to 352 spindles per frame. This would tend to rule out 2 inch ring as being uneconomical in comparison with the 1 3/4 inch ring.

16-0 JUSTIFICATION FOR NEW PLANT

16-1 To justify the replacement of the plant by new machines the following points are reiterated.

16-2 Although lap regularity is reasonably good, the Blending, Opening and Lapping is far from satisfactory. With Carding the whole plant is in very poor condition. Nearly all the Cards require the wire covering to be replaced within a short time. Many parts also require attention.

16-3 Draw frames are old and out of date and this also applies to Flyer and Ring Frames.

16-4 Yarn strength and regularity are very poor and detrimental to good weavability at the looms. Direct weft must be of good quality to be of any economical advantage.

16-5 Textile machinery manufacturers are no longer prepared to supply spare parts for old plant. In this respect difficulties can be expected to increase.

16-6 Plan 2 leaves a whole bay for the installation of Combing and extra spinning capacity.

16-7 Labour for plan 2 would be reduced by approximately 1/4 to 1/3.

17-0 PHASEING OF NEW PLANT

17-1 It is assumed that any new plant would still have Scutchers with lap ends. This, however, is not necessary as the system of direct feeding to Cards is well advanced technologically. The advantage of a lap end is that lap stocks can be used as a buffer in case of breakdowns, etc.

17-2 The method is important because if laps are to be used the present scutchers (Platts) may be fitted with automatic lap doffers and the scutcher fitted with Kirschner beaters. Blenders may be added to the feed end and in this way the Platt line could keep in production. The Reiter and Ingolstadt would require new scutchers and automatic lap ends.

17-3 Alternatively, if direct feed to the Cards, then it would probably be necessary to scrap all the Blowing Room plant, as the cotton must be in suitable condition for feeding through trunking and shutes. One would, in any case, advocate a complete new plant.

17-4 Changeover of plant in Carding is quite easy as one high production card requiring little more space than an ordinary card, thus quickly replacing a number of cards, making space available for further erection of new Draw frames, Speed frames and new Ring frames without loss of production.

17-5 This also applies to the Draw Frames, but in this area the phaseing out of old frames must be in line with phaseing out of old slubbers.

17-6 Slubbers and Inters will phase out with the Ring frames and to this end the following is suggested :

17-7 Phase 1. The removal of Howard & Bullough weft ring frames, followed by the Reiter weft ring frames, but the programmeing of this will depend on the purchase and erection of new Pirn Winding machines.

17-8 Phase 2. Reiter Warp spinning ring frames, followed by Howard & Bullough warp frames.

17-9 Phase 3. Ingolstadt weft spinning frames, followed by the Ingolstadt warp spinning frames.

17-10 Speed frames would keep pace in each phase, together with the draw frames.

17-11 Attention should be drawn to the extra space made available by the introduction of high production Cards and Draw Frames, and the possibility of introducing more capacity in machinery. New Ring frames will give additional production therefore it will be an advantage to re-equip this mill and at a latter date increase the number of frames to give additional production.

17-12 We would also urge the consideration of having a Technical and Training Department, as described earlier in this report.

18-0

18-1 I should like to express my appreciation of the assistance given to me at Textile Texin by Mr. T.S. Hadibowo, Jr., Mr. Mukri, Spinning Dept., Chief Technician, Mr. Kashir from the Preparation Department, who acted as my counterpart at the plant, and to Mr. Liek Suparii, of the Institute of Textile Technology, my personal counterpart.

Appendix 1

19-0 LIST OF EXISTING PLANT

19-1 Blowing Room Plant

Consists of two lines of production

1. Manufactured by Reiter 1938 and additional machines manufactured by Ingolstadt 1952.

   a. 18 ft. Feed Lattice (to Bale Breaker)
   b. Bale Breaker.
   c. Hopper Feeder
   d. Porcupine Cylinder Opener
   e. Vertical Stack Beater
   f. Crighton Opener - not connected
   g. Two way Distributor to : - Scutcher Lines.

Reiter Line

h. Hopper Feeder
i. Two-bladed Beater
j. Three-bladed Kirschner
   Lap end.

Ingolstadt Line

h. 1st Hopper Feeder
i. 2nd Hopper Feeder
j. Three-bladed Beater
k. Three-bladed Kirschner
   Beater Lap End

19-2 2. Manufactured by Platt Bros. 1941.

   a. 18 ft. Feed Lattice (to Bale Breaker).
   b. Bale Beater.
   c. Porcupine Beater.
   d. Two Crighton Openers (not in use).
   e. Triple Opener manufactured by Howard & Bullough Ltd., 1941, and consisting of :
      Two 24 inch diameter Striker Cylinders;
      One 18 inch three-bladed beater.
   f. Two-way Distributor feeding two scutcher lines, each consisting of :
   g. Hopper Feeder
   h. Three-bladed beater.
   Lap end.

19-3 Also in the room - One Rowing Waste Opener (Reiter, 1938); Shirley Institute Breaker and cage manufactured by Howard & Bullough 1941. The purpose of this machine is to break into fibres ring frame under clearer waste.

Card Room

19-4 **Card machines**

29 Cards manufactured by Reiter 1939/40. Small pattern having 82 flats.
Silver Can size 10 inch diameter x 36 inches high.
30 Cards manufactured by Ingolstadt 1952. Standard size having 108 flats.
Silver Can size 10 inch diameter x 36 inches high.
41 Cards manufactured by Platt Bros 1941. Standard size having 106 flats.
Silver Can Size 10 inch diameter x 36 inches high.

19-5 **Drawing Frames**

19-6 Reiter 1938 -

6 machines 1st passage, each having 5 deliveries, 6 slivers per delivery.
6 machines 2nd passage, each having 5 deliveries, 6 slivers per delivery.
Sliver can size 10 inch diameter x 36 inches high.
Drafting system 4 rollers over 4 rollers in three zones.
Electric stop motion on broken sliver or roller lap.

19-7 Ingolstadt 1952 -

2 machines 1st passage, each having 5 deliveries, 6 slivers per delivery.
2 machines 2nd passage, each having 5 deliveries, 6 slivers per delivery.
Sliver can size 10 inch diameter x 36 inches high.
Drafting System 4 rollers over 4 rollers in three zones.
Electric stop motion on broken sliver or roller lap.

19-8 Howard & Bullough 1941 -

4 machines 1st passage, each having 2 x 4 = 8 deliveries.
4 machines 2nd p sage, each having 2 x 4 = 8 deliveries.
6 slivers fed to each delivery.
Sliver can size 10 inch diameter x 36 inches high.
Drafting system 4 rollers over 4 rollers in three zones.
Electric stop motion on broken 4 sliver or roller lap.

19-9 **Flyer Frames**

19-10 **Slubbers**

19-11 Reiter 1938/40.

6 machines each of 60 spindles, gauge 4 spindles in 19 1/8" (9 1/2")
Bobbin size 10 inch lift 6 inch diameter
3 over 3 roller drafting.

19-12 Ingolstadt 1952.

3 machines each of 60 spindles, gauge 4 spindles in 20 1/2" (10 1/4")
Bobbin size 10 inch lift 6 inch diameter.
3 over 3 roller drafting.

19-13 Howard & Bullough 1941.

4 machines set in 2 double drive each 50 spindles. 2 x 2 x 50 = Total 200 spindles.
Gauge 4 spindles in 17 3/8" (8 5/8")
3 over 3 roller drafting.

19-14 Intermediate Frames

19-15 Reiter 1939.

12 machines each 126 spindles, gauge 6 spindles in 19 1/2" (6 3/8").
10 inch lift x 4 3/4 inch diameter.
4 over 4 roller drafting in 3 zones.

19-16 Ingolstadt 1952.

5 machines each 126 spindles, gauge 6 spindles in 18 7/8" (6 3/8").
10 inch lift 4 3/4 inch diameter.
4 over 4 roller drafting in 3 zones.

19-17 Howard & Bullough 1941.

6 machines each 142 spindles, gauge 6 spindles in 19 1/2" (6 3/8").
10 inch lift 4 3/4 inch diameter.
4 over 4 roller drafting in 3 zones.

19-18 Ring Spinning Frames

19-19 Weft Spinning

19-20 Reiter 1939 - 6 machines — Fixed speed motors
1940 - 10 machines — Variable speed motors.

Each having 444 spindles, 6 inch lift 1 1/4" (32 mm) ring dia.
2 1/4 gauge.
Tape spindle drive, Le-blan Roth single apron drafting system, back top roller self weighted, 1st and middle top rollers "dead" weighted, pencil roller on nose of apron. Plain spindle inserts.

19-21 Ingolstadt 1952.

12 machines, each having variables speed motors, 444 spindles, 6 inch lift 32 mm. ring (1 1/4") dia. ring. Gauge 60 mm. (2.38"). Tape spindle drive, ball bearing inserts to spindles, Le-blan Roth single apron drafting, Back top roller self weighted, 1st and middle top roller "dead" weighted, pencil roller on nose of apron. Pneumafil broken end thread extraction.

19-22 Howard & Bullough 1941. Fixed Speed Motors.

11 machines each with 444 spindles, 6 inch lift, 32 mm. (1 1/4") diameter ring, 2 1/4" gauge. Spindle tape driver plain inserts to spindle base.
4 over 4 roller drafting system, front roller "dead" weighted, other lines self weighted.

19-23 Warp Spinning

19-24 Reiter 1939/40. Variable Speed Motors.

15 machines each with 400 spindles, 6 inch lift 38 mm (1 1/2") dia. ring, gauge 64 mm. (2 1/2"). Tape spindle drive, Le-blan Roth single apron drafting, self weighted top back roller, "dead" weighted 1st and middle top roller, pencil roller on nose of apron.

19-25 Ingolstadt 1952. Variable Speed Motors.

22 machines each with 364 spindles, 7 inch lift, 44 mm. (1 3/4") rings, tape spindle drive, ball bearing inserts to spindles, Le-blan Roth single apron drafting, back top roller self weighted, 1st and middle rollers "dead" weighted, pencil roller on nose of apron. Pneumafil broken end thread extraction.

19-26 Howard & Bullough 1941. Fixed Speed Motors.

8 machines each with 364 spindles, 7 inch lift, 1 3/4" ring, 2 3/4" gauge.
7 machines each with 400 spindles, 6 inch lift, 1 1/2 inch dia. ring, gauge 2 1/2".
All having tape drive spindles, plain inserts, SKF top arm weighted, single apron drafting.

19-27. Ring Doubling Frames

Ingolstadt 1952. Variable Speed Motors.

6 machines for dry doubling. 8 1/2 inch lift, 54 mm. dia. rings, 90 mm. gauge, single roller delivery, four deck creel. Tape spindle drive, roller bearing spindle inserts.

APPENDIX 2

PLAN

SPIN PLAN OF EXISTING PLA

For TEXIN TEGAL

Machines	Hank Roving or Count	Ends into One	Draft	Front Roller or Spindle Speed	Twist Multi-plier	Turns per inch	% Waste Allowance
Finishing Scutchers							
Carding Enginees	0.12						5
1st Pas. Draw Frame Reiter	0.12	6		320 rpm			1
Ingolstadt				350 rpm			
H & B				360 rpm			
2nd Pas. Draw Frame	0.12	6					
Slubber Reiter	0.6	1	5.0	570 rpm	0.95	0.736	1
Slubber H & B	0.6	1	5.0	640 rpm	0.95	0.736	1
Slubber Ingolstadt	0.55	1	4.6	600 rpm	0.95	0.705	1
Speed Intermediate Reiter	1.9	2	6.35	800 rpm	1.05	1.446	½
Speed Intermediate H & B	1.75	2	5.58	830 rpm	1.05	1.32	½
Speed Intermediate Ingolstadt	1.25	2	4.55	800 rpm	1.05	1.173	½
Ring Spinning Frames Warp Reiter	40	1	21	9800	3.42	22.2	1
Ring Spinning Frames H & B	32	1	18.3	9600	4.1	23.2	1
Ring Spinning Frames Ingolstadt	20	1	16.0	9700	4.3	19.2	1
Ring Spinning Frames Weft Reiter & Ingolstadt	32	1	18.3	9800	3.55	20.1	1
Ring Doubling Frames H & B	20	1	16.0	8600	3.6	16.1	1

SECTION 1

PLAN 1

ISTING PLANT PRODUCTION

Date 20 - 3 - 1972
Total Rings Spindles 37,456
Total production 10,260 Kgs. 24 Hrs.

Waste Allowance	Weight in Process Per 8 hrs.lbs	Production per machine Delivery or Spdl per 8hrs Hks.	Lbs.	Calculated Machine Efficiency %	Calculated Number of Machines Deliveries or Spindles	Quantity and Particulars of Machines Proposed.	
					4 finishing scutcher		
5					92		
1	3390 3904 1050	13.6 14.7 12.6	113 122 105	70 70 70	6 x 5 deliveries 2 x 5 deliveries 4 x 8 deliveries	11,730 kgs/ 24 hrs.	
	ditto	ditto	ditto				
					Spindle Frames	Total Spindles	
1	3700	7.5	12.5	65	60 x 5	300	
1	3700	9.0	15.0	65	50 x 4	200	
1	3200	8.8	16	65	60 x 3	180	
½		6.25		60	126 x 12	1512	
½		7.0		60	142 x 6	852	
½		7.55		60	126 x 5	630	
1	394	5.95	0.149	85	400 x 15	6000	kgs.24 hrs. 1220
1	936	5.26	0.164	80	364 x 8 400 x 7	2912 2800	1230
1	2640	6.6	0.33	80	364 x 22	8008	3500
1	1802	4.65	0.145	60	444 x 16 444 x 12	7104 5348	2460
1	1245	5.1	0.255	60	444 x 11	4884	1700

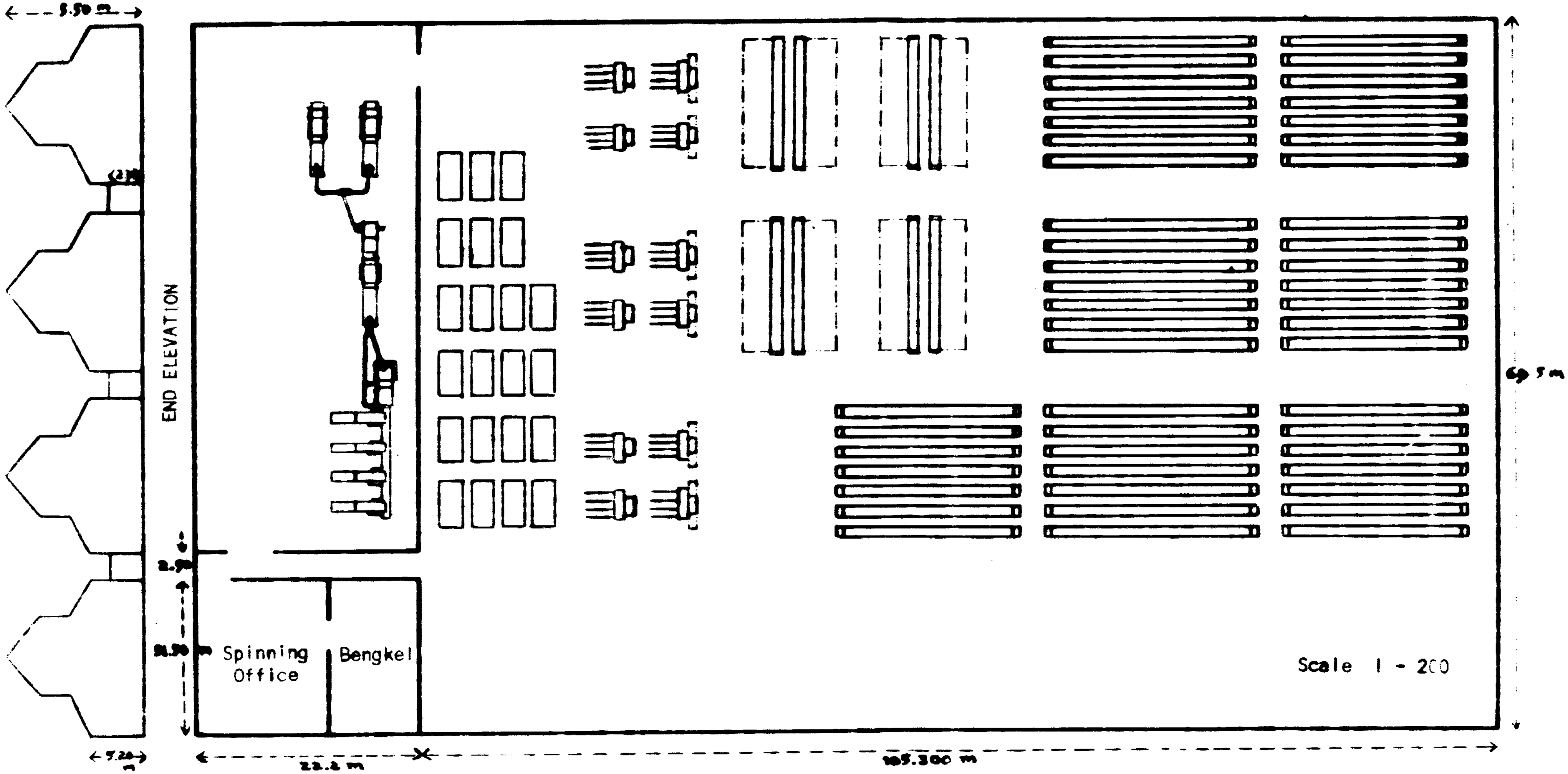
10260 kgs.24 hrs.

SECTION 2

APPENDIX 3

SUGGEST MACHINERY LAY OUT PLAN "TEXIN", TEGAL

See Plan 2



Area for air conditioning - 6,566 sq.m
Spinning Dept. - 5,423 sq.m
Blowing room - 1,143 sq.m

21,800 Ring Spindles -
50 Frames each 436 spindles.

APPENDIX 4 PLAN 2

A SPIN PLAN FOR THE RECOMMENDATION OF 21,800 SP
50 RING FRAMES EACH WITH 436 SPINDLES
TO GIVE THE SAME PRODUCTION AS THE EXISTING

For : TEXIN TEGAL

MACHINES	Hank Roving or Count	Ends into One	Draft	Front Roller or Spindle Speed	Twist Multi-plier	Turns per inch	% Waste Allowance	Weigh in Proce Per 8 (Lbs)
Finisher Scutchers	15 ozs/yd 465 gramms per meter.							36 (79
Carding Engines	0.14	1		40 rpm Doffer			3	34 (7
1st Pas. Draw Frame								
2nd Pas. Draw Frame								
Lap Former								
Comber								
Drawing Frames 1st Passage	0.14			200 meters per min, 720 ft.			½	34 (71
Drawing Frames 2nd Passage	0.14			200 meters per min. 720 ft.			½	34 (71
High Draft Speed Frame	1.1	1		1200	1.2	1.25	1	16 (35
High Draft Speed Frame	0.9	1		900	0.95	0.85	1	18 (39
Ring Spinning Frames	40s			13500	4.1	26.0	1	3 (8.
Ring Spinning Frames	32s			13500	4.0	22.6	1	(26 12
Ring Spinning Frames	20s			12500	4.0	17.9	1	(39. 17
Ring Spinning Frames								
Ring Doubling Frames								
Ring Doubling Frames								

SECTION 1

COMMENDATION OF 21,800 SPINDLES
EACH WITH 436 SPINDLES
DUCTION AS THE EXISTING PLANT.

Date

...	Turns per inch	% Waste Allowance	Weight in Process Per 8Hrs. (Lbs) kgs.	Production per Machine Delivery or Spdl. per 8Hrs. Hks	Lbs	Calculated Machine Efficiency %	Calculated Number of Machines Delivery or Spindles	Quantity and Particulars of Machines
			3600 (7920)			90	2 Scutchers 1 Opening Line	
		3	3480 (7656)		360	90	22 Cards. Single Delivery	22 High Prod. Cards.
		½	3480 (7120)	99.0	708	80	6 Machines each 2 deliveries	High Prod. 12 deliveries Cans 18"x 42
		½	3440 (7100)	99.0	708	80	6 Machines each 2 deliveries	High Prod. 12 Deliveries Cans 18"x 42
	1.25	1	1600 (3510)	11.45	10.4	75	4 Frames each 90 Spindles	10 inch lift 5½" bobbin dia.
	0.85	1	1800 (3960)	11.85	13.2	70	4 Frames each 90 Spindles	10 inch lift 5½" bobbin dia.
	26.0	1	377 (828)	7.6	0.19	92	10 Frames each 436 Spindles	1¾" dia.Ring 2¾" Gauge 7" lift.
	22.6	1	(2650) 1205	8.7	0.272	92	22 Frames each 436 Spindles	1¾" dia.Ring 2¾" Gauge 7" lift.
	17.9	1	(3920) 1780	10.45	0.5	90	18 Frames each 436 Spindles	1¾" dia.Ring 2¾" Gauge 7" lift.

SECTION 2

WEAVING

1. INTRODUCTION

This is the summary of the mill condition before and now, my performance, programme and prospect of the future.

2. DATE & PERIODS OF MY FIELD OPERATION

I arrived in Indonesia on December 3, 1971 from Japan via Vienna, and visited this mill on the following days.

(1)	23, December, 1971	-	1 day
(2)	17 - 21, January, 1972	-	5 days
(3)	1 - 5, March, 1972	-	5 days
(4)	30 April & 1 May 1972	-	2 days
	Total		13 days.

3. GENERAL CONDITION OF THE MILL

3-1 History of the Mill

It was established by some Dutch families as a private textile mill before the Independence, and now it is under "Pinda Sandang Djateng" - the Provincial Government Textile Industry Corporation of Central Java.

3-2 Type of the Mill

It is one of the biggest integrated mill in Indonesia consisted of spinning, weaving and finishing. The spinning mill has total 37,056 spindles and produces the raw yarn 20s - 40s for the weaving and the yarn for market, the weaving mill has at present 1,254 looms installed and produces the raw cloth for the finishing mill, and the finishing mill has bleaching, dyeing & printing processes.

3-3 Financial Condition offthe mill

The profit during last one year is Rp. 97,533,621 ($235,027) and this is equivalent to 6.8% of total cost Rp. 1,015,496,930. This mill is not operated by self-profit system, but under the budget control of the Provincial Government, they cannot freely utilize this profit for their reinvestment to this mill.

4. WEATHER CONDITION, ACCOMMODATION & MACHINERY OF WEAVING

4-1 Weather Condition for Weaving

Averagely speaking, this location of the seaside town in Central Java is not so bad for weaving - the temperature is never low and the humiditt is not so much insufficient, which varies from about 55% in the dry season up to 85% in the rainy season. But the fluctuation of humidity during one day and one year is not so small that the air conditioning system is advisable with construction of lower ceiling.

4-2 Site & Building

It is situated in Tegal, Central Java and a little distant from Java Sea, surrounded with vast rice field and has much sufficient space for extension of the building.

The building is of simple tropical construction without air conditioning system and has very high roof with side ventilation /holes through which outside air comes very freely into the mill.

4-3 Machinery for Process

4-3-1 Cheese Winding Machine

(1) Leesona Rote-Coner, 1949 - 1951 (6" Traverse, 750 yds/m)

100 drum /s x 4 sets = 400 drum

This has stop motion, slit gauge & bobbin conveyer etc., but the maintenance was not so sufficient that some of the stop motion were not operated and almost all slit gauge were not adjustable due to the rust when I visited this mill at first.
The spindle bearings on the cradle are all worn away and the horizontal vibration can be seen very much to cause the run-out cheese in the next process.

(2) Franz Müller Cone Winder, 1938 & 1951 (4 1/2" & 4 3/4" Traverse, 350 - 600 yds/m).

100 d/s	x	4 sets	=	400 d
50 d/s	x	1 set	=	50 d
Total				450 d.

This has no stop motion, no adjustable slit gauge at present, the vibration of winding cheese is very much - very obsolete.
Abolition and replacement rather than partial modernization is much desirable.

(3) Franz Müller QT Type Cone Winder, 1936 (4 1/2" Traverse, 135 - 235 yds/m).

100 d/s x 1 set = 100 d

The condition is just the same as the above paragraph (2).

4-3-2 Pirn Winding Machine

Murata Automatic Pirn Winder, Type No. 100, 1970 (2" Traverse, 4,500 r/m).

4 spl/s x 25 sets = 100 spl.

Good condition.

4-3-3 Warping Machine

(1) Schlafhorst Drum Driving Warper, 1936 & 1952.

No. of Set	:	Four
Drum	:	21 1/2" d x 54"
Beam	:	24" d x 54"
Yarn Speed	:	250 - 400 yds/m
Creel Stand	:	Magazine Creel Type, 560 peg x 2
Stop Motion	:	Electric type, Detectors are on the Creel Bars.
Brake System	:	Abrasion Steel Band on the Beam Sides
Rewinding System	:	None

Normal condition.

(2) Schlafhorst Direct Driving Warper Type EZD, 1957.

No. of Set	:	Two
Drum (For Diameter Feeling)	:	20 1/4" d x 54"
Beam	:	24" d x 54"
Yarn Speed	:	300 - 1,200 yds/m
Creel Stand	:	the same as (1)
Stop Motion	:	Not equipped
Brake System	:	Hydraulic direct system
Rewinding System	:	None

Except stop motion, condition is normal.

4-3-4 Size Mixing Equipment

(1) Kanemaru New System.

Small Cistern (for PVA & Fat)	-	One
Big Cistern	-	Two
Automatic High Pressure Cooker	-	One
Feed Tank	-	One
Automatic Control Panel	-	One

Normal condition.

(2) Old System.

Wooden Cistern	-	Two
Wooden Feed Tank	-	Two

Very obsolete.

4-3-5 Sizing Machine

(1) Sucker Hot Air Type Sizer, 1936, 1938, 1951

No. of Set	:	Four
Warper's Beam Stand	:	Passive Letting - off
Size Feed & Boiling System	:	Cavity Box Type
Immersion Roll	:	One

Squeezing Roll : Two Pairs - Copper & Flannel, Dead Weight System
Temperature Regulation
for Size Liquid : Unautomatic
Drying Chamber : Hot Air Type
Yarn Speed Change
System : P.I.V (1936, 1951)
Cone Drum (1938)
Max. Yarn Speed : 60 yds/m.

The gear pump for cavity boxes is now all broken, the size liquid is poured directly into size box. This gear pump should be repaired.
The automatic controller for the moisture content of sized yarn is recommendable.

(2) Hibbert Hot Air Type Sizer, 1941.

No. of Set : One
Almost same as (1).

(3) Kanemaru Unit Heater Type Sizer, 1971.

No. of Set : One
Warper's Beam Stand : Passive Letting-off
Size Feed & Boiling
System : Cavity Box Type
Pre-Moisturing Roll : One Pair of Rubber-Covered Rolls.
Immersion Roll : One Stainless Steel Roll
Squeezing Roll : Two Pairs (Upper Rolls are Rubber-Covered).
Temperature Regulation
for Size Liquid : Automatic
Drying Chamber : Unit Diagonal Heater Type
Yarn Speed Change
System : DS Moter
Max. Yarn Speed : 120 yds/m

The mechanical condition is very new and good.

4-3-6 R.I.M. & W.T.M.

(1) R.I.M.

They have no Reaching-in Machine, but 25 Nos. of primitive wooden Reaching Frames for helper.

(2) W.T.M., Uster "Knotex"

The maintenance is not so sufficient that we can see many miss-knotting, especially double knot.

4-3-7 Loom

(1) Toyoda G III Automatic Shuttle Change Type, 56" R/S, 1970

No. of Loom	: 120 sets
Shuttle Box	: I x I
Picking Motion	: Side Lever System, Under Pick Type
Letting-off Motion	: Positive
W.S.M.	: 6 line , Mechanical
Weft Fork	: Mechanical
Weft Feeler	: Mechanical
Beam Flange Diameter	: 20"
Present Speed	: 165 r/m
Kind of Cloth at Present	: 42" Width Shirting

This is universal for light, medium & heavy cloth. All of them are in good condition.

(2) Suzuki Ordinary Loom, 50" R/S, 1936 - 1961

No. of Loom	: 840 sets
Shuttle Box	: I x I
Picking Motion	: Side Lever System, Under Pick Type
Letting-off Motion	: Positive
W.S.M.	: 4 line, Mechanical
Weft Fork	: Mechanical
Present Speed	: 160 r/m
Kind of Cloth Produced at Present	: 42" Width Shirting

The maintenance condition at present is rather poor, but these looms are never obsolete, all of them are being operated now.

(3) TEXIN-Made Ordinary Loom, 50" R/S, 1964 - 1966

No. of Loom	: 64 sets
Shuttle Box	: I x I
Picking Motion	: Side Lever System, Under Pick Type
Letting-off Motion	: Negative
W.S.M.	: None
Weft Fork	: Mechanical
Present Speed	: 150 r/m
Kind of Cloth Produced at Present	: 36" Width T-Cloth & Shirting

The maintenance condition at present is almost the same as the above paragraph (2).

(4) Suzuki Ordinary Loom, 70" R/S, 1940

No. of Loom	: 230 sets
Shuttle Box	: I x I
Picking Motion	: Side Lever System, Under Pick Type
Letting-off Motion	: Negative
W.S.M.	: None

Weft Fork : Mechanical
Present Speed : 120 r/m
Kind of Cloth Produced at Present : 63" T-Cloth.

All of them are now in very poor conditions, but they can use them for more long years if they maintain them more carefully and with supply of sufficient spare parts.
76 looms are now stopped due to the spare parts shortage.

4-3-8 Cloth Inspecting Equipment

25 Sets of inclined table with feeding & rolling device without transparent lightning glass for cloth inspection.

4-4 Testing Apparatus, Workshop, Boiler & Generator

4-4-1 Testing Apparatus

Ordinary and old-type sets of single yarn tester, twist counter etc., without sizing material testing apparatus nor abrasion tester for raw & sized yarn.

4-4-2 Workshop for Weaving

Drilling M/C	one
Grinder	one
Primitive Lathe	one
Furnace	one
Vise	three

Almost all of them are obsolete, replacement by new equipments are necessary.

4-4-3 Boiler

(1) German-made Automatic Pakcage Boiler one
12 t/H

(2) Indonesian-made Ordinary Type Boiler one
21 t/H

Seemed in good condition.

4-4-4 Generator

(1) HEEMAF, Germany three
1,300 KVA

(2) HEEMAF, Germany two
600 KVA

Seemed in good condition.

5. RAW YARN

All of the raw yarn for weaving are produced in this spinning mill and brought into the weaving department in the state of warp and weft bobbin.

The quality of this raw yarn cannot be said good at present.

The mechanical factors of yarn, for example, the breaking strength & elongation of single yarn is rather normal, but the appearance is very inferior - uneven (cf. Uster U% for 20^s is 18.9, and for 32^s is 22.6 and especially very nappy).

Because of this much nap, the sizing process needs to be more improved in such a way that the covering of yarn is completely done more than usual.

The yarn p roduced by Tjilatjap Spinning Mill, which is one of the best quality in Indonesia, is going to be woven in this TEXIN weaving for comparison of the productivity.

6. WEAVING PRODUCTION

Generally speaking, when we want to know the change of weaving productivity, we need to grasp the amount of production per one actual operated loom, taking the cloth kind into consideration.

These 'actual operated looms' are the number of looms which can be got by subtracting the stopped looms due to the marketing situation and planned overhaul, etc. from the total number of installed looms.

Actually, in this mill when the yarn price is high, the Head Office instructs frequently to sell the yarn directly without weaving, for this reason sometimes many looms are stopped intentionally.
We cannot understand the trend of weaving efficiency unless we consider this fact.

But, so far in this mill they have not recorded precisely the number of stopped looms due to the reason above mentioned, I cannot know the productivity per one actual operated loom, but only know simply the total produced yards and picks of each kind cloth in the past time.

The last three years productions are shown in the next table.

Item / Year	Annual Total		Monthly (Av./Total)	
	Yards	1,000 Picks	Yards	1,000 Picks
1969	12,235,994	25,967,463	1,019,666 (100)	2,163,955 (100)
1970	12,484,529	27,386,680	1,040,794 (102)	2,282,223 (105)
1971	12,818,203	29,089,369	1,068,183 (105)	2,424,114 (112)

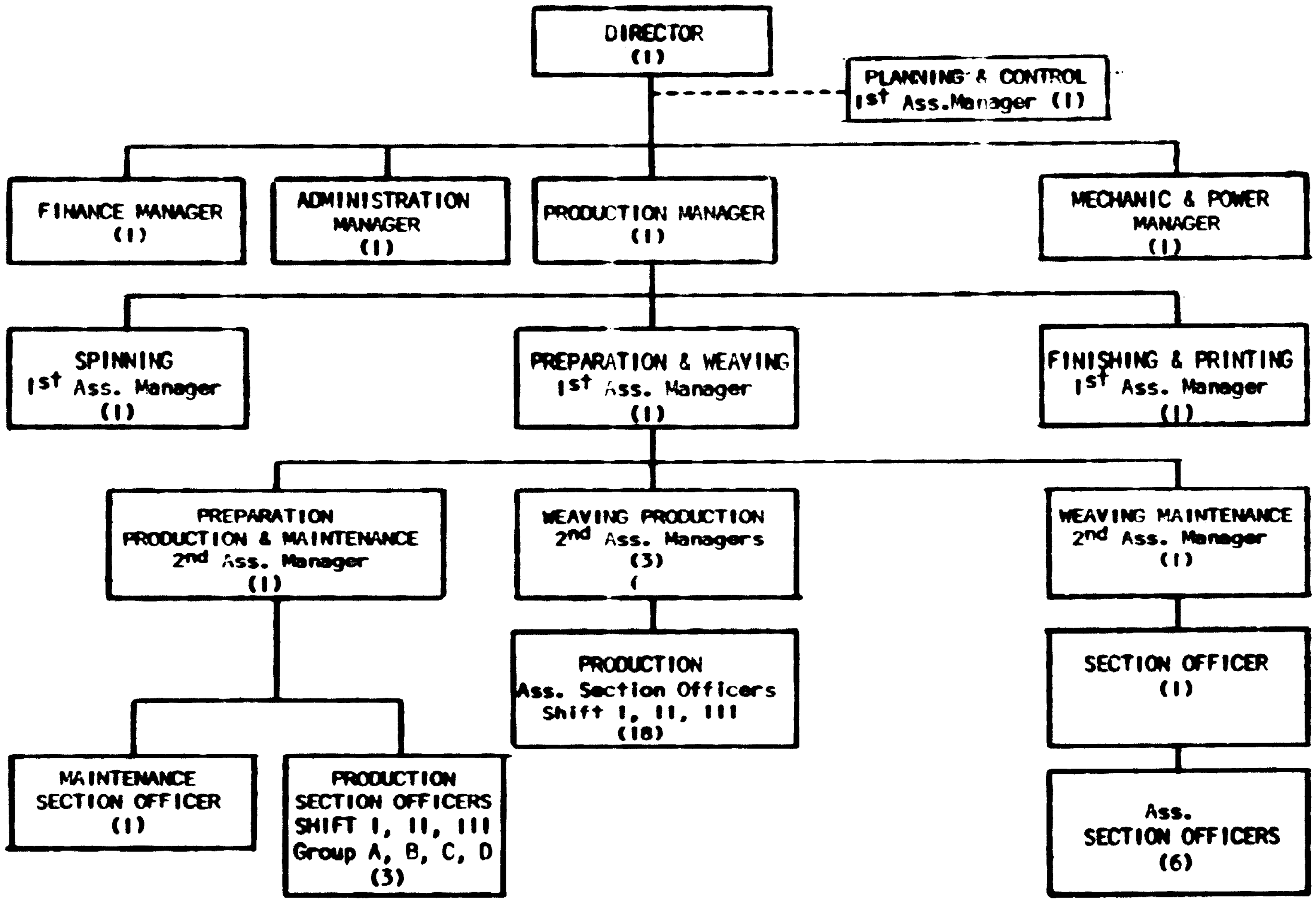
The three months production in this year are shown comparing with the same months of last three years in the next table.

Month & Year		Yards (Item)	1,000 Picks (Item)
1969	January	1,191,581 (100)	2,512,959 (100)
	February	1,011,694 (100)	2,260,160 (100)
	March	1,055,255 (100)	2,353,715 (100)
1970	January	1,070,672 (90)	2,264,910 (90)
	February	823,538 (82)	1,742,993 (77)
	March	1,133,787 (107)	2,399,311 (102)
1971	January	1,237,693 (103)	2,763,897 (110)
	February	1,091,024 (108)	2,570,563 (114)
	March	1,362,337 (129)	3,045,416 (129)
1972	January	916,495 (77)	2,058,016 (82)
	February	975,868 (97)	2,193,017 (97)
	March	1,266,505 (120)	2,826,246 (120)

In the former table, we can see the annual productions have been increased during these three years (in yards 5% and in picks 12%), but the reason for this fact cannot be clearly understood whether due to the technological improvement or due to the increase of operating looms under the changing marketing condition and spare parts shortage, etc.

In the latter table, we can see the big fluctuation of production between the same months during these four years, and, just the same as the former table, we cannot understand the real reason of this variance.

7. GENERAL POST ORGANIZATION



8. PERSONAL ORGANIZATION IN WEAVING

8-1 Production

8-1-1 Preparatory production

Function		Number of Person
Second Ass. Manager		1
Production Section Officer		3 (1 x 3 shifts)
Foreman	Winding	4 (1 x 4 Groups)
	Warping & Sizing	3 (1 x 3 shifts)
	Drawing	1
	Total	8
Operator	Winding	264 (66 x 4 Groups)
	Pirn Winding	29
	Warping	36 (12 x 3 shifts)
	Sizing	36 (12 x 3 shifts)
	Drawing-In	66
	W.T.M.	11
	Total	431
Others	Cleaner	4 (1 x 4 Groups)
	Oiler	4 (1 x 4 Groups)
	Doffer	12 (3 x 4 Groups)
	Bobbin Cleaner	16 (4 x 4 Groups)
	Weft Mislaid Opener	47
	Scale Man	4 (1 x 4 Groups)
	Service	15
	Total	102
	Total	545

8-1-2 Weaving Production

Function		Number of Person
Ass. Manager for Preparation & Weaving		1
Second Ass. Manager		3 (1 x 3 shifts)
Ass. Section Officer		18 (6 x 3 shifts)
Administration		9 (3 x 3 shifts)
Foreman		78 (26 x 3 shifts)
Operator	Piece Rate Wage	631
	Monthly Salary	35
	Fellow	13
	Reserved	7
	Total	686
Total		795

8-2 Maintenance

8-2-1 Preparatory Maintenance

Function	Number of Person
Maintenance Section Officer	1
Mechanic	24
Total	25

8-2-2 Weaving Maintenance

Function		Number of Person
Second Ass. Manager		1
Section Officer		1
Ass. Section Officer		6
Administration		5
Mechanic		27
Shuttle Maintenance		6
Oiler		8
Fellow		10
Peon		1
Cleaner	Room	4
	Lamp	4
	Fan	5
	Lavatory	1
	Total	14
Total		80

8-3 Total Personnel

Function		Number of Person	%
Production	Preparatory	545	38
	Weaving	795	55
	Total	1,340	93
Maintenance	Preparatory	25	1.5
	Weaving	80	5.5
	Total	105	7
Grand Total		1,445	100

9. BOTTLE-NECK OF LOW PRODUCTIVITY, INFERIOR QUALITY & HIGH COST

When I visited this mill for the first time on December 23, 1971, the weaving efficiency was only 52% in Toyoda G III 56" R/s shuttle change Automaticlooms (1970), and 54% in Suzuki & Texin Made Ordinary Looms (1936 - 1966), however one weaver operated only 2 - 6 looms.
In weaving mills, generally speaking, if the productive efficiency is low, the quality of cloth is naturally very inferior at the same time, and the production cost is reversely very high.
As a matter of fact, the cloth quality was then very inferior, and numbers of workers were too many, causing the cost to be very high.
I checked all of the raw yarn, production process of preparation and weaving condition of warp beam & weft pirn, training situation of worker and mechanical condition of all machineries. Then I found that all of these factors are very inferior and full of defects and results.
Also I discussed the technological problems on the spot with production managers and understood that they are well educated in their universities & institutes, etc., but they had no opportunity to be systematically trained on the spot, so they have not sufficient practical knowledge and experience.

10. MY SOLUTION WAY FOR BOTTLE-NECK, ACTIVITY & EFFECT

10-1 Solution way

As above mentioned already in the previous chapter, I felt at first the necessity of making the production managers to understand the unseparability of improvements of both the production quality and the productive efficiency in the weaving industry, and I discussed with them and explained this matter very minutely. Then I went into the mill accompanying them to point out the problems and explain how to solve these one.
I told and promised them that if you are very cooperative with me and follow all of my suggestions, you can definitely raise your productivity and, at the same time, improve your quality to very much extent without spending any money.
Also I explained that actually at present you have so much to do in your present condition and with your present machinery and accomodation without buying new ones, you can do and have to do them in this way.
The solution way is very simple and it is never complicated, only to train the workers, to maintain and adjust the machinery and finally to get the superior warp beams and weft pirns that is all, nothing else at present stage.

10-2 My activity

I visited this mill totally four times and surveyed the various conditions, demonstrated how to do, trained them.
I believed it very necessary & important to give the form of written document as soon as possible for each of my visit,

otherwise, due to the difference and difficulty of language, sometimes they cannot understand my suggestions and discussions, etc., and I gave them already two times - first, total pages of 18, and second 22 pages one, they have appreciated them very much and now they are following them very willingly and pleasantly.

10-3 Effects of My Activity

The weaving efficiency has been raised since my first visit to this mill in January 1972, but as mentioned already in chapter 6, the real productivity per one actual operated loom cannot be calculated due to the lack of data & records in this mill.

However, there are two weaving sections in this mill -- one consists of newly installed Toyoda Shuttle Change Automatic Looms (120 looms) and the other of old ordinary looms (1,134 looms).

The former Toyoda Looms are so new and automatic that they want and try to operate them as many and long as possible under any kind of marketing condition.

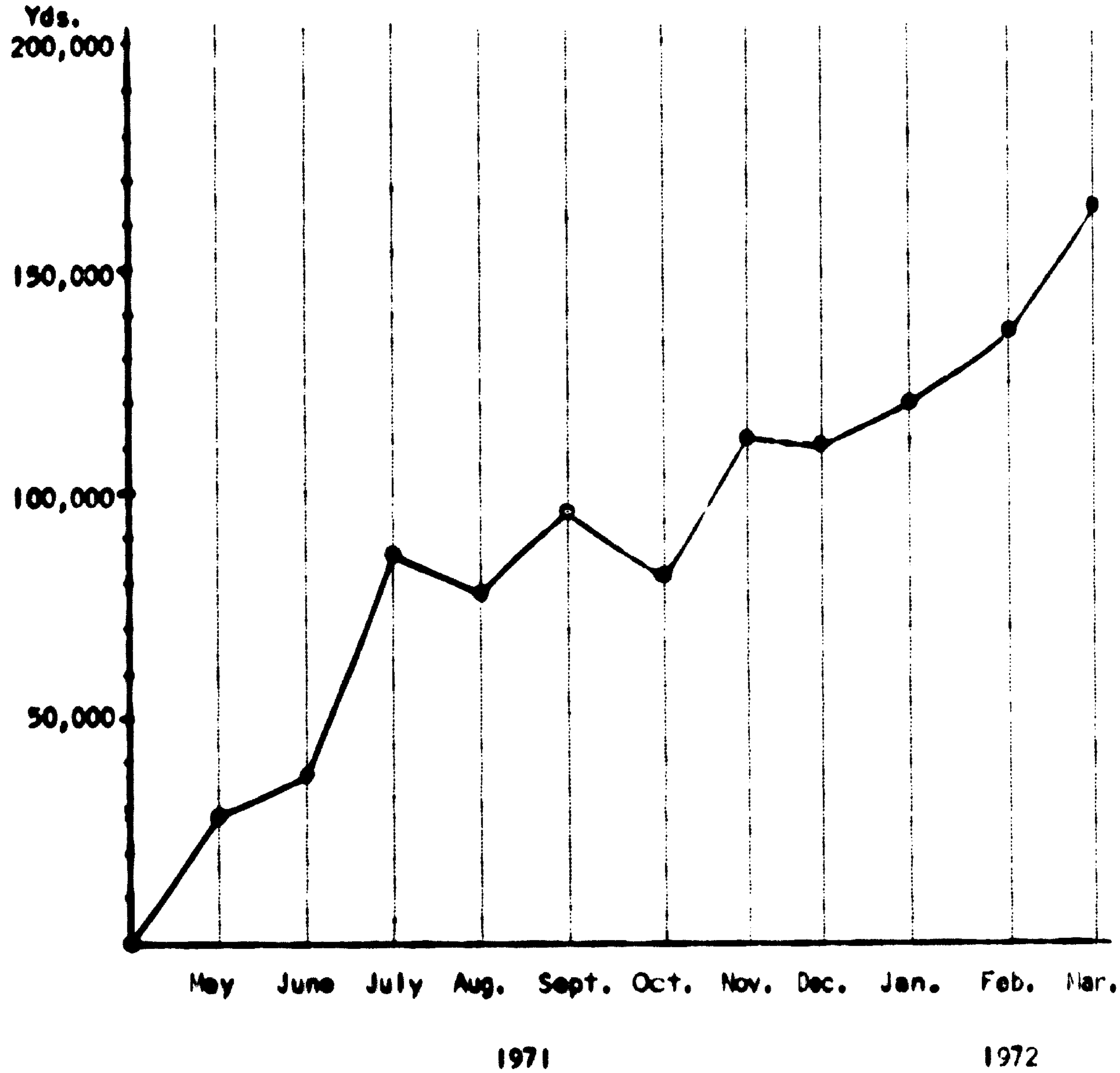
For this reason, if we separate the productions into the two ways (one for Toyoda and the other for old ordinary looms), we can grasp the real trend of productivity being undisturbed by the factor of marketing, etc.

The next table shows these two productions.

Year \ Month \ Item		Toyoda Looms		Other Looms		Total	
		Yards	1,000Picks	Yards	1,000 Picks	Yards	1,000 Picks
1971	May	28,596	72,062	1,136,330	2,533,201	1,164,926	2,605,263
	Jun.	37,089	93,464	1,080,981	2,413,353	1,118,070	2,506,817
	Jul.	86,129	217,045	1,121,440	2,523,180	1,207,569	2,740,225
	Aug.	78,703	198,329	876,722	2,010,303	955,425	2,208,632
	Sept.	95,927	241,736	859,498	1,944,742	955,425	2,186,478
	Oct.	81,683	205,841	591,853	1,338,949	673,536	1,544,790
	Nov.	102,758	258,948	802,536	1,758,603	905,294	2,017,551
	Dec.	100,784	204,897	817,569	1,889,600	918,353	2,094,497
1972	Jan.	109,175	275,118	807,320	1,782,898	916,495	2,058,016
	Feb.	135,008	340,220	840,860	1,852,797	975,868	2,193,017
	Mar.	164,463	414,444	1,102,042	2,411,802	1,266,505	2,826,246

Monthly Production in Toyoda Automatic Loom

(120 looms)



These Toyoda looms began to be operated in May 1971, the operated loom numbers were gradually increased and finally in July all of the 120 looms were wholly under operation.
Their production reached the peak of 102,758 yds. in November, but in December it was a little down 100,784 yds., and in January 1972 109,175 yds., in February 135,008 yds., and March 164,463 yds.
This shows that during three months from November 1971 to January 1972, the production was between 100,000 and 110,000 yds. and that was a peak in this mill, but, after my activity, in February it was 35% up and in March 64% up.

The cloth quality has also naturally been improved at the same time, the defects of cloth have decreased.

This effects has originated from the cooperation with the mill side, they are now in good effort to raise the efficiency of Toyoda Automatic Looms up to 90% constantly and that of the other old ordinary looms up to 80%.

10-3-1 Cone Winding & Warping

1). All of these operators are now using "Boyce's" Weaver's Knotters, and every day 10 of all these knotters are overhauled and maintained by a special mechanic.

2). Slit gauges of Leesona Roto-Corner have already been overhauld and adjusted wholly they are now cutting & cleaning the defects of raw yarn.

3). Cheese Simultaneous Change System in the Warper's Creel is being done in every warping machine.

4). By the above mentioned actions, now the quality of cheese has been much improved, and eventually the quality and productivity in the warping has been raised so much, in the past time they could produce only one warper's beam per one shift, but now they produce three beams (3-times productivity), which is causing the higher efficiency and quality in weaving process at the same time.

10-3-2 Sizing

They are following my suggestion for size mixing process as well as sizing process - sizing materials are very carefully mixed and sufficiently boiled, and the penetration of size liquid into the yarn body is being done much better than before.
The flange space of weaver's beam is adjusted one by one in the way of my suggestion to avoid the selvedge yarn breakage - this will be done completely within a few month. After that we can expect more improved weaving efficiency.

10-3-3 Pirn Winding

Weft bunch yarn for Toyoda Automatic Looms are now increased and the double pick yarn at the shuttle changing portion on the cloth has been decreased. The volume of yarn per one pirn is also increased to raise the weaving efficiency.

10-3-4 Weaving

Training of the weavers is being done, low efficient weavers are now called by the managers and foreman, and trained individually.
Maintenance method is now gradually being systematized.

10-3-5 Others

Many new actions are now being done besides the above mentioned. By snap-reading method, every process efficiency is observed 3 times in every shift, the reason of low productivity is surveyed, and all of these shifts are competeting each other to increase their production very keenly.

11. EXPECTATION IN FUTURE

11-1 My Principle & Philosophy On Rehabilitation of Weaving Mill

In spinning & weaving mills, generally speaking, production efficiency should be raised at first, and when this efficiency reaches a certain level, the speed-up of machinery (if possible and proper mechanically) and labourer-rationalization should be done secondarily.
After these machinery speed-up and labourer-rationalization, the production efficiency comes down naturally. So we have to try to raise the efficiency again under this new condition. And when the efficiency reaches a certain level, again we can raise the machinery speed and rationalize the laboror number. This above mentioned circulation should be carried out in this order. And finally, when production-efficiency, machinery-speed and laboror-rationalization arrive at satisfactory and maximum level under the present machines & accommodations, they need and should consider the purchase of new machinery & accommodation.
The engineers who cannot carry out these steps and have no ability to utilize the present machinery cannot be entitled in requesting new machinery and accommodation.
This is my fundamental principle and philosophy on rehabilitating weaving mills especially in the developing countries, because those countries are generally not rich and they cannot afford the huge and nonurgent expenses.

11-2 Expectation in Future

According to my fundamental principle & philosophy just mentioned in the last paragraph, this mill has nearly succeeded in the first step and they are, of course, still trying to raise the weaving efficiency up to 90%. So, at present, we cannot urgently expect the speed-up of machinery and the rationalization of labor-power, however, in the very near future we can expect these two elements improved, and moreover next raising of efficiency under high-speed machinery and decreased laborors.
As mentioned already, the production managers in this mill are very cooperative with me and keen to improve their productivity, I can expect the rehabilitation & development of this mill in the near future.

11-3 Additional Suggestion to the Mill & Head-Office

11-3-1 To Spinning mill

1). Improvement of yarn quality.

As mentioned already, the yarn of this mill is poor in its appearance uneven and nappy. Especially the nap needs to be urgently decreased for raising weaving efficiency.

2). Modernization of Ring Spinning Frame.

At present, all of weft yarn for Suzuki & Texin-Made looms are supplied in the small weft pirn directly from spinning.
These weft ring spinning frames should be modernized into large ring ones in order to spin the big bobbin, which is wound into cone in winding process and then into weft pirn by pirn winder.
This is done for improving both the spinning & weaving efficiency and also the quality of cloth.

11-3-2 To Weaving mill

1). Replacement of Franz Müller Cone Winder.

As mentioned already, Franz Müller Cone winders are all obsolete and they need to be replaced by new ones. This is also related with the increase demand for winders mentioned in 11-3-1-(2).

2). Increment of Pirn Winder.

Related with 11-3-1-(2) again, the number of Murata #100 pirn winder should be increased.

11-3-3 To Head-Office

They need more to try to simplify the number of cloth kinds and to decrease the frequency of cloth kind change in order to raise the weaving efficiency and to minimize the production cost.
More profitable kind of cloth in the market should be studied.

12. NECESSARY NUMBER OF BOTH CONE & PIRN WINDERS AFTER WEAVING EFFICIENCY RAISED & RING SPINNING FRAME MODERNIZED

As mentioned in 10-3 already, now they are expected to raise their weaving efficiency up to 90% for Toyoda Automatic Looms and 80% for Suzuki & TEXIN Ordinary Looms.
When they have attained this high efficiency, the yarn need is, of course, raised and some preparatory machines become insufficient.
The warp-packagezation of weft small bobbin in the ring spinning process is under consideration as mentioned 11-3-1-(2).
Related with these two reasons, and due to the obsoleteness and necessity of replacement of Franz Muller Cone Winder mentioned in 4-3-1-(2) & (3), the purchase of both cone & pirn winder is necessary as follows :

12-1 Scheduled Weaving Production & Yarn Need

Efficiency of Toyoda Automatic Looms 90%
Efficiency of Suzuki & TEXIN Ordinary Looms 80%

Item \ Cloth		TEXIN Blue 64	TEXIN Blue 70	T.K.E	LSG, I	LSG, II	Keper (Drill)	Total
Cloth Kind		Shirting	Shirting	Shirting	T-Cloth	T-Cloth	Drill	-
WidthxLength (inch x m)		42 x 46	42 x 46	42 x 46	63 x 46	36 x 46	55x36	-
Density/inch		66 x 64	76 x 70	76 x 66	66 x 60	60 x 60	66x60	-
Yarn Count		32^S	32^Sx40^S	32^S	20^S	20^S	20^S	-
Yarn need/ piece (kg)		2.58 x 2.56	3.00 x 2.25	3.10 x 2.75	6.05 x 5.65	3.48 x 3.24	4.47 x 4.05	-
Loom Kind		Suzuki & TEXIN 50" R/s	Toyoda 56" R/s	Suzuki & TEXIN 50" R/s	Suzuki 70" R/s	Suzuki & TEXIN 50" R/s	Suzuki 70"R/s	-
r/m of Loom		160	165	160	120	160	120	-
Mechanical Power/Loom/Day (m)		76.2	71.8	74.0	61.0	81.4	65.8	-
No. of Loom		400	120	204	144	300	10	1,178
Total Production/Day (m)		(at 80%) 24,400	(at 90%) 7,740	(at 80%) 12,100	(at 80%) 7,010	(at 80%) 19,500	(at 70%) 460	71,210
- do - (piece)		530	168	263	152	423	13	1,549
Yarn Need /Day (kg)	Warp	(32^S) 1,370	(32^S) 505	(32^S) 715	(20^S) 920	(20^S) 1,475	(20^S) 58	5,143
	Weft	(32^S) 1,360	(40^S) 378	(32^S) 725	(20^S) 860	(20^S) 1,370	(20^S) 53	4,746
	Total	2,730	883	1,540	1,780	2,845	111	9,889

Total Yarn Need/Day : 20^S .... 4,736 kg
32^S .... 4,775 kg
40^S .... 378 kg

Total 9,889 kg.

12-2 Necessary No. of Cone Winder After Spinning Modernization

Item \ Count	20^s	32^s	40^s	Total
Necessary yarn/Day (kg)	4,736	4,775	378	9,889
Yarn Speed (y/m)	500	500	400	-
Mechanical Power/Drum/Day (kg)	16.2	10.1	6.5	-
Efficiency (%)	60	60	60	-
Actual Production/Drum/Day (kg)	9.7	6.1	3.9	-
Necessary No. of Drum	488	782	97	1,367
Necessary No. of Machine (100 d/machine)	4.9	7.8	1.0	13.7

Ordinary type Roto-Coner is recommendable than fully automatic one in this country.

12-3 Necessary Pirn Winder

Item \ Count	20^s	32^s	40^s	Total
Necessary Yarn/Day (kg)	2,283	2,085	378	4,746
Spindle r/m	6,000	6,000	5,000	-
Yarn Speed (y/m) (*)(*)	400	400	330	-
Mechanical Power/Spl/Day (kg)	12.9	8.1	5.3	-
Efficiency (%) (*)(*)	70	70	70	-
Actual Production/Spl/Day (kg)	9.0	5.7	3.7	-
Necessary No. of Spindle	254	367	102	723
Necessary No. of Machine (*)	2.3	3.3	25.5	Abbot Type Quiller:5.6 Murata#100 25.5

(*)
No. of Spl /machine :
Abbot Type Quiller : 110 spl.
Murata#100 4 spl.

(*)(*)
Yarn speed and E of both Abbot & Murata# is the same

12-4 Necessary New Purchase Number of Both Cone & Pirn Winder

(1) Cone Winder (100 drums/machine).

Necessary No. of Machine	(+) 14
Present Machine	(-) 10
Abolition	(+) 6

Necessary New Purchase 10 machines (1,000 drums)

These 10 machines are ordinary Roto-Coner, not automatic ones.

(2) Pirn Winder.

Necessary No. of Spindle	(+) 723
Present No. of Spindle (Murata# 100)	(-) 100

623 spl. ÷ 110 spl/machine

= 5.6 → 6 machines.

These 6 machines are Abbot Type Automatic Quillers.

13. CONCLUSION

There are so much problems to be solved in order to rehabilitate and develop this weaving mill as well as the other mills in Indonesia, but the production managers of this mill are very cooperative with me and also they are very keen to improve their mill, and already they have carried out the first necessary step and have attained very good results which, frankly speaking, were not expected by anybody at first.

We can expect the brillient future of this mill in not only high productivity but also in good quality and low cost, if they faithfully follow my coming suggestions in the same as before and now.

--sjt--

F I N I S H I N G

S U M M A R Y

This report is the results of observations made during four visits to
Tegal : 29-11-1971 - 3-12-1971
13-12-1971 - 17-12-1971
20-12-1971 - 23-12-1971
7- 2-1972 - 11- 2-1972.

The building is very impressive and can be used to develop a fine modern finishing plant. A short history is included in the report.
The machines are a mixture of old and new, and the Stork Rotary Printing machine is the key machine around which production must be based.
(see appendix for detailed list of machinery).

The main problems are as follows :

1. The quality of the work is not satisfactory.
2. How to develop the best use of the available machinery, this is the problem of production.
3. The machinery is out of balance thus limiting production and causing bottlenecks.
4. The work flow is complicated. In the second stage of our recommendations this will be improved.
5. The maintenance of the equipment and the knowledge of the machines are unsatisfactory. Methods to improve are indicated.
6. Training and augmentation of staff are required in order to develop the full potential of Texin.

The problems are discussed seriatim together with recommendations.
We recommend that the Future development of Texin be separated into three PHASES.

PHASE I

7. To work to approach the limit of the Famatex production of 7 millions metres per annum, 4 teams 3 shifts working 24 hours 7 days 350 days a year at 70% efficiency against less than 1 million metres a year at present.
This can be achieved without major expenditure at a cost of approximately $ 75,000.

PHASE II

8. In this phase which involves capital expenditure on bleaching and finishing equipment we approach the limits of the Stork Rotary Printing machine potential of 21,000,000 metres per annum approximately cost $ 485,000.

PHASE III

9. We suggest machines for a move into the polyester blend field which seems from various prognestications to be a certain future development approximately cost $ 450,500.

10. Finally there are the various appendices concerning machinery, production, work flow and technical procedures.

PROBLEMS DISCUSSED

QUALITY

11. There is a general complaint that the printed cloth quality is unsatisfactory. Particular complaints are about the general dullness of the fabric and about too thick black outlines.
In my opinion the woven cloth of Texin is very dirty and nappy and this may have a bearing on the complaints.
The process routine as at present gives an insufficient scour and bleach as denoted by the poor absorbency and uneven bleaching before printing. There is insufficient inspection at the end of the various processes and chemical testing is limited.
There is no quality control and we recommend that analytical chemist be appointed to work out chemical test procedures.
The laboratory is insufficiently equipped.
The practice of half drying cloth is wrong it encourages mildew growth and uneven cloth in bleaching.

Finishing.
We suggest that the final sizing on the finished cloth be adjusted and that they use a lighter weight on the calender in order to avoid an undue papery handle.

PRINTING QUALITY

12. The printing technique and design teams in my opinion are satisfactory. The only system used at the moment is pigment printing. This is cheap and effective and not too difficult, for one can see faults immediately.
With the installation of the baker steamer it will be possible to print reactive, naphtol, and even vat styles. These will require washing off after soaping after steaming and in consequence will reduce the production. In this case it will be necessary to add and open width washing machine.

PROBLEM

How to get the best use of existing machines

13. This is a production problem.
The present production as estimated amounts to less than 1 million metre a year. The estimated capacity of the Rotary Screen Printing machine working 4 teams 3 shifts 24 hours 7 days a week 350 days a year at 70% efficiency, is 21,000,000 metres per annum.
But due to the limited production of the present machines the optimum quantity which can be produced depends upon the Famatex stenter which we estimate about 7 millions metres per annum and the Phase I of our plan we propose to base our calculations on this figure (see graph).

The present product run is :

Singe	- 80 mpm
Desize wash Rope-o-matic	- 25 mpm
Scutch cylinder half drying	- 25 mpm
Foulard bleach H_2O_2 two passes	- 40 mpm = 20 mpm
Spin over-night on 4000 metres &	
Bleach down Rope-o-matic	- 25 mpm
Scutch cylinder half dry	- 25 mpm
Famatex Stenter	- 40 mpm
Big batch on Foulard	- 60 mpm
Print	- 40 mpm
Bake on Sulphur Black cylinder	- 22 mpm
Size at cylinder Famatex	- 15 mpm
Calender	- 40 mpm
Make up.	

From this routine it can be seen that the same machine is used in some cases twice and in the case of the Foulard three times. Looking at the work flow diagram shows the complications.
When the new steamer baker comes into stream at a speed of 40 mpm this will release cylinder drying capacity. It is now at the docks Djakarta.
To improve this flow and also which is as important, to improve the quality which is not good, we propose and recommend a three phase programme.

PHASE I

Object : To develop slowly the output to the production of the Famatex stenter which a key machine running 2 passes at a production of 7,000,000 metres a year with better quantity.

Method we recommend :

a. Maintain the present bleaching method, but develop alkaline Kier and Jig boiling to the maximum which according to our estimate is approximately 3,000,000 metres a year Kier
2,940,000 metres a year Jigs
this leaves a shortfull of I million metres a year to be processed as now but of inferior quality.
It is probable that one passage on the Foulard for bleaching will now suffice and the quality will be improved.

b. We recommend that the desized cloth should be washed off on the sulphur black range or in the Kier or at the Winches in order to free the Rope-o-matic from excessive double runs. It is also recommended that the Rope-o-matic ordinary wash off run be speeded to 60 mpm still retaining the bleaching run at 25 mpm.

c. It will be necessary as production increase to extend the bleaching spin rotation units.

d. It is essential to improve the condition of the squeeze mangles, the cylinder driers and the driers themselves.
We estimate that if these measures are carried out, the drying capacity will be increased by at least 10%.

e. The winches are not now used. Modernization could be considered for a cost of say $ 7,500 which would enable them to be used for scouring or bleaching or washing off. Otherwise they should be sold.

f. We recommend the purchase of an open width washing machine to follow the erection of the steamer cost approximately $ 50,000.

This phase will develop into 3 shifts 4 teams working apart from the singer, calender, printing machine, and steamer bake which will work less and measures must be planned with this in view.

During phase I there would be time :

1. to study the market
2. to gain experience in production and quality and printing styles
3. to initiate a training programme for staff & workers

And finally it is inexpensive (see graph).

PHASE II

In this phase we would approach the potential capacity of the Rotary Screen Printing machine 4 teams 3 shifts 24 hours day 350 days at 70% efficiency of 21,000,000 million metres per annum.

The undermentioned steps could be taken as follows :

I.	Modify the Famatex Stenter by adding two more heating sections plus chain and batching gear speed 80 mpm cost	$ 40,000
II.	Establish a rope scouring and bleaching range based on 2500 kg heated J-box plus basic sections of saturators and washers and pits approximately cost	$200,000
III.	Cylinder drying machine 2 stack 12 cylinders plus squeezing mangles	$ 50,000
	Cylinder Drying machine plus squeezing mangle	$ 30,000
iv.	One conditioning clip machine	$ 50,000
v.	Auxiliary equipment sewing machine great batch stands trucks inspection +	$ 75,000
	plant installation	$ 40,000
	less machinery scrapped	$485,000

PHASE III

In our opinion and that of UNIDO forecast the demand for polyester - cotton blends will increase and it may be wise to provide for processing these fabrics. In 1980 it is estimated that 25% of consumption will be blended divided into 56% dyed and bleached, 44% printed. We estimate that with this additional machinery the production would achieve 28 million metres a year, and improve cloth flow and layout.

of which 21,000,000 could be printed
3,000,000 dyed
4,000,000 bleached
at least a third of the printed cloth to be polyester cotton blend.

The undermentioned steps could be taken as follows :

Merceriser chain or chainless 45 mpm		$ 125,000
Heat setting stenter		$ 125,000
Additional steam boiler or hot oil boiler		$ 30,000
Baker a hot flue		$ 37,500
Sanforiser		$ 100,000
Auxiliary equipment		$ 33,000
Total	Approximately	$ 450,500

MACHINERY

14. The machines can beclassified as old and modern, and a detailed list is given Appendix. The old machines apart from the Calender can be rated as obsolescent, but with improvements can be of use until finance is available as detailed in the phase II. The modern machines, the printing machine, Rope-o-matic, Kier, Jigs are good but a modification is required on the Famatex stenter, a key machine, to make it a productive drying and stentering machine. The question of maintenance is discussed under separate heading.
The reasons for the mixture of old and new machines is historical, and in bound up with established sulphur dyeing range and the reduction in the Dutch Grant.
The management of this unbalanced and old machinery is a very difficult problem causing bottlenecks and inferior quality.
A phased programme of rehabilitation is recommended in the report.
The extra ordinary complicated work flow is the results of ad hoc planning and any improvement will have to await the implementation phase II. For technical considerations see Appendix.

WORK FLOW

15. There is the problem of work flow. This is due to the unbalanced mechinery and means that some machines have to be used two or three times.
A modern factory is usually designed on the straight or U-flow system and as far as possible one machine, one process. This will be approached in the second phase of rehabilitation (see diagram of work flow).

MAINTENANCE

16. Many of the problems here stem from old obsolescent machines.
There is also a lack of liaison between the works engineer and the line staff.

This starts from lack of experience. There must be diagrams of machines with work speeds, temperatures, services, graduated levels and capacities available.
A record of down time should be kept and an attempt made to organise planned maintenance.
Leaky doll heads on the cylinder drying machines and inefficient water squeeze mangles are one obvious need at Texin.
The water supply to many machines is insufficient, and the practice of keeping hydrogen peroxide in old metal drums is inadvisable.
The line staff and the engineer should work hand in glove as a team.

TRAINING AND AUGMENTATION OF STAFF

17. The staff are keen and intelligent and well versed in book knowledge but are short of practical experience.
If the works introduce the four teams three shifts 24 hours working some more technicians will be required and more workers. Texin are already training workers and more will have to be done.
Bleaching dyeing and printing is not so labour intensive as spinning and weaving, but the technicians need to be well experienced.
The technical staff should be experts in the running and knowledge of all the machinery.
The Textile Institute in Bandung should provide more technical cum engineering training on modern machinery.
A training manual should be completed, and as far as possible staff should be helped to visit other works and machinery exhibitions.
The wage system does not encourage incentive working.

STEAM SERVICES

18. There are two oil package steam boilers, producing 5000 kg of steam 9 atmospheres. Another boiler may be required, hot oil circulation to be considered.

W A T E R

19. The water has been analysed by I.T.T., and seems fairly satisfactory for bleaching, dyeing and finishing process work, not for steam production. With the use of modern synthetic detergents, the need for fully softened water, is not so vital for dyeing processes.
The supply of water needs examination. During of my visit the supply seemed to be weak. All finishing processes need copious quantities of water. It may be necessary to provide a water softening plant if there is a switch to polyester blends.

MATERIAL HANDLING

20. A start has been made with big batching equipment, i.e. up to 2000 m and the possibility of developing this, should be kept in mind.
Little provision has been made as yet for chemical feed stations,

with external bulk chemical storage tanks, and piped supplies. There are no fork lift trucks for handling of large loads, and in-consequence there is a great deal of man power required.

EFFLUENT

21. There is no provision for the treatment of effluent. The central and perimeter drains flow into a ditch, which presumably enters the local river. So far there has been flow of effluent to cause any difficulty.

RECOMMENDATIONS

22. PHASE I

i. appoint an analytical chemist, institute quality control and improve laboratory.
ii. rehabilitate the water squeeze mangles and cylinder driers and winches.
iii. purchase an open width washing machine.

PHASE II

iv. modify the Famatex stenter by adding 2 heating sections.
v. establish a rope scouring and bleaching range.
vi. replace the cylinder driers by two new modern machines.
vii. purchase a conditioning clip machine
viii. install a baking machine
ix. addition necessary anciliary equipment big batch stands inspection machine etc.
x. initiate training for staff and work people and encourage liaison between line management and engineer.

PHASE III

xi. purchase mercoriser, install heat setting stenter.
xii. additional steam boiler.
xiii. baker or hot flue sanforiser additional equipment.

COUNTERPART

23. My counterpart Mr. Rasjid has accompanied me on my visits and has assisted in the scouring and bleaching trials. We have surveyed all aspects of the works together and he has been present at my discussions and talks to the staff. He is intelligent and anxious to learn.

METHODS OF IMPROVED WORKING PUT INTO PRACTICE

24. a. The processes were all analysed and examined and our first proposal was to utilise the small kier to give the cloth a through scouring.

This is now being carried out and has resulted in improved absorbency and more level bleaching with cleaner cloth (see Appendix).

b. The washing off after scouring process and desizing has been increased from 25 metres a minute to 60 metres a minute.

c. The difficulty of obtaining a fine print line was overcome by the recommendations of using thicker printing paste and lower squeeze pressure.

d. Recommendations were made for improving calender maintenance and reducing the weight of nip pressure.

e. A jig mercerisation trial was carried out with the aim of improving lustre.

APPENDIX I

1\. I. To obtain the maximum absorbency for the printing of cotton fabric, it is essential to employ caustic soda or other strong alkali scour under high temperature conditions. The actual method chosen will depend upon the efficiency of the machines chosen and the characteristics of the cloth, i.e. cleanliness and grade of cotton and density of structure.

II. The Toxin cloth contains much impurity, and the present method of double impregnation of hydrogen peroxide at the Foulard, revolving on large batches over-night, and the thorough hot washing in the Rope-o-matic, nevertheless fails to give sufficient absorbency and does not clean the cloth adequately, for the best printing and finishing results.
The great danger with hydrogen peroxide bleaching is the catalytic damage that can be caused by the presence of metallic residues left in the cloth. So far, I understand that little damage has been observed.

III. There has been established at Toxin, a small high pressure kier of 600 kg. capacity for the intention of scouring, but because of lack of experience this has not been used. I have been able to instruct the staff in its use yet even if this machine is utilised, the small capacity and lack of washing facilities will decrease the already small production. The Rope-o-matic washing machine is the only machine as such in the department, and it is the main bleaching apparatus receiving the batches of peroxide padded cloth that have stood over-night.
This kier working seven days a week would be able to scour only 84,000 metres.

2\. From these considerations, it can be clearly seen, that at Toxin, the scouring and bleaching of the cloth is a major problem to be grappled with.

3\. At present time, there are systems available for scouring and bleaching cotton cloth. They have been tested and tried by long experience and comprise, discontinuous or batch; semi-continuous; and continuous; and those three systems can be either open width or in rope form. The oldest method is the discontinuous rope it is interesting that Toxin was originally planned on this routine although the system now is a pad roll open width process, with rope form desize.

The current work flow is follows;
Singe with desizing agent in quench tank;
Cloth allowed to stand over-night for the starch to be digested;
Wash off in Rope-o-matic, in rope form; scutch under mangle; semi dry on cylinders;
Two impregnations in hydrogen peroxide at foulard; big batch;
Stand and revolve over night;
Wash off in hot water down Rope-o-matic; scutch; semi dry cylinders;
Dry completely to width on Famatex;

Make into large batches on Foulard;
Print and finish.

The traditional way which differs from Texin process is as follows :
Singe with desizing agent in quench tank;
Rope wash and pile into high pressure kier for long boil in sodium hydroxide;
Rope wash and acid sour into pits;
Rope wash and bleach with hypochlorite in large cisterns;
Rope wash and anti-chlor into cisterns for scutching and drying.
It has to be noted that there are no cisterns at Texin for cloth storage or delay.

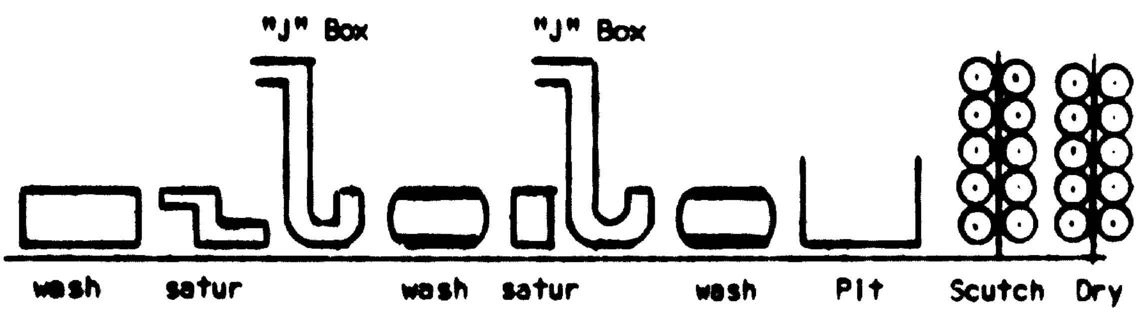
This process has the advantages that once the installations have been built and established, it is cheap to run as far as chemicals are concerned, it has great flexibility with width and weights of cloth, and the bleached cloth is of good colour and absorbency. It requires, however a certain amount of technical skill and experience in control and testing, and rather more men than the methods to be detailed.

4. Modern practice is to scour and bleach in open width on semi continuous and continuous ranges, polyester cotton blends and dense cloths especially.
In these ranges the cloth is processed at open width through various washing compartments and high pressure autoclaves, or reaction chambers which subject the fabric to caustic soda at high temperature for several minutes, wash, and into further reaction chambers where bleaching with hydrogen peroxide or sodium chlorite takes place. More washing chambers and the cloth is finally squeezed and dried on cylinders.
There is semi continuous process, where the cloth is saturated with caustic soda, batched on large rollers and spun for several hours in a steam heated container or steam cottage, washed, bleached on a continuous range with hydrogen peroxide, washed, and cylinder dried.
There is no doubt that these continuous and semi continuous scouring and bleaching range have many advantages. They can process cloth at very high speeds, over 100 metres a minute, and they are designed for large productions. They are inflexible to some degree in widths and are most suitable for standard fabrics. Many polyester cotton blends are treated on this ranges. Their great disadvantage is the very high capital cost.

5. The semi or continuous rope scouring and bleaching process depends on the building up of a range according to the production required, the characteristics of the cloth, and the finance available; from the three basic units, washers, chemical saturators, and J-boxes.
The saturator applies the chemicals, the washers restore neutrality by removing the chemicals, and the "J" box applies heat or process delay.
It is a simple system planned around the heated storage chamber or "J" box originating from the Gantt piler, which can hold 1500 - 3000 kgs. cloth previously saturated with chemical. The chemical can be either caustic soda or hydrogen peroxide or hypochlorite.

The capacity of the "J" box and the time required for reaction determine the speed of production. For example with Texin cloth weighing 1 kg for 10 metres and a "J" box holding 2000 kgs with a 2 hours stay at a temperature of 210°F, the speed of delivery would be 150 metres per minute. Ranges can be built up into one, two, three, and to five "J" box stages with the required washing machines and saturators.
The minimum range would consist of saturator, two washes and a "J" box but the cloth would need two passes, the "J" box being changed from caustic soda to hydrogen peroxide.
A two "J" box range plus ancillary washers and saturators would enable cloth to be scoured and bleached in a continuous run.
This systems has many advantages; it is flexible; occupies the minimum of space and has a good lay out. It is economical to work; simple and straight forward to supervise; and can be easily extended if production increases. The quality of the scouring and bleaching is satisfactory for dyeing and printing and it is easy to alter and change the flow line for differing standards which may be required.
It is comparatively cheap to install and can be developed in instalments.

6. In view of the foregoing explanations and considerations, I recommand that Texin consider the installation of a two stage continuous rope scouring and bleaching units plus storage pits, scutcher, and modern cylinder drying machine as the following schematic drawing. "J" box capacity 2000 kgs.



7. It is recommended that similar plant should be examined in operation and a short list of suppliers assembled. The relevant fabrics could then be processed on the machines and tested for standard requirements. The financial analysis of the rehabilitation can be estimated.

8. Printing.
If it is the opinion of Texin that they will more into better cloth constructions like poplin and polyester blends it may be wiser to install open width scouring and bleaching range but this would cost in the region of $ 500,000, open width washing would also be preferable.

APPENDIX 2

OLD MACHINERY

Description	Type	Make	Power	Year	Speed Actual	Possible	Width actual working	Condition
Singer I	Two Burner	Wakayama	5 HP	1940	48 - 60 mpm	100 mpm	160 cm - 150 cm	Good
Sulphur Black	5 compartments + nip rollers skying rollers + 2 stack stainless steel cylinder dryer	Mather + Platt	15 HP	1940	12 mpm		165 cm - 150 cm	Poor efficiency of steam cy - linder leaky doll heads
	1 compartmen + squeezing foulard + 3 stack tinned cylinder dryer.	Mather + Platt	15 HP	1940	25 mpm		165 cm - 150 cm	Poor efficiency leaky doll heads. Old fashioned roller bearings. Poor squeeze mangle.
Calender I	3 Bowl, 2 Cotton 1 steel heated hand leverage steam conditioning.	Jackson & Son Bolton		1952	60 mpm		150 cm - 140 cm	Pitted Bowls + Rust Unused.
Calender I	5 Bowl 2 steel heated 3 wool + paper or cotton hand leverage steam conditioner.	Kyoto	15 KW	1963	60 mpm	80 mpm	165 cm - 160 cm	Fair pitted bowls.

OLD MACHINERY

Description	Type	Make	Power	Year	Speed Actual	Possible	Width actual working	Condition
Winches 3	Wooden 5 draft stainless steel lined, 25 cm water pipe	Made in Bandung	25 KW	un-known	10 mpm		60 kg loading 3800 litres capacity.	Poor design too slow too weak, no temperature control.
Cylinder dryer 1 + squeezing mangle.	Squeeze mangle hand 1 ver + 2 stack cylinder dryer stainless steel	Mather + Platt	15 KW	1963	25 mpm		165 cm - 160 cm	Poor expression of squeeze, old fashioned doll heads, incomplete drying.
Plaiting machines 6	Pin nip	British	1 KW	old	75 mpm		150 cm	Fair satis-factory.
Inspection machines 2	Wagon to wagon			old	30 mpm		150 cm	Fair, removed.
Stamping machines 2	Continuous	Henry Wall work	2 KW	old	20 mpm			Fair
Baling machines 2		Hindle	2.5 KW	1954	10 min. per bale			Fair

APPENDIX 2

NEW MACHINERY

Description	Type	Make	Power	Year	Speed actual	capacity possible	width actual	possible	Condition
Rotary Screen Printing RD II	8 colours screens mesh 40.60.80,100	Stork	30 KW	1971	40 mpm	4-80 per min.	160 cm - 180 cm		Very good
+ Rotary Drying machine.	Hot air jets	Stork		1971	temp. 140°C - 150°C			140 cm	Very good
Rope-o-matic I	Rope washing, soaping, scouring 6 compartments temperature control	Stork	6 KW	1971	30 mpm	60 mpm	Rope		Very good counter current
Scutcher	automatic	Stork	2 KW	1971	30 - 60 mpm		180 cm		Very good
Stenter I	2 section clip	Fama tex	16 KW	1971	Maximum temp. 150°C 25 mpm		180 cm		Very good but too small for efficient economical drying
Crease + lapping Machine I		Monfort		1971					Very good
Machinery steamer	on order Feston high pressure	Arioli		1972	5 - 52 m/minute capacity of chamber 120 m.			190 cm	

NEW MACHINERY

Description	Type	Make	Power	Year	Speed actual Capacity possible	Width actual possible	Condition
Kier 1	High pressure steam oil heater 2 supply tanks steam coils + 1 tiled storage tank.	Kyoto	2.5 HP 3800 l.	1964	600 kg		Good with poor water supply small capacity
Jiggers 3	Open Jigs steam coil 100°C automatic diff. gear 2 bottom roller constant speed stainless steel	Kyoto	1.5 HP	1964	50 kg 75 kg Unmeasured speed 400 liters	150 cm Diam. Roller	Good condition poor water supply unmeasured.
Jiggers 3	Closed coil heating 100°C temperature control automatic diff.gear constant speed stainless steel 1 top pressure roller 1 bottom roller	Benninger	1.5 HP	1970	50 kg 90 kg 20 mpm 200 liters	180 cm - 160 cm	Good condition inadequate water supply no measured level.
Foulard Impregnator	2 bowl rubber inclined padding tank 35 liters air pressure 10 ton big batching stainless steel 2 home made feed tanks.	Aeg.	0.75 - 7.5 KW	1970	50 mpm 80 mpm	160 cm - 150 cm	Very good

APPENDIX 3 (historical)

Texin, an integrated textile factory spinning, weaving and finishing, is situated at the Eastern of Tegal town in Middle Java.
It is owned by the Provincial Government of Central Java and it is controlled by Perusahaan Industri Daerah "SANDANG" Djawa Tengah.
It contains 37,072 spindles and 1244 looms and a finishing department which is not yet completed.
The factory was established in 1935, by the former Dutch Government seized by the Japanese in 1942, and under the Indonesian Proclamation of Independence on 17 August 1945 it was taken over by the Government of the Republic Indonesia.
In 1947 it was returned to the Dutch, but in accordance with the instruction of the 4th Provincial Military Authority it was finally taken by the Indonesian Government on April 2,1959, and so remains to this day.
The spinning and weaving departments are well established, and the main business is selling grey cloth for Batik trade.
There is no tradition of bleaching, dyeing and printing at Texin although for many years, there has been a small plant set up for the dyeing of Sulphur Black on a 90 cm cotton cloth 66 x 60, 20'S x 20'S.
This dyeing machinery was housed in the weaving factory, but quite recently it was transferred to the new finishing department.
The finishing department consists of a large modern building 135 metres long, 40 metres wide, of two bays, with central piers, and open ventilation above the windows. It has a hard concrete tiled dustless floor with central drainage, overhead strip lighting, and overhead piped water, and steam services.
The building of the finishing department commenced in 1965 with the encouragement of Japanese credit and advice, but unfortunately because of financial problems, the plans were shelved and changed.
On the 17th June 1968 The Dutch Government offered a grant of 3,000,000 Guilders, and it was decided by Texin to establish a complete Rotary Printing finishing department in the new building, but again, because the financial aid was reduced, the plan was not completed.
At the present time the building contains a heterogeneous collection of machinery some old, some new, and due to the changes of policy and financial stringency, there is no regular economic production flow or balance.
The works is operating on an ad hoc basis of trials and training with a general manager, plus bleaching and dyeing assistant, a printer plus design staff, a maintenance engineering, and about eighty people working one shift, and paid time wages.

HOW PHASE I

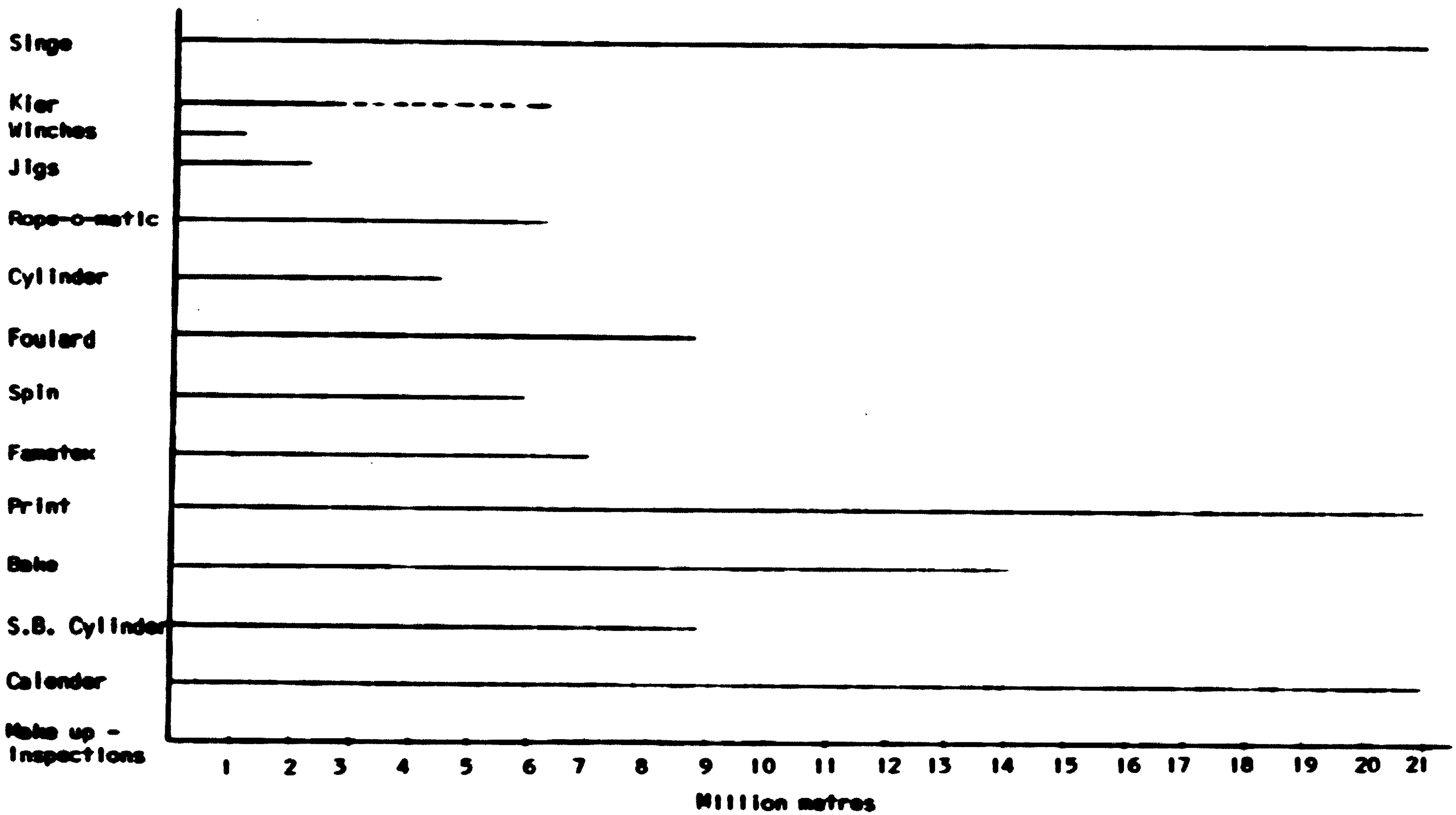
Estimated Texin Production per 24 hours day, 7 days 50 weeks at 70% efficiency

		Effective speed	Week	Year
Singe		60 mpm	423,360	21,068,000 mpy
Kier 600 kg	1200 kg a day	8.33 mpm	58,800	2,940,000 mpy
Winches (3)	450 kg a day	3.1 mpm	22,000	1,100,000 mpy
Jigs (6)	900 kg a day	6.2 mpm	44,000	2,200,000 mpy
Rope-o-matic	Wash and second run bleach	60 mpm + 25 mpm = 16.6 mpm	123,480	6,209,000 mpy
Cylinder 1	Dry after wash and bleach	25 mpm + 25 mpm = 12.5 mpm	88,200	4,410,000 mpy
Foulard	Double impregnation	50 mpm + 50 mpm = 25 mpm	776,400	8,820,000 mpy
Spin	4 stands 20,000 m per 24 hrs	14 mpm	98,000	4,900,000 mpy
Rope-o-matic	Bleach run	17.5 mpm	123,480	5,174,000 mpy
Cylinder 2		12.5 mpm	88,200	4,410,000 mpy
Famatex	weft straightening run (2 runs)	4.. mpm + 40 mpm = 20 mpm	141,120	7,056,000 mpy
Print		60 mpm	423,360	21,068,000 mpy
Bake	new steamer bake to be erected	40 mpm	282,240	14,132,000 mpy
Sulphur Black	Cylinder 3 size or dry	25 mpm	176,400	8,820,000 mpy
Famatex	final stenter	20 mpm	141,120	7,056,000 mpy
Calender		60 mpm	423,360	21,068,000 mpy
Make up and Inspection		Number to be arranged.		

APPENDIX 4

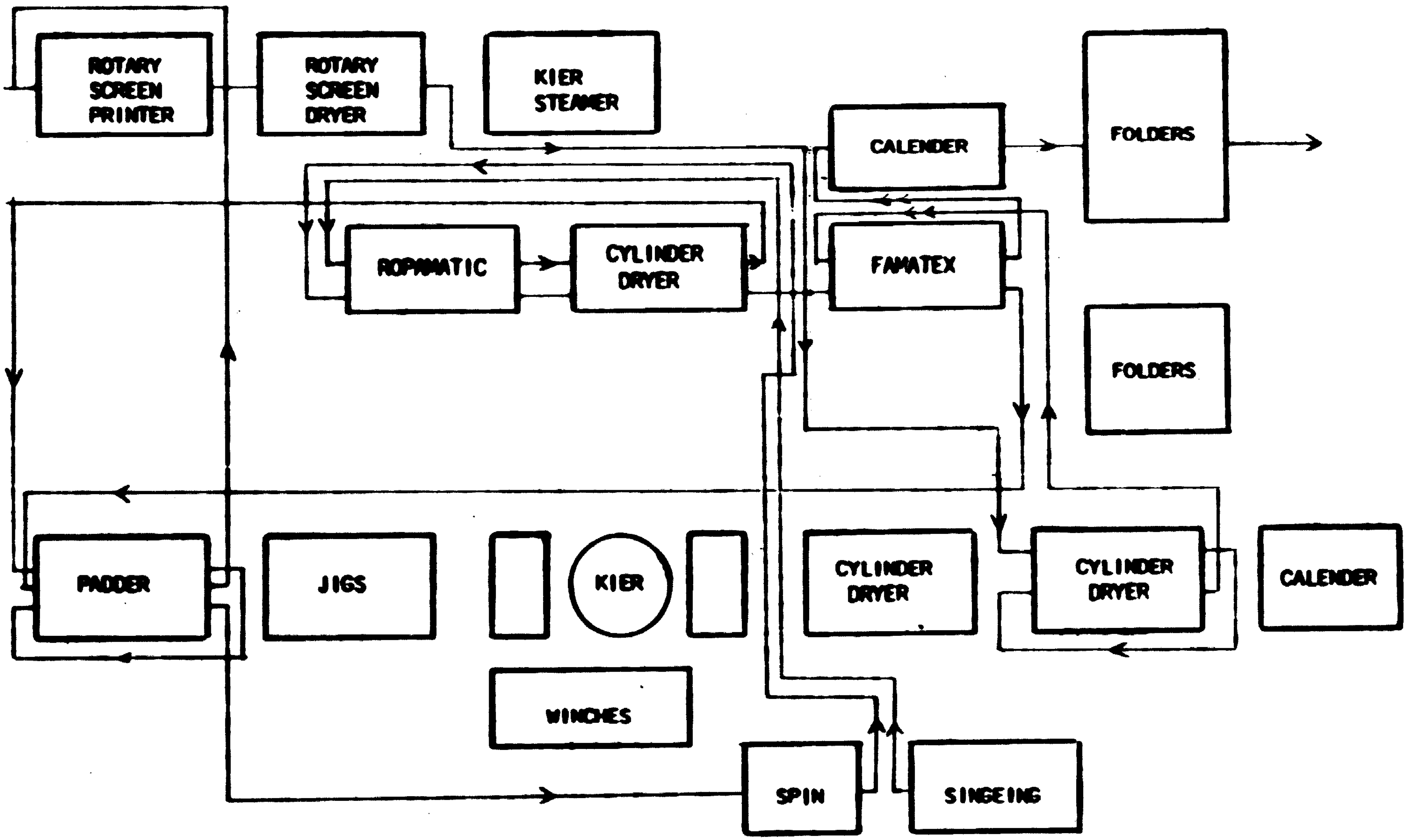
TEXIN PHASE I

Estimated Production Now 24 hours, 7 days, 350 day/year, 4 shift working



APPENDIX 5

TEXIN PRINT WORK FLOW



APPENDIX 6

Departemen Perindustrian
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Alamat kawat : INTITEKS

Kepada / Addressed to :

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C/o Mr. John E.H.BENNETT
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318, Djl. Djend. A. Yani
B A N D U N G.

No. : 625/I.1.2.3/72 Type:PS/Is/MS.

SURAT TANDA PENGUDJIAN
(Testing Certificate)
No. 348/LK/72

W.O. No. : 550/LK/Sgr.

Dengan lisan/surat/with directly order

No. : -

Tanggal/Date : February 15, 1972

Tjontoh/Samples : 3 (three) pieces of cotton plain fabric made by TEXIN.

Diterima tgl./Date received : February 15, 1972.

No.	Test - Items	Test - Results		
1.	Code of samples	Scoured	Bleached one run	Bleached two runs
2.	Wettability test (minutes',second")	5' (poor)	2'5" (good)	5' (poor)
	Original Samples			

Bandung, February 21, 1972

INSTITUT TEKNOLOGI TEKSTIL
For the Director of Research and Development,

ttd.
P. SOEPRIJONO, S. Teks.
Head, Evaluation & Standardization Unit

Tembusan :

1. Ditdjenteks.
2. A r s i p.-

APPENDIX 7

MANNING PER SHIFT PHASE I ESTIMATED APROXIMATE :

SCOURING AND BLEACHING

Singeing	2 - 1 girl	
Desizing	2	
3 Jig 6	3	
2 Kier	2	
2 Winches	2	
1 Scutch	1	
2 Cylinder	2	
2 Foulard	2	
2 Sulphur Black	2	
2 Auxiliaries	3	
18	23 - 1	

ADMINISTRATION

Office	4	
Maintenance	3	3
Chemist	1	
Assistant Lab.	1	
Supervisor Technologist	4	3
General Manager	1	
	14	6

PRINTING

Design	5
Screen	3
Colour kitchen	1
Rotary Screen	4
Steamer baker	2
Auxiliaries	2
	17

Total 66 - 1 girl

4 teams 3 shift - 120

Administration 14

FINISHING + MAKE UP

Washer	2	2
Fematex	3	3
Cylinder	2	2
Calender	2	
Monfort	1	1
Plaiting	2	2
Rolling inspection	4	
Cloth carrier	2	
Baling	2	
Stamping	2	
Papering	4	
Auxiliaries	2	
	28	10

SUMMARY RECOMMENDATIONS & CONCLUSIONS

SPINNING

In considering all the facts, the recommendations would be :

1. To completely re-equip the Spinning Department of this mill.
2. The machinery to consist of modern but conventional plant, capable of running at high speeds.
3. To install air conditioning to the existing building.
4. To install an efficient lighting system.
5. To install a false ceiling at a height of approximately 4.0 meters.

   Alternatively to the above work on the old building .

6. To erect a new building for the Spinning Mill, this to be built prepared for air conditioning.
   The argument in favour of this is that a modern plant into an old building always presents some difficulty. In this case the Ring Frames are to be installed at right angles to the old machines, resulting in wasted space between and under the roof valleys : See floor plan.
7. The new installation of machinery would consist of 21,800 spindles to give the same production as the existing 37,465 spindles. See Spin Plans.

Estimated cost of work as suggested on old building	34,000,000 Ru.
Cost of new building (prepared for the installation of air conditioning)	106,840,000 Ru.
Estimated cost of new plant	2,500,000 Ru.
Estimated cost of air conditioning old building	80,000,000 Ru.

With reference to the existing plant, the following recommendations were given with a view to improving both quality and production.

BLOWING AND OPENING PLANT

1. That the waste never exceeds 5% and a consistent percentage fed all the time.
2. As overbeating is taking place to remove one section of the Howard & Bullough Triple Opener.
3. To check and correct beater settings in all machines: they were too wide, causing stringy laps.

4. Kirschner beaters to be fitted in the Scutchers to give a smooth lap.

5. More attention to be given to cleaning and maintenance.

CARDING

1. To give much more attention to grinding of the wire at supervisory level.
2. To see that the Operative Grinder knows his job and does it in a competent manner.
3. To see that the Grinding rollers and the Emery Fillet are in good order.
4. To give good effective maintenance and settings to the cards.
5. Many of the Cards require new wire fillet.

DRAW FRAMES

1. To convert the 4 over 4 roller graduated drafting system to a two-zone system, having a neutral zone between second and third rollers.
2. To check top synthetic covered rollers and to grind true those which are hollow or ridged.
3. To check the weights to see that all are in proper position so that the weight comes on to the roller correctly after using the weight relieving motion.

SPEED (OR FLYER) FRAMES

1. To give attention to making a hard and firm bobbin by drilling out the top of the flyer, taking two or three turns of the roving round the presser arm, and fitting the correct lifter and builder wheels, and running the cone belt in its correct winding position on the cone drums.

2. To change the 4 over 4 roller graduated drafting system to a four roller two zone system, as on the Draw Frames.

3. Checking and straightening of flyer legs and presser arms.

4. To check top synthetic covered rollers and to grind true those which are hollow.

RING FRAMES

1. Give attention to correct oiling and maintenance.
2. Centring of spindles to rings.
3. Cleaning and polishing of rings.
4. To check top synthetic covered rollers and to grind true those which are hollow.

1. To give more attention to training and re-training of operatives.
2. The setting up of a Technical and Training Department in conjunction with the Laboratory.
3. The training of Technical staff, particularly new entrants, is strongly recommended.
4. The podition of the present testing equipment is very poor. It is recommended that a new laboratory be set up between the spinning and weaving departments, doing test work for both sections on a routine and special test basis.
5. That allied to this be a practical quality control section.

W E A V I N G

1. Understanding the following principles are recommended. As weaving is a labour intensive industry, the training of labor forces is the key point, and the quantity & quality of production are improved simultaneously. There exists so much margins for improving this mill without spending extra money.

2. Raw yarn needs to be more improved especially in uneveness and nap. The yarn produced in Tjilatjap Spinning Mill, a sister factory to Texin, needs to be used.

3. In cone winding, the knotting apparatus should be used, slub catcher and stop motion are to be adjusted and utilized. Due to obsolescence of Frans Muller winders, the increase of weaving production and the replacement of spinning machinery in future ten new winders need to be installed.

4. In pirn winding, the unit volume is to be increased, the bunch yarn for automatic looms are to be lengthened.

5. In warping, all cones in the creel should be changed simultaneously, all yarn tensions are to be controlled uniformly.

6. In sizing, mixing process should be carried out more carefully, size liquid is to be supplied into cavity box and circulation between this and size boxes should be done, size liquid needs to be boiled more longer and hotter. Squeezing roll is to be covered by synthetic rubber and yarn moisture controller is advisable. The viscosity and pH should be checked and controlled.

7. In drawing-in, every three exhausted beams tied by W.T.M. should be cut and drawn by human hands.

8. In weaving, survey on the loom stop frequency, period and reason should be done, and the analyzed data are to be fed back. Weavers need to be trained to amend the defects of beam. Specialists for smashed yarn tying, defective cloth loosening and cop insertion at automatic looms should be separately appointed. Beam flange space for plain weave should be three inches wider than that of drawing in on reed. Spare parts need to be ordered properly. Maintenance is to be done more systematically. Maintenance is to be done more systematically. Air conditioner is recommendable.

FINISHING

1. The finishing department at Texin is a new venture with the usual difficulties of starting a business.

2. The machinery is a mixture of old and new and is unbalanced with poor work flow.

3. Because of inexperience the quality of the work is unsatisfactory. Instruction has been given in Kier scouring, desizing, print definition and improvement has resulted as can be seen from the figures of current production.

January	1972	=	25,338.50 metres
February	1972	=	80,630.25 "
March	1972	=	78,838.75 "

   These are produced by one shift and would increase further but the present system of marketing is by contract. This will persist until market policy is stabilized.

4. The maintenance and knowledge of the machines are unsatisfactory.

5. Training and augmentation of staff are required especially in the laboratory. The present staff have good theoretical knowledge but lack practical experience.

6. From these conclusions it is recommended a three phase development programme is instituted.

   Phase I

   To approach the limit of the Famatex Stenter production of 7 million metres per annum with 4 teams 3 shiftworks 24 hrs a day, 7 days a week at 70% efficiency, as against the figure of less than 1 million metres at present. In this phase the present machines are modified and a new washing machine purchased. Cost approximate US$ 75,000. During this phase there will be opportunity.

   a. To study the market.
   b. To gain experience in production and quality and printing styles.
   c. To initiate a training programme for staff and works and to recruit a works chemist with adequate laboratory facilities.

Phase II

To approach the limit of the potential production of the Stork Rotary Printing machine of 21,000,000 metres/plus 3,000,000 dyed,

a. increasing the capacity of the Famatex by adding two section heaters.
b. establishing a scouring and bleaching range plus auxiliary equipment at approximate cost at US$ 485,000.

Phase III

We suggest in this phase that with the trend towards polyester blend cloth prognosticated by Werners and ourselves that suitable machines are bought at an approximate cost of US$ 450,000 in addition to machines requires as in phase II.

7. From the beginning of the first phase it is recommended that the maintenance is improved by the introduction of a preventive maintenance programme and that there is more liaison between the line management and the engineering section.
It is also recommended that suitable training schemes for staff and workpeople are initiated in consultation with I.T.T. Bandung.

SPARE-COPY HOLD

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
(SPECIAL FUND PROJECT / INS-71/531)

04460
(2 of 17)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report No. 2

Seminar I

How to Improve Productivity in Weaving & Finishing

(March 30, 1972)

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

Bandung, March 30, 1972

EL-SAYED M. OWEISS
Project Manager.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME (SPECIAL FUND PROJECT / INS - 71/531)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

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Bandung, March 30, 1972

S.

EL-SAYED M. OWEISS
Project Manager.

INTRODUCTION TO SEMINAR HELD AT I.T.T. MARCH 30, 1972.

1. This was the first of a series of seminars to be organised by UNDP-UNIDO Special Fund Project (SF/INS 71/531), for the Textile Industry Rehabilitation and Development in Indonesia.

2. It was sponsored by the Director General Textiles Mr. Safioen and organised by the I.T.T. Bandung where it took place March 30, 1972.

3. The subject was " How to Improve Productivity in Weaving and Finishing " and two papers were given, one by the UNIDO Weaving Expert Mr. T.Hoshiyama, and other by the UNIDO Finishing Expert Mr. John E.H. Bennett.
The papers were delivered in English and written copies in English and a translation in Indonesian were given to those attending. Copies of those are attached.

4. There were approximately a hundred persons present and they included members of the Government Textile Department, staff from I.T.T. and UNDP and UNIDO officials including Mr. Morvan the Assistant Resident Representative, Mr. Nils Ram Ericson UNIDO Regional Advisor and Mr. Hydenstein the Textile Advisor in Indonesia.

5. The seminar was opened by Mr. Siagian the Government Director of the Textile Industry at 09.00 hrs. who introduced the Project Manager and his team of speakers.
The Project Manager followed with a talk where he stated that the object of the seminars was to spread as widely as possible the results of the observations and recommendations of the team of experts.
He stressed that the textile industry in Indonesia was very widespread with over a thousand factories and so it was impossible to deal with each factory individually. Several factories had been chosen for particular attention by the team and he hoped that these would provide good examples of progress for the industry. In this and similar seminars the opportunity would be given to introduce to a larger section of the industry the results of the investigations which were being made.
The team of experts was not yet complete, and experts were coming on management, costing, training and maintenance.

6. Director General for Textiles closed the opening ceremony by encouraging those present to concentrate on improving the efficiency of the industry. He concluded by thanking UNDP and UNIDO for their valued assistance and help.

7. After this opening talk tose attending were divided into a weaving group and a finishing group with numbers of thirty six and thirty one respectively.
The programme was as follows :

10.00 - 13.30 1. Weaving

Chairman	:	Wibowo Moordoko
Speaker	:	T.Hoshiyama
Reporters	:	Malikus/Rosy Asnawi
Secretary	:	Soenoko

2. Finishing

Chairman	:	Santosa
Speaker	:	J.E.H. Bennett
Reporters	:	Rasjid/Apandi
Secretary	:	Suparman

13.30 - 14.30 Break for lunch

14.30 - 16.00 Discussion

16.00 - 16.30 Coffee Break

16.30 - 17.00 Closing of Seminar by Mr. Siagian

The papers were well received by attentive audiences and many questions were asked. There were in fact more questions than the time available and so it is recommended that the next seminar to take place in August 1972 should last for two days instead of one day.
After the seminar the team and senior I.T.T. staff were entertained to dinner by the Director General. It was the general opinion that the seminar had been a success. This was confirmed by the counterparts who had translated so well the papers and the questions.

8. Much of the success of the seminar was due to the excellent organisation and cooperation of the Government officials and the staff of I.T.T. and the Project Manager thanked the Director General and the Director of I.T.T. for their support.

S.

Bandung, March 30, 1972.

EDWARD M.OWLISS
Project Manager.

HOW TO IMPROVE
THE PRODUCTIVITY IN THE WEAVING MILL

MARCH 30, 1972

BANDUNG

TAMOTSU HOSHIYAMA

WEAVING EXPERT

TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMENT PROGRAMME, UNIDO

I. L E C T U R E

1. INTRODUCTION

This is a summary of my speech in the seminar which was held for textile engineers by UNIDO Project on March 30, 1972 in Bandung.

In this seminar, I had only 3 hours and 30 minutes for my speech so I limited my topics very narrowly only on the purely and practically technological problems on the spot, which are very eagerly and urgently requested by the engineers in this country.

It is of course very necessary to refer to the importance of administration and marketing etc., but on the above mentioned ground, I postponed them to the next opportunity.

2. SPECIALITY OF TEXTILE INDUSTRY

In comparison with the other industries, textile industry has a speciality of labour intensive one, which means that both the quantity and the quality of production depend not only on the equipment but also on the labourers themselves. In this point, textile industry is basically different from an equipment industry, for example, chemical industry.

3. SPECIALITY OF WEAVING INDUSTRY

One ring spinning frame of 400 spindles does never be stopped only by one single yarn br akage, but the other all 399 spindles continue to produce 399 yarns.

In contrast to this spinning process, one loom of, for example, total 5,000 ends is stopped completely only by one single warp breakage, that means the other 4,999 ends are all stopped without any productive activity. This difference between the spinning and weaving cannot be overemphasized.

In other words, it is not so easy to raise weaving production, because no single yarn breakage is permitted to continue the weaving production, you should try not to break even only one warp out of total 5,000 ends in order to improve the weaving productivity, no other efforts can raise production, for this reason the demand for quality of both the raw yarn itself and the warp beam is very strict and severe. This beam is produced by the above mentioned labour intensive process of preparation, whose quality is mainly decided by the activity of labourers.

4. UNSEPARABILITY OF IMPORTANCE OF BOTH THE QUALITY AND THE QUANTITY IN WEAVING PRODUCTION

If one warp is broken, the loom and production is completely stopped, and at the same time, the yarn breakage causes definitely the cloth defects, for instance, warp falling, weft bar etc. In the case of weft breakage, situation is the same as warp. While a loom is continuously operated, the production is continued and no defects is caused besides some exceptions. This means nobody can raise weaving production without cloth quality improvement and also good cloth quality is attained only by good weaving productivity.

Anyway, all improvements of the production, quality and cost in the weaving depend upon only the decrease of yarn breakage in the process - it is never any exaggeration at all, every well-experienced weaving technologist in the world agrees with this point.

5. IMPORTANCE OF RAW YARN

In every industry, the quality of raw materials is very important - it is needless to say. But especially in the weaving industry this can never be overemphasised. If there is only one inferior warp among the total 5,000 ends, all the other 4,999 ends are completely stopped in the loom - the criminal is only one single thread.

All well-experienced weaving technologists in the world understand that more than 60% of loom stoppage reasons are due to the defects of raw yarn.

6. IMPORTANCE OF PREPARATORY PROCESS

We can see so many yarn breakage due to the defects of preparatory processes, for example, mis-knotting in winding, insufficient and unfit sizing, waste - yarn, slack warp and fly waste-fiber etc. Without improving this inferiority in the preparation, nobody can avoid the stoppage of looms and, at the same time, degradation of cloth quality.

Moreover, we can see many mills who are degrading their own preparatory processes - it is tremendously nonsense and ridiculous for them who can have, generally speaking in this country, only rather inferior quality yarn to make it more inferior in their own processes. For instance, the yarn way in front & in the rear of slit gauge or slub catcher in the cheese winder is sometimes bent, scrubbed and made more nappier by the edge of slit gauge, this yarn way should, of course, be straight through the slit gauge; the yarn way has sometimes very sharp scratches to cause the unnecessary quality degradation and breakage,

Once I saw a production manager of weaving mill who told me that the raw yarn quality in his mill was so inferior that he could not raise his weaving efficiency. But when I visited his mill to survey, I found that the inferior raw yarn were being "made more inferior by his own processes".

Another mill manager once told me, "We have no sufficient capital to import and install the up-to-date machines, for this reason we cannot have a high weaving efficiency", But, according to my survey, the efficiency of 1970 - made looms was about 2% lower than that of 1940 & 1960 - made ones. The reason is that the raw yarn and the preparatory process for both of them is just the same - weaver's beam & weft pirn are of the same quality - but the training of weaver is more insufficient in 1970-made looms than in 1940 & 1960-made ones.

This [illegible] the decisive importance of preparatory process and also training of workers.

7. IMPORTANCE OF MAINTENANCE

In the case of insufficient & improper maintenance of machinery, you will never be able to raise your productivity and quality.
It seems needless to emphasise this importance, but still now many mills neglect this problem and, in the end, they cannot get good productivity. Because when new machines are installed by skillful mechanics, every part of them can be operated very well, so every body does not feel the necessity of maintenance, neglects it for a long time and does not order the spare parts. After that many parts of them become out of order and the efficiency comes down very quickly, but they have not trained their mechanics, not established maintenance system and not ordered the necessary spare parts, so they cannot do anything to recover this miserable situation - in this stage, they say "We have no money to buy new machines, for this reason we cannot raise our efficiency".

For avoiding this unhappy situation, from the beginning and from now we need to be very careful of " Maintenance ".

Generally speaking, there are three kinds of machinery maintenance as follows :

a). Adjustment Maintenance & Oiling

The important moving parts of the machine should be adjusted and oiled periodically with the help of necessary gauge or scales, and the worn spare parts need to be replaced by the new ones.
Otherwise the moving parts will be in the wrong position after a long time motion, and its action will be ineffective.

For example, the picking motion should be measured by scale and adjusted; picking bowl, bush, nose, stick, check-strap & picker should be checked and replaced if necessary; and the stop position of shuttle in the box should be measured and adjusted.

b). Reparation

When some portion of machine is out of order or broken, they should be quickly repaired without any delay.

For this reparation, you need to have statistics of necessary spare parts per one month or one year etc. and to order them in advance periodically to the Machine Companies concerned.

c). Preventive Maintenance

To avoid the accident and damage of machine and to lengthen the life of machine, this preventive maintenance is essential.

For example, every loom should be checked, maintained and oiled every beaming time in the points which cannot be done during weaving, and especially every six months it should be done in more wider range. The complete overhaul of loom needs to be done every 3-5 years according to the condition.

8. IMPORTANCE OF CLEANING

Cleaning in the spinning & weaving mills is very important for good quality & efficiency, not for giving nice impression to the guests who visit there.

Especially fly-waste causes the yarn breakage and prevents the improvement of quality and efficiency so much.

The preparatory processes where the bobbin, cheese, beam and machines are covered with much fly-waste can never produce any good warp beams nor weft pirns, and they can never raise their weaving efficiency in the end.

The fly-waste has to be removed and cleaned periodically by the operator themselves and specially appointed cleaners, Of course, it is the best way to do this by some up-to-date equipment like vaccum cleaner, but you can clean by hands, fans, bamboo bars and brooms etc.

The importance of cleaning in the preparation as well as weaving cannot be overemphasised by anybody.

9. IMPORTANCE OF TRAINING

Still now almost all key works in weaving mills are done by human hands, for example, in the winding process cone bobbin is rotated and the yarn is traversed by the winding machine, but when the yarn is broken it should be knotted usually by operator, so if he is not well trained his knotting-end is irregular and knotting-point is not so tight and the tension of the yarn by his hand is not so sufficient as to avoid the slack warp - all of these defects will cause the degradation of weaving efficiency in the end.

Anyway, I can emphasise the importance and necessity of the training of workers much more than that of up-to-date machinery installation according to my about 20 years long experience on the spot of weaving.

10. IMPORTANCE OF TESTING

Your mills are of course not institutes, nor colleges, nor universities, so you need not install various kinds of expensive and complicated testing apparatus.

But you need at least to test the quality of raw & sized yarn; the nature of sizing materials, viscosity, pH-value & temperature of size liquid.

For this reason, the following apparatus should be purchased and installed in your laboratory or the spot as follows :

(1) Single Yarn Tensile Tester (Test Span : 50 cm)
(2) Abrasion Tester for Sized Yarn
(3) Chemical Analisation Apparatus
(4) Visco-Cup & Stop Watch
(5) pH-value Test Paper
(6) Thermometer

All of them are not so expensive, you can very easily buy them, and they are very much useful for improving your productivity.

11. IMPORTANCE OF SURVEY ON THE SPOT BY PRODUCTION MANAGER HIMSELF

A production manager - I mean the " top " technologist in the mill - is always very busy and he cannot so easily find the time for survey on the spot, but still he needs and has as frequently as possible to do it by himself. Only from the survey list by his fellow men, he cannot minutely understand the real reason and situation of low weaving efficiency and reason of loom stoppage, so he cannot take the most proper action for improving it. And also during his survey on the spot, he can observe the worker's activity and maintenance condition etc. to get very useful information for the improvement.

12. HOW TO IMPROVE YOUR PRODUCTIVITY IN THE WEAVING MILL

If you have completely understood the above mentioned principles, the means of solving problems will be naturally come out as follows :

STEP No. 1 : <u>To Grasp Your Weaving Efficiency by Snap-Reading</u>

The mill manager himself needs to go inside the weaving spot and go through all looms to count the number of working ones in the morning, afternoon and nighttime as many time as possible, and calculate the efficiency percentage.

STEP No. 2 : <u>To Grasp the Absolute Frequency of Loom Stoppage</u>

He selects a group of about 20 looms at random and stands up near the group for one hour to observe how many times each of the looms are stopped by warp and weft reasons individually.

STEP No. 3 : <u>To Grasp the Reason of Loom Stoppage</u>

He goes through all of the looms as STEP No. 1 and observes the reasons of all stopping looms itemisingly.

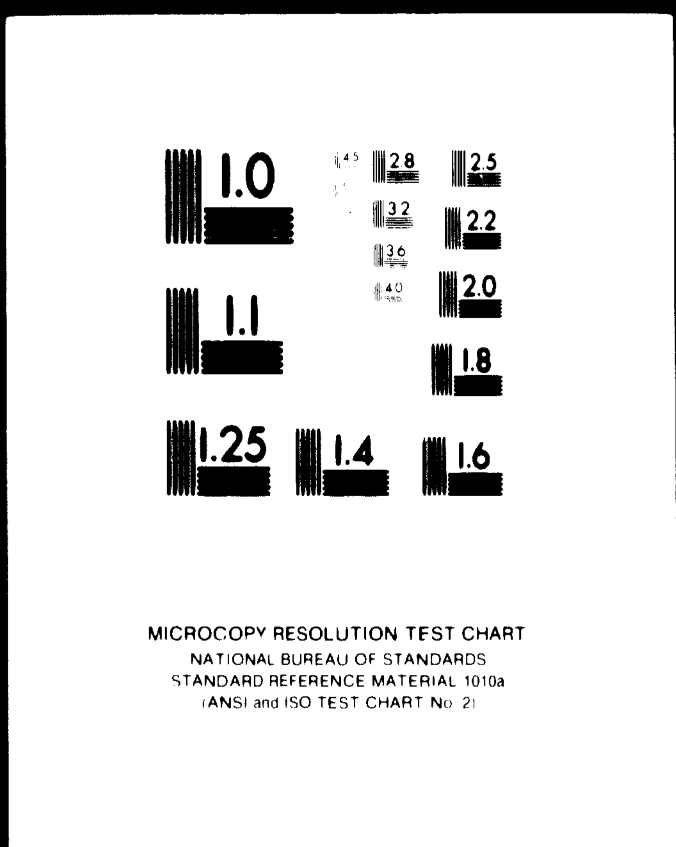
STEP No. 4 : <u>To Grasp the Period of Each Loom Stoppage and Weaver's Activity</u>

He stands up on some places in the weaving and watches the stopping looms about how many minutes each of them is let alone without the weaver's action, this survey should be done as many times as possible,

STEP No. 5 : <u>To Analyse the Above Mentioned Data</u>

He orders his fellowmen to calculate and make list of all the above mentioned data gained by his own survey on the spot. By this list he can understand what the real bottleneck for low weaving efficiency is. Probably he will be much surprised at the fact that the main reason of low weaving efficiency comes from the inferior beams and weaver's dull and irrational activities.

2 OF 7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STEP No. 6 : **To Train the Weaver and Appoint Special Workers for Smashed Yarn Knotting, Defective Cloth Loosening and Weft Cop Insertion for Automatic Loom**

i) To Train the Weaver

Weavers should act not only quickly but also rationally.

Many of the weavers are at first engaged in knotting complicatedly broken loom, letting the other one - yarn broken loom alone, in this case, of course, they need to come to the simple reasoned stopping looms and start them, then to the more complicated ones.

Anyway, they need to be again trained to be careful of all their other looms, even while they are doing onething for their one loom, to maximise the loom efficiency.

ii) To Appoint Special Worker

For getting high loom efficiency, we need to shorten the loom stopping time as little as possible, so the weaver needs to concentrate his activity to start the stopping loom as quickly as possible. To spend much time for knotting smashed yarn, for loosening defect cloth on the loom, and also for inserting weft cop to the shuttle in the case of automatic shuttle change loom etc. are all nonsense for the weaver, they should be done by special worker.

STEP No. 7 : To Improve the Sizing Process

Not only the size recipe itself, but also the size mixing process should be very carefully considered, and needless to say about size materials themselves.

The raw yarn in Indonesia is generally very nappy, so the complete covering by string size film should be made around the yarn body against the shedding and reeding abrasion on loom, and also it should be well penetrated into the yarn body, otherwise the size on the surface will be removed down on the floor in vain.

In textile industry, there are two kinds of sizing - warp sizing and finishing sizing. The purpose for these two sizings is quite different, warp sizing is done for giving the raw yarn the increment of tensile strength and protective ability for abrasion - mechanical aim, but finishing sizing for woven cloth is given for commercial aim for nice looking and proper weight etc.

This tapioca is very good material for finishing sizing, because, the pasting is very easy, it has bright luster and also it is very cheap.

But for warp sizing, this Tapioca cannot be said a good material, the reasons are as follows :

(1) The adhesive power is low.
(2) The viscosity is not stable and comes down very quickly during boiling and after boiling.
(3) The dry film is not strong.

(4) Moisture absorption is too big, and when the humidity is too high in the weaving process the abrasionproof ability comes very speedily down and the sized yarn becomes too soft and nappy.
(5) The acidification after pasting is much higher than the other natural starches, and the viscosity comes down so quickly.
(6) The penetrating ability into the yarn body is low, the size remains only on the surface of the yarn and is removed very easily by warp shedding and beating motion of reed.

In England, once they used this Tapioca for warp sizing when the other starch became very expensive in 1903, but the weaving efficiency came extremely down, afterwards they have never used Tapioca for warp sizing at all - a certain book says.

But this Tapioca is one of your domestic products and can be got very easily and cheaply, so we need to utilise it as much as possible, being very careful of the following points :

(1) Quality of Tapioca is very different according to the place of production and season of harvest etc. We need to establish the Standard for material inspection and check Tapioca.

(2) Boiling hour and temperature should be carefully considered than the other starches.

(3) Penetration is not so sufficient that the weight & number of squeezing rollers should be increased.

(4) Abrasion reducing agent like wax needs to be mixed.

(5) Wetting agent also should be mixed.

(6) The old size, for instance, boiled & prepared one day before, should not be used.

(7) Because of the inferiority of Tapioca itself and the tendency of size taking-up % fluctuation in wide range, we need to give more sizing to the yarn than the other starch - at least 15% for shirting-class cloth up to 20%.

(8) Some portion of Tapioca needs to be replaced by the other better starch, for example PVA, Maize Starch etc.

STEP No. 8 : To Improve the Warping Process

If the warper's beam is inferior, the weaver's beam can never be superior. To get the best quality warper's beam is the secret of high weaving efficiency, and to minimise the warper stoppage is the secret of the best quality warper's beam. The cheese changing system on the creel is, in this point, very important as well as the quality of cheese itself. The stop motion and beam breaking device need to be very carefully maintained.

STEP No. 9 : <u>To Improve the Winding Process</u>

As mentioned in STEP No. 8, the quality of cheese needs to be improved for high weaving efficiency.

The purpose of this process is not only to wind up big cheese from small spinning bobbin, but also to remove the raw yarn defects such as slub, ring fly-waste and weak point of unevenness etc. by slit gauge and proper yarn tension. So slit gauge should be definitely adjusted according to the yarn count & quality; all yarn way and yarn contact portion need to be checked not to make the inferior yarn more inferior by this process itself.

The knotter should be used to knot the yarn - knotting by hand & nail is the biggest reason of inferior cheese.

The stop motion should be also adjusted to operate properly, otherwise the useless abrasion between drum and cheese will cause both the degradation of raw yarn and the run-out of cheese in the warping process.

STEP No. 10 : <u>To Increase the Winding Quantity per One Weft Pirn</u>

This increment can raise so much the weaving efficiency as well as the cloth quality, in many mills this problem is neglected and very thin pirn is used in the shuttle. The proper hardness of yarn winding and the winding spiral pitch should be given, otherwise it will be collapsed in the shuttle during weaving. Of course, the shuttle, especially the direction and fixedness of tongue, needs to be more carefully maintained and corrected one by one to avoid the surface touch of bobbin inside the shuttle.

STEP No. 11 : <u>To Maintain and Adjust the Machinery Periodically</u>

This should be done for every kind of machinery in the right way preparing the necessary spare parts.

STEP No. 12 : <u>Next Action to be Taken</u>

Until the weaving efficiency reaches 85 - 90%, we cannot increase the number of looms per one weaver, and also we cannot increase the r/m of loom. At first, we need to raise weaving efficiency under the present condition, then we can increase both the number of looms per one operator and the loom speed, these steps should be done step by step. And finally we arrive at the highest weaving efficiency with the present machinery and equipment, then we deserve to request the new investment for the up-to-date machines.

13. CONCLUSION

It is very nonsense and a big mistake to say that we have no money so we cannot improve our weaving efficiency, almost all the above mentioned steps need not money.

The improvement of weaving mill can be attained only by the careful and patient study, training and control.

Every developed country of textile industry has succeeded only in this way.

"There is no royal road in weaving". Nobody has magic hands for raising productivity of weaving.

Everybody who has understood the above mentioned principles and philosophy and then follows the STEPs No.1 - No.12, will be definitely able to improve the weaving productivity & quality, and naturally the total cost will be reduced so much.

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DISCUSSION

I. MANAGEMENT

1. Name : Mr. Sumarno M.Sc.
Representation : I.T.T.

Question : a. So far you haven't mentioned any about the welfare of the weaver/operator.
What is your opinion in this matter.

b. Could you explain more detail about " Snap-reading " in weaving and in obtaining the number of yarn breakage in weaving Mill.

c. Do you have any standard for :
1. Yarn breakage for warp (Different number).
2. Training of weaver.

Answer : a. In this time, the management is said to have the social responsibility on the welfare of workers as well as on share- holders (mill owner etc.), consumers and the regional community. But without the proper profit you cannot operate your enterprises and then cannot advance the worker's welfare.
Also for this reason, you need to improve your productivity in the mill in order to fulfil one of your social responsibility, just being mentioned above now.
We should try our best to improve and advance worker's welfare, because it is the most important problems, not only from the national point of view, but also from the mill management side. If their welfare is poor and miserable you can't expect them to be cooperative with you in improving the productivity is not so high you cannot rise their welfare due to shortage of good profit and capital. Worker's welfare and productivity are closely connected and inseparable.

b. Snap-reading is a method which can be adopted as the simplest and the most efficient way to measure the productive efficiency of machinery. For example, if you are operating 100 looms in the mill, and now 85 of them are working and the rest 15 looms are stopped due to yarn breakage, maintenance or beam doffing, etc., the mechanical efficiency at this time is 85%. To get this value, you need only to go around all of these 100 looms and count how many are working.

Of course, this is one of the statistical and probability problems, so the frequency of the survey is the more the better to raise the accuracy of the observation.
For example, getting the weaving efficiency for one shift (8 hours), you need to survey at least 4 times in this way and calculated the average.
Still the value is in rough accuracy, because the efficiency changes from time to time. But this value is sufficient for you to control the mill. We need not take care of the difference of a few procentage, the real minutest value can be known only by the God in the Heaven.

c. 1. Standard for cotton yarn breakage in Jananese weaving mill per one loom per 10 hours :

- Poplin $\dfrac{\text{combed } 40\text{'s} \times \text{combed } 40\text{'s}}{132 \times 70}$ x 38" width

  warp : 6 - 7, weft : 5 - 5,5.

- Shirting $\dfrac{\text{carded } 48\text{'s} \times \text{carded } 44\text{'s}}{85 \times 84}$ x 38" width

  warp : 5,5 - 6, weft : 5,5 - 6.

2. Standard for weaver training.

- Explanation for uniform, Break-Time.
- Names of Loom parts and Tools.
- Explanation & warning for dangerous portion of loom.
- How to knot the yarn.
- How to dent the yarn to Droper, Heald wire & Reed.
- Cop insertion action.
- How to start & stop loom.
- How to knot the yarn on the loom.
- Shuttle change action.
- How to loosen defective cloth & start weaving.
- How to treat the defective warp.
- Kind, name and cause of the defective cloth.
- How to clean the loom.
- How to go around looms.
- Exhausted beam treatment.
- Action for fire
- Action for electricity stoppage.

2. Name : Mr. Pawitro S.Teks.
Representation : I.T.T.

Question : a. Could you explain, how to calculate the loom efficiency.
Is it based on the total working hours or, the effective working hours (after reduced by the breaking time) or, the machine hours.
In the matter if mentioned above, is the time needed for setting the loom to be counted.

b. To improve productivity in weaving mill, which step should we take at first :

- to train the weaver/operator or,
- to improve quality of raw material or,
- to improve loom efficiency or,
- others.

c. What is the percentage of loom stop caused by the weft and warp broken-off as standard, in normal weaving mill.

Answer : a. It depends upon your purpose & object to utilise them on the mill control.

b. At first, you need to train the workers and to improve raw material quality simultaneously. Without these steps, you can never improve your loom efficiency.

c. Warp broken-off 55%
Weft broken-off 40%
Maintenance & others 5%

3. Name : Mr. Supojo
Representation : Insin Djateng.

Question : - Man power factor has a very important influence on improving productivity.
What is your opinion about bad mental attitude of man power in the mill.

- To over-come such psychological aspect, what should we do besides training.

Answer : - In my impression, the man power factor in this country is much better than the other many developing countries in Asia & Africa, which I have seen by myself.

The home education by parents and elders is necessary as well as the training in your mill to improve the " bad " mental attitudes of man power which you called.

- The " true " incentive wage system needs to be much more adopted than now.

4. Name : S. Kusumosudirdjo S.Teks.
Representation : Insin Daerah Istimewa Jogjakarta.

Question : a. You classify Textile Industry into Labour intensive.
What is the minimum limit of labourers in weaving mills so that we can classify it into Labour intensive Industry.
As a matter of fact in modern weaving mill, one weaver can operate more than 20 looms.

b. Could you mention to us, concerning the minimum percentage of looms stoppage in Developed Countries; because every loom stopped causes less efficiency and productivity.

Answer : a. In Japan, for example, now one operator has 40 - 60 looms in the efficiency of 92 - 95%, but still it is called a Labour intensive Industry, because both quality & the quantity depend upon the operator's action in the preparations and weaving.
At present, we textile technologists, need to consider only the modernized mechanical factories and need not to involve the handy-craft into our discussion on the classification of various Industries.

b. It will 5 - 7%

5. Name : Mr. Kridoharsojo
Representation : Perteksi (Mill Owner Association).

Question : a. Could you give us detail of the Job-Organisation and Job-Discription of that every position required in weaving mill that has 300 ordinary looms to produce one kind of cloth, for instance.

b. Do you agree that one or other reasons make unefficiency due to over or short of the labour and lack of Job-Discription.

Answer : It will takes time to answer this question.

6. Name : Mr. Sardi Bk.Teks.
Representation : Pinda Sandang Texin Tegal.
Question : One factor that has influence to the productivity is pay.
What is your opinion in this matter and which system of Pay is suitable for Indonesia to day.

Answer : In my impression, the Pay system in Indonesia is one kind of Social compensation. Social Compensation itself is, of course, very necessary and incentive system seems to me more urgent to be introduced.
For example, the supply of sugar, oil, etc. to the worker uniformly is the inherittance from your past difficult and confused times.

7. Name : Mr. Achmad Sunaryo
Representation : P.T. Primissima Jogjakarta.
Question : a. Is it the time for Indonesia to posses standard concerning cloth quality (e.i. Raw & finished cloth).

b. Does the standard salary of the operator & supervisor, etc., depend on loom condition, loom stoppage per hour.

Answer : a. I think so, but standardisation of cloth quality is not so simple matter, it is painstaking job.

b. Yes.

8. Name : Mr. Sjukri Effendi
Representation : Dalimatex Textile Mill.
Question : a. A mill sets the used loom transfered from the other mill (± 10 years old).
Do you think that the mill can produce high quality and high productivity of fine cloth.

b. How long can the mill maintain the condition with that looms.

c. Can we rely on that mill for the next future.

d. What should we do for keeping the mill running well continuously.

Answer : a. It depends upon the machinery condition. In Japan, 10 years old machine is never said " Old ".

b. Still now, in Japan we are using 50 years old looms with more than 90% efficiency.

c. Of course, but so far as the maintenance is properly carried out.

d. See the draft of the Seminar.

9. Name : -
Representation : -

Question : a. Could you give us comparison factors of efficiency that caused by :

- raw material
- preparatory
- weaving process
- man power
- room condition

b. Is there any connection between optimum of the salary and labour efficiency; that means if the salary is too high moreover it reduces the efficiency.

Answer : a. Raw material 55%
Preparatory 30%
Weaving process 10%
Room condition 5%
Man power (this should be included by the other factors).

b. The comparison with the other mills has big influence on the worker's efficiency morales.

II. TECHNOLOGY.

1. Name : Mr. Nukman Hasjim.
   Representation : P.N. Industri Sandang Djakarta.

   Question : a. What is the normal age of the accessories as under mentioned :

   - Reed - Shuttle
   - Picker - Picking stick.

   (Those are made in Japan).

   b. What is the distinction between actual running percentage known from pick counter and production efficiency.

   Answer : a.

Reed	2 years
Shuttle	1 year
Picker	1,5 - 2,5 months
Picking stick	6 - 12 months.

   b. Production efficiency percentage is the function of loom r/m, working hour, production cloth length, weft density, if one of those factors is measured in the wrong way, the efficiency is different from that known from the pick counter.

2. Name : Mr. Santoso Singgih
   Representation : B.T.N. Textile Mill.

   Question : a. We are using Sakamoto Loom 48".
   In the matter of weaving the cloth with the following construction :

   - warp = 45's T/C
   - weft = 45's T/C
   - No. of reed = 64/4
   - picks = 70 per inch.

   We would like to ask you :

   - which is better used, single or double reed.
   - how can we surpass the static electricity.
   - how can we surpass the floating yarn of palin weave.

   b. For sizing polyester warp yarn, which starch is better used, Tapioca or Corn.

c. Would you please explain us, what is the standard of test to measure the viscosity.

d. Please explain in detail for sizing method need for cotton and T/C - yarn with the beam sizing process.

Answer : a. Single reed is sufficient; in my experience if the sizing is proper for T/C, the static electricity does not matter so much.
Floating yarn is caused by so many kinds of reasons.
Heald frame setting, picking motion, shedding motion (warp line, sizing), etc., are to be checked.

b. Corn starch is much better than Tapioca for its strong film over the yarn surface and superior penetration into the yarn body.

c. On the spot of the mill, every measuring instrument should be simple. For viscosity, visco-cup is the best.

d. The stickness of size to polyester is so inferior than to cotton, that PVA which is rich in it should be used.
Also the elongation of polyester fibre is too large, so it should be restricted for weaving, this is the most different point from cotton.
Anyway PVA-217 & corn starch is the main adhesive agent in T/C sizing at present.

3. Name : Mr. Junus Buchari
Representation : Famatex Textile Mill, Bandung.

Question : a. Let us know your recommendation of sizing recipe used for 40/2 yarn count of 65% tetoron and 35% rayon.
So far we are not satisfied to get recipe that had been given by some expert from Japan and West Germany.

b. To produce Texture filament using ordinary loom and filament yarns as warp, what should we do to solve the problem concerned before we get special loom.

Answer : a. Recipe :

R/	Corn starch	125. kg
	Maconol B-19 (synthotic oil & paraffin).	6.5 kg
	Acrilon (synthothic adhesive agent)	30. kg
	Marposol T-30	12 kg
	PVA-217	35 kg
	Corgon-S (water softener agent)	1.2 kg
	P.C.P.	0.1 kg
	Total	211.8 kg
	F.V.	1,420 liter.

Actually this recipe is used for :

Poplin T/C $\frac{40's \times 40's}{135 \times 70}$

- For sizing 40/2 of T/R, you had better increase water to 2,000 liter and decreasing little of Corn starch.

b. The production of Texture warp cloth.

Preparation :

The following three points should carefully considered :

1). Not to damage the elasticity of the yarn.

2). Not to produce the shrinkage unevenness by tension unevenness.

3). To avoid the drop of productivity due to the shrinkage or twisting torque.

for 1). Don't give the extreme temperature and tension.

for 2). Give the tension more than 0,07 gr/den and keep it constant as much as possible, and don't change the winding speed.

for 3). This is now solved by sizing. For this kind of cloth, sizing is done for improving the productivity in the preparatory processes rather than weaving process itself.

Sizing is done in hank and then the sized yarn is wound into cone cheese and beam.

The loom for long filament and for short fibre are both useful for the weaving. But temple and strip roller should be changed into the suitable ones, and the letting-off motion needs to be completely adjusted and the warp tension is advisable to be 0.15-0.25 gr/den.

4. Name : Mr. Ibnu Saleh.
Representation : G.K.B.I. Medari, Jogjakarta.

Question : a. According to the Suggestion of Mr. Hoshiyama, we had adjusted loom back-rest down; by this way the looms run well enough. But the picks per inch decreasing from 62 filling to 60 fillings.
What should we do to overcome this missing picks.

b. By the change of the cloth construction from 32's x 32's to 30's x 36's, can we maintain the setting as mentioned above continuously.

c. Could you give me the maintenance/repairation programme the looms.

Answer : a. Only by back rest down, I cannot understand the happening of difference of weft density from 62 to 60 picks/inch.
But if so, you need to decrease the weight on the warp yarn sheet, and also adjust the letting-off motion of warp.

b. This change is only in weft count from 30 to 36's or 20% finer. You can continue the setting of back-rest in this way to keep the high productivity.

c. At first you should try your best to raise your loom maintenance condition up to usual standard.
But so far as I have checked your looms in G.K.B.I. mill they are not so old in the true sense and you can and need to follow the loom maker's instruction.

5. Name : Mr. Misbach Sudur.
Representation : P.T.G. Garut.

Question : a. Could you explain the best yarn tension in every process in preparatory.

b. How much the sizing agent is absorbed into yarn.

c. What is the specific gravity of the :
- Cotton fibre in grey cloth.
- Cotton fibre in dyed cloth.
- Cotton yarn after dyed.
- Cotton yarn after sized.

d. What the maximum efficiency which can be achieved by 40 years old loom; and how much the defect probably happened.

e. Would you recommend us the best sizing recipe with Tapioca for :
- Sizing cotton yarn 30's count.
- Sizing cotton yarn 50's count.
- Sizing cotton yarn 70's count.

Answer : a. It is impossible to explain the best yarn tension in value, because it should comprehensively considered in the type & speed of machinery, the quality and count of yarn and kind of cloth etc.

1). Winding.

The tension should be suitable for removing the defective portion of the yarn and getting the proper hardness of cheese.

2). Sizing.

Maximum draft of the yarn in sizing process has to be limited within one percent. If the yarn tension is too high, the remaining elongation becomes too low and the yarn breakage in the weaving increases very much.

b. Size taking-up percentage should be more increased when the warp & weft density is higher and the warp is finer. It should also be a little increased when the temperature & humidity is higher.
For Tapioca sizing and for domestic made inferior yarn the following is the standard of size taking up percentage :

- For coarse construction cloth 6-12%
  Medium construction cloth 10-15%
  Fine construction cloth 15-20%

c. The inquitor's intension was found to ask the yarn diameter, which is as follows:

Count	Diameter (inch)
100's	0.00383
80's	0.00427
60's	0.00445
50's	0.00540
40's	0.00606
30's	0.00700
20's	0.00847
10's	0.01200

d. Weaving efficiency depends upon not only the loom condition, but also the raw-yarn, preparatory process and room condition, etc. Also this loom condition depends upon the maintenance much more than upon the simple loom age.
For this reason, nobody can answer this question.
But if this 40 years old looms have been maintained very well with sufficient spare-parts, the beam & weft pirn are in good condition and weavers are well trained etc., you can get more than 90% efficiency even though in the case of 40 looms per one operator.

e. <u>Recipe :</u>

R/	- Tapioca	50 kg
	- P.V.A.-117	17 kg
	- Softening agent, ex Macnol T & B 19	1.5 kg
	- Penetration agent ex Teepol	0.5 kg
	- Water softener ex Calgon-S	0.8 kg
	- Antiseptic agent, ex PCP	0.1 kg
	- pH adjustmen agent, ex Soda-ash	to pH 6.8
	- Water :	
	- for 30's shirting	600 ltr.
	- for 50's poplin	500 ltr.
	- for 70's loan	400 ltr.

III. OTHERS.

1. Name : Mr. Salura S.Teks.
   Representation : I.T.T.

   Question : a. I don't understand yet, your Step No.2 concerning
   - frequency.
   - loom grouping, due to the fact that various brands of loom being operated in some mills now.

   If you don't mind it will be kind of you to make an example of problem and deliver to this meeting, for the shake of mills.

   b. After improving efficiency, which step should we take afterward :

   - to increase number of loom/operator
   - or to increase Rpm of the loom.

   What is the reason to take that step concerned.

   Answer : a. Absolute frequency of loom stoppage can be said, in the more easy expression, how many times loom stop during a unit hour.
   This is very important factor for controlling a weaving mill, because the weaving efficiency consist of this frequency and average stopping period per each stoppage.
   Loom grouping in the survey of this frequency should be done according to your intension on what kind of cloth or loom you are now going to observe the weaving situation.
   If some of the brands are, for instance,

   woven by only 10 looms, you may select these 10 looms only.

   b. It depends upon the condition of operator and loom maintenance. When the speed of loom is generally and roughly speaking, nearly 145 x R/m (75" R/S), 150 R/m (60" R/S), 160 R/m (50" R/S) and 175 R/m (44" R/S) already the number of looms per one operator may be increased at first.

   Agreement : a. Testing is one of the tool controlling.
   But, we are familiar to hear a mill owner says : "I have operated this mill for years and earned money without a single testing apparatus".

I fully agree to you that we need patient, we need time to ccavince them that more money can be earned by the implementation of the mentioned apparatus.

b. Please refer to your point 3, here we have the same view point, that's :

- Quality of yarn and preparation mainly depend on the activity of labours. At the same time if I may add, the root source not only comes from labourers them selves but as well as from :
  - The raw material of the yarn, that is the proper specification of fibres, needed to spun for the domestic consumption.
  - Humidifying problem to a certain level of process.
  - Problem of mill management.

c. Contexted to the point 6,"ernsciousness" is the main factor of the problem. It is requested not only from the side of operators but from mill manager or mill owner as well. How can operators piece a broken yarn properly without training them, worker conscious against the miserable effects of inadequate setting of slit gauge/slub catcher without giving the opportunity to lean it, the operator spare their time to study without any facilities of promotion given by the mill. It is of course a matter of financial, personnal/human relation etc., or in one word " Management ".

Opposition : I don't agree with you, if it is said that Tapioca is not good size starch. It is not only because produced in this country or mush cheaper, but due to the facts as the results of many thesis of graduated students of I.T.T.
By replacing it to the other starch, it is matter of cost.
I agree if you could recommend Tapioca Stahdard for Textile needs.

Suggestion : By analysis fabric defect is able to locate and to pin point the problem.
Inspection of fabric defect is very important.
Standard defect, if any, should be maintained.

2. Name : Mr. Sudjajoto S.Teks.
Representation : -
Suggestion : a. The important of training.
So far we haven't Textile High School, there for I propose it is better that in Indonesia we have to present a number of Textile High Schools mainly at the centers as quickly as possible, so they are able to produce the intermediate experts.
Besides above mentioned, we have to present more many Textile's practical training, especially to each speciality, for instance : weaving, spinning, knitting, finishing, etc. and its maintenance (1 year). It can be executed in the local mill.

b. Importance of testing.
Please let me add some proposal; I think there are a quality control system, that is better to use it in the mill.

c. Importance of yarn.
I would like to remind you the importance of taking care of the yarn extension percentage during process from the preparatory up to weaving process.

CONCLUSIONS OF THE SEMINAR "HOW TO IMPROVE PRODUCTIVITY IN WEAVING" HELD AT INSTITUTE OF TEXTILE TECHNOLOGY BANDUNG ON MARCH 30, 1972.

After considering the paper delivered by Mr. T.Hoshiyama a UNIDO Weaving Expert, and after discussing the problems concerning the condition of Textile Industries in Indonesia at this moment, the Seminar gives the following conclusions,

1. Productivity of the weaving mill at this moment can be improved by cultivating patiently and carefully, in respect of planning and methods.
2. It is very important for every weaving technologist to understand the specialities and foundamental philosophy of the weaving industry.
3. Scientific steps for improving productivity should be understood by all managers and supervisors.
4. Training of the weaver should be conducted intensively and regularly as the operator is a very important factor in determining productivity in weaving.
5. It is very important for the weaving mills to have a minimum testing apparatus required in the Laboratory. The better the yarn quality, the greater the productivity.
6. The Production Manager should go on the shop floor daily to evaluate the production processes.
7. The necessity of cleanliness inside the mill to maintain both quality and production efficiency will improve productivity was emphasised.
8. The importance of the preparation process to give a good quality product in order to increase weaving was underlined.
9. The seminar recommended those concerned, especially Institute of Textile Technology in Bandung, to examine Tapioca as a starch size continuously; tapioca is provided by domestic production, cheap and easy to get. It has however some serious limitations.

These conclusions have been made for the benefit of developing the Indonesian Textile Industries.

CHAIRMAN
OF THE STEERING COMMITTEE OF
WEAVING SECTION,

(WIBOWO MOERDOKO S.Teks.)

HOW TO IMPROVE
THE PRODUCTIVITY IN A FINISHING WORKS

MARCH 30, 1972
BANDUNG

JOHN E.H. BENNETT
FINISHING EXPERT
TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME, UNIDO

HOW TO IMPROVE THE PRODUCTIVITY OF A FINISHING WORKS

1. Before I start considering the problems of improving productivity in a finishing works I think that it will be a good idea for us to consider some of the general aspects and difficulties of the science and art of finishing, and then to sketch the particular sections of the technology and the management functions to which attention must be paid if the productivity is to advance. In the course of this paper I can do no more, as I say then sketch the outlines, but I hope that from the written copy, which you have before you and the subsequent discussion, that some benefit will be obtained to all of us. I apologise for not being able to speak to you in your native language yet I am grateful to Mr. Rasjid for what is I hope a good translation.

You will notice in my introduction that I used the word Art. Finishing has always been described as an art and a science, and whilst science is catching up, as Lord Kelvin said measurement is the beginning of science, and we are now able to measure colour differences - we still deal with the unmeasureable, tactile assessment, the handle of a fabric and the visual assessment, the look and appearance. These are basically subjective tests as opposed to objective measurement, and it is in this area of aesthetic qualities that is the cause of so many of the vicissitudes of Finishing industry. Our friends in the spinning and the weaving sectors do not have these problems to anything like the same extent, they have their problems of course, but not aesthetic arguments, and they are not so near to the customer. It is the dyer and finisher always, who receives the first attack of criticism about the fabric, and although in the end it may be proved to have been the fault of the spinner or the weaver, the finisher has had the first attack and is left with the unhappy feeling of being in dock, of being arraigned. For example we all know the problems of variation in spinning and weaving and we always hesitate to criticize, nevertheless the most ordinary young person will not refrain from passing a confident opinion about a question of colour matching and disparage with the greatest aplomb, the struggles of the dyer or printer.

Similarly some customer, may be colourblind, anyway he has usually never had his eyes tested for colour vision and we are told that 8% of the male population has some colour aberration, will criticize unfairly some colour matching especially if the market is turning against the shade.

It is why the finisher is so anxious that instrumental colour matching becomes more general; we shall then be able to work to definite tolerances like the engineers. Not only with colour but with the question of handle or feel the finisher chases some illusory quality often at great expense of money and patience.

These are the important subjective tests. There are now an ever increasing number of objective tests with which he has to cope.
I refer to washing tests, fastness to dry-cleaning, fastness to sea water, sewing tests, fastness to weathering and rot proofing, waterproofing, crease-resisting, flame-proofing, moth-proofing; you mention it there's a test for it.
Added to these difficulties there are the problems of fashion and change, new substrates, new dyestuffs, new methods of application, new finishes, new demands for anti-soil properties, and finally last but not least the problems of keeping plant occupied and making a profit.

2. From this introduction you will agree, I hope, that the problems of finishing are many and variable, the permutations and combinations expand to the "nth" degree, and it is the number of variables that dominate the finishing works.
I have described what we can call the external variables, the foreign policy variables, we now approach the other sector, the home ground, the internal variables and these are even more imposing.
The different substrates, the dyestuffs, the chemicals, the cloth to liquor ratios, the temperatures, the processes, the differing machines, the pattern, the colourways, and so on ad infinitum.
All these many factors lead to what is the main point I am going to make in this paper, the importance of control and the need for control, and the place and headquarters for this control is in the laboratory, I repeat, the place, the key point for control of these variables is the laboratory.

3. Productivity, and the future economic operation of the finisher, in my opinion, and not only mine, depends upon an efficient works laboratory and around this centre should the works processing be built up.
A well equipped and staffed laboratory should be the nerve and the exchange and the focal point of the works.
Amongst the many duties of the laboratory should be :

a. Laboratory specifications of correct details for each job.
b. Correlation of laboratory methods with plant operation.
c. Strict control of all plant processes.
d. Control of dyes and chemicals and substrates.
e. Training of supervisory personnel.
f. Testing-fastness tests, monitoring tests and liaison with ITT.

I really want to emphasise the factor of laboratory control, for in my visits to works in Java, I have found that importance of the laboratory is apt to be overlooked. It must be remembered that the laboratory is not an overhead or an on-cost, but a productive cost and very much concerned with productivity.

To start trials on large batches of expensive cloth without preliminary laboratory experiments is illogical and expensive. It is of course necessary sometimes to rely upon reputable dyestuff makers for the standard and quality of their products but not always; I can give many examples where dyestuffs and chemicals have been below standard. One example springs to mind, where we were troubled with a precipitation of green colour spots of a vat jellow dyestuff on many metres of fabric. At the end of a worrying time we found out that the colour spots came from the makers green shading dyestuff, you all know that all dyestuffs are standardised by the addition of shading colour and this can very like any other dyeing or printing operation. This example could have been a very costly exercise without the laboratory detective work.
The other point that I should like to make without stressing it too strongly or going too deeply into an important aspect, is the opportunity in the laboratory for the training of staff. Any young clever man, no matter what degrees he has obtained at university or I.T.T. enters a finishing works as a new boy. We say that he is wet behind the ears, in other words, just weaned fresh from the cradle, and he or she needs a probationary period, a time to correlate his knowledge obtained at the academic institutes with works practise. It is not a matter of shaving his head or putting him to learn the right songs, but to get him trained in what goes on in a works, to initiate him into bulk production and the problems of productivity.
That is why it is necessary for him to spend a year or two in the laboratory before launching him with responsibility. Dyeing and printing are becoming more and more chemical engineering operations and the laboratory should be the pilot plant with its miniature equipment balanced with the works processes.
Works laboratories will vary in size, some small, some large and it will be necessary to look to I.T.T. as the central laboratory. They will also act as an independent authority to whom disputes can be taken. Nevertheless they should be consulted for advice on staff and methods and procedures and constant liaison should be encouraged by frequent visits both from the works and from I.T.T.

4. I could speak for a long time about the laboratory but there is much to cover and I will pass on to the next topic which affects productivity, works organisation. Organisation is a function of management and must be of interest to all supervisors or technologists who are part of the management team.
Organisation is a matter of dividing work amongst people whose efforts are to be co-ordinated for a common purpose. No one person can do everything, so functions and responsibilities are devided. In Indonesia, works as far as I can judge are organised on the Classical system with a distinct chain of command, Army style. We have the general manager and the various departments with their respective heads, bleacher, dyer, printer one thing that strikes me is that I have not yet met a finisher as such, or anybody going under the name of quality controller.

This diagram could be said to be a typical set-up in a moderately sized plant.

General Manager

Office Manager   Works Manager   Engineer   Quality Control

Chemist   Bleacher   Head Dyer or Colourist   Finisher   Make-up/Dispatch

It is essential in any works to have responsibilities defined and specialized as far as possible; this is not easy and will vary with the size of the works.
I should have thought it necessary to have a technical supervisor to deal with all aspects of finishing that is, the responsibility for the cloth after dyeing or printing, the calendering, the stentering, and all the mechanical and chemical finishing processes, shrinking and crease resisting, and the quality control of handle, appearance, and dimension.
In developed countries the finishing technician is an important member of the staff. He has a keen eye, good sense of touch and handle of fabric, and he builds up an extensive library or samples and records of finished deliveries. He acts as a quality controller of the finished and final product.

5. Let us now examine a typical process run. We must assume that the routine has been worked out by the works manager and the laboratory and the relevant documentation established. It is an axiom in finishing works that the cloth is accompanied by a document which will indicate to all concerned the process details in sequence. In other words the cloth batch should be able to find its own way around the works. After grey examination we start with singeing and desizing. The supervisor should be aware of the size to be removed and simple tests should be carried out to see that this is so done.
The iodine test in the case of starch sizes. It is essential that cloth for dyeing and printing is thoroughly desized. It is also essential that the fabric is not left too long in the wet state to avoid the danger of mildew. The next usual process is scouring and bleaching depending on the substrate. The methods used will vary from batch, semi-continuous, continuous, rope or open width.
There is the question of the scouring and bleaching agents to be used and the degree of treatment necessary.
Chemical controls may be required and tests and inspection should always be routine. It is useless and uneconomic to send goods forward to the next operation unless we are sure that the quality is correct. From scouring and bleaching we sometimes follow with mercerising. This process improves the lustre, increases the tensile strength of cotton, and the affinity for dyestuffs and regulates the weft dimension.
It is a most important stage in finishing and require great attention to detail; the machine speed, the time of dwell in the caustic soda, and the cloth tensions.

It is also necessary to monitor the strength and temperature of the caustic soda, the washing off, and the frredom of the cloth from creases. Samples should be checked for lustre, convolution count, and dimensional stability. We all know that the cotton fibre shrinks and changes from kidney shaped to almost circular in cross section.

6. The dyeing department is a key process in the productivity of a finishing works. It is here that the many variables crowd for attention. The usual dyeing methods for cotton piece goods are jigger, and padding or foulard, batch, semi-continuous, and continuous, cold batch pad reactive, continuous pad steam ranges or indigosol ranges. The dyeing department is the most difficult to manage, for it is here that we break bulk and the bleached cloth is split into the various orders and shades. Planning and attention to detail is demanded for it is the place where the large expenses occur and are incurred. Dyestuffs and chemicals are very expensive and the dyers have to watch that the profits do not go down the drain both figuratively and literally. Dyeing, unfortunately brings to light all the previous faults inherent in the cloth; the spinning deficiencies, the weaving shortcomings, and the preparation weaknesses. The increase in the number of variables points to the need for control and attention to details is paramount. We can distinguish into a matter of five " M's " methods, machines, materials, money and men. The methods must be correct, the machines suitable and well maintained with good water supplies and drainage with temperature controls and variable speed and constant speed devices.
In Jig processing, the operator is a skilled workman and should be trained as such. The weighing and dispensing of dyestuffs and chemicals is a most important factor in the productivity function, and there should be departure from " bucket and spade " rough and ready practises, to more accurate systems. The cloth batches shoul be of known weight and containers should be measured and graduated in order that cloth to liquor ratios can be standardised, this of course refers especially to jiggers and winches. The planning of shade runs from light to dark to light is necessary in order to prevent undue time "down-time", boiling out and cleaning of machines.
As we move from batch processing to semi-continuous and continuous ranges the machine takes over and it is here that machine maintenance becomes a key factor for succesful productivity. The most important items to watch here are the rollers to see that they are balanced and running freely in good bearings, and the various pad nips; are the bowls of the same hardness. Pads or foulards are a subject in themselves and their maintenance is very important. They should be inspected for uneven wear, the disintegration of the coverings may cause unevenness of dye pick up. The bowls may deflect under pressure or under uneven load and cause shade variation. Shade variations may occur because of the different characteristics of the mixture of dyestuffs, in fact continuous dyeing machines are very expensive and demand professional planning and attention to detail in order to run them efficiently and economically.

Most of what I am saying applies equally to printing which is by nature a continuous process or nearly always so except for the famous batik resist system.
Here again patient examination of the problems such as choice of dyestuff and thickeners and methods; the care and maintenance of the machines; cleanliness and good housekeeping, and the training and supervision of the workers are the key points of notice. Printing hides most spinning and weaving faults but the cloth must be absorbent and free from lint or loose threads. Engraved rollers and printing screens must be thoroughly checked and tested by print-outs.
Print pastes should be well mixed and free from impurities and aggregates. The viscosities should be checked by a suitable instrument.
Doctor blades must be well ground and constantly inspected. It is important to care for the squeegees and records should be kept of details such as type, hardness and profile and pressures.

7. Moving on to the Finishing department all drying machines, bakers, steamers, and washing machines must be kept clean and well maintained. There must be keen attention to the cloth as it is processed and instant action should be taken when faults are noticed. It is here that the good supervisor sets the standard and trains the operatives in the right methods. There are no short cuts to good dyeing and printing efficiency.
Patient attention to details are the recipe for success.
I have mentioned previously the importance of having a technical in charge of the finishing department, with its stenters, drying machines, calenders, damping and shrinking machines and breaking machines.
Cleanliness and maintenance of equipment is, if anything, more important here than anywhere else, for the cloth is presumably near the end of its run. There should be planning of the work; from light to dark shades and back again to light. The characteristics of all machines should be understood, such as speeds, nip pressures, temperatures and the need for weft straightening, and moisture control.
Sometimes automatic moisture control apparatus is fitted to stenters and if this is not so it is a worthwhile investment to buy such instruments. Most cloth is overdried and significant increases in production can be obtained. There are also hand moisture control instruments on the market which are extremely useful. In my experience in Indonesia, not sufficient attention is given to the factor of cloth condition and its influence on handle. In order to get the maximum production from stenters it is necessary to see that the lint screens are regularly cleaned, from experience I have found that dirty lint screens can reduce the efficiency of a stenter by 50%.
Calenders should be washed weekly and checked for foreign bodies, such as weaving needles etc., and pieces of metal. During my career it is amasing what I have found in cloth, needles, spins, screws, and pieces of the loom. Anything that becomes inbedded in a bowl is a potential source of damage, and no customer will buy cloth with holes in it. In order to over-come this problem some works have installed magnetic detectors at their cloth inspection assembly. This device is well worth installing like a mine detector in war.

There should always be a pyrometer in the works so that the temperature of the heated calender bowl can be checked. Nip pressures should be examined regularly by means of carbon paper. It is also important, as I have mentioned, to check weft straightening and width control.
In my experience the most returns and complaints from customers relate to bowed weft, skewed weft, off-grain call it what you will.
It is a most annoying fault and is often a result of weaving cloth with tight and slack selvedges. It can also be caused by worn stenter clips or too much tension during processing.
Any good finisher keeps a record of his finishes and builds up a library of patterns and data, and he tries as far as possible to repeat the process for similar cloth qualities.
It is most essential that the salesman or market representative works closely with the general manager and the finisher. The market man knows the customers wants and the finishes required and should supply the works with a constant flow of market intelligence concerning design, finish and general knowledge of the business.

8. The making up and dispatch department are the places where the final inspection and checking take place. In the U.K. and U.S.A. it is usual to inspect the finished cloth over a board or table and to mark the obvious faults with a string or colour tab. Cloth is graded either first, second or third according to the number of strings put in for weaving or dyeing or printing faults, this is an arbitary number, say first grade piece no more than five strings in fifty metres. All the making-up machines length counters should be checked weekly in order to prevent over or under measuring. A loss of 5% is quite common and hinders maximum productivity. From every batch or colourway a piece of the fabric should be selected at random and checked for handle and appearance, for pick and width and compared with previous deliveries. This is the time to take and cut samples which should be kept in plastic envelopes with recorded details of processing. Income or outcome to be checked.
The dispatch department is the final operation and good recording is essential.
In my experience I have known pieces go out without invoices and invoices be sent without cloth. Complete note should be kept of all cloth damaged and kept and it is imperative that figures of lengths should be, as it were audited, mistakes can occur and usually they are against the works.

9. Another important factor in productivity is works maintenance.
The engineer or maintenance supervisor is and should be an integral part of the management team.
Dyeing and printing as already stated are becoming more and more chemical engineering operations and there must be complete liaison between the technologist and the engineer, in fact the technologist should be engineer oriented and the engineer cloth conscious.

Maintenance is a never ending problem. Machines have to be lubricated and lubrication is an enemy of clean and stainless fabric. More attention must be given to planned maintenance and the present system which is as far as I can see "breakdown maintenance" with no spares available should be helped to disappear. Planned maintenance is in the first instance more expensive but it is the right way. Planned maintenance means preventive maintenance and maintenance programmes should be drawn up and the management must insist that the programme is carried out. It means a thorough examination of all machines and the arrangement of periodic checks, weekly, monthly even yearly and regular inspections just as one must maintain a motorcar or cycle in order to get the maximum from the asset. It is a question of organisation and mutual understanding between the line management and the engineer. The matter of spares is most important and it should be possible to have sufficient without undue expense on the budget.
Breakdown maintenance is the great enemy of productivity.
Associated with maintenance is "good housekeeping". We must aim at having tidy and clean works and departments. The workmen take their lead from the supervisors or managers and insistence on a clean department result in clean cloth. The engineer can set a good example here by keeping odd bits of equipment, tools, and chocks of wood and bamboo in the proper place.

10. Another very important factor in productivity often overlooked is that of training, not only of staff but workpeople. In my opinion and that many others this especially in the developed countries is the greatest untapped source of productivity. Everybody is becoming more sophisticated they buy radios and bicycles and they usually anxious to cooperate in their work. The more one knows about a job the more interesting it becomes and operative must be taught what the job is about, the drill, and the right way of doing it. If they are well trained they can be most helpful in preventing faults and helping to cure them when they occur. If possible there should be a member of the staff responsible for training and he should produce training schemes and training manuals. Staff training should be centred around the laboratory, as I have already mentioned. Nevertheless each technologist or departmental head should make himself responsible for training his section, this means that he must be an expert at his job and able to instruct and run every machine in his department.
Dyeing and finishing are not so labour intensive as spinning or weaving but it is even more essential that he should be a master of his craft and an expert at his job. It is therefore necessary that he too should be given every help in keeping up to date, by having access to the latest books and magazines and refresher courses, with if possible visits to other factories, and assistance in joining organisations. UNIDO and Dr. Oweiss are very concerned about training and a training expert is due to arrive shortly. There will be the training of top management, middle management, and operatives.

The training expert will train the trainees at the factories who will train supervisors to train the operatives.
Top management training will be done by means of fellowships to other countries and by the other experts.

Production Planning and Control.
These are of course managerial functions but as every supervisor technologist is a part of the management team it is essential that he should be aware of the importance of these factors in the aim of maximum productivity.
It is a matter of utilising the productive resources to the best possible degree, of matching work to machines, of method study and work measurement.
There must be records of production and down time and reprocessing, in order that faults can be identified and responsibility allocated both quality-wise and maintenance-wise. There must be constant detailed planning and collection of data. If possible targets should be given to every department and frequent meeting should be held to report progress and hold-ups.

11. Finally last but not least, there is the costing function. The costing department monitors the productivity and is dependent on adequate feedback from the various departments and supervisors and engineer. It should be responsible for the documentation of stock control both receipt and issues, and it should work in close collaboration with the wages and pricing sections.• Without accurate costing, a works is like a blind man and it is so easy to work hard and yet make no progress.
The department has the job of giving targets and making budgets and projections and measuring real productivity. The significant costs in dyeworks and printworks are steam and power, dyestuffs and chemicals, wages and salaries, and maintenance and it is essential that all the staff are aware of importance of economy in all these aspects and outgoings. Bound up with these expenses are the great items of waste, damaged and downgraded cloth, dyestuffs and chemicals going down the drain in excess, menders and cobblers, imperfect goods over bleached, underbleached, badly dyed, badly printed - the causes are many and various but they all lead to waste of steam, waste of power, waste of money and effort and productive resources.
Well that's all for now. I have not dealt with any of the items on great depth but I hope that I have given you enough to think about and stimulate you in the search for greater productivity in your various works.

Questions.

Division into small syndicates in the afternoon where we shall consider.
1. What are the necessary requirements of a good technical supervisor ?
2. What system of documentation do you think advisable in a finishing works ?

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DISCUSSION

I. LABORATORY

Questions : Mrs. Purwanti Kusno (I.T.T.)
Miss Isminingsih (I.T.T.)
Mr. Hendrodyantopo (I.T.T.)
Mr. Iman Soetjipto (Ditdjenteks)
Mr. Arifin M. (Ratatex)

1. Laboratory equipment necessary used in the unit of the finishing works are :

   - colour matching lamp
   - ultra violet and Tungsten lamps
   - balance
   - microscope
   - dyeing pots
   - pH meter
   - washing wheel
   - viscometer
   - strength tester
   - mangle
   - foulard
   - jig
   - heater
   - baking chamber
   - steamer.

   For larger size unit of finishing works it should be equipped with moisture conditioning room and also a library.

   Note : According to the audience the number and the cost of the equipments are too big.

2. The kinds of tests that should be held are :

   a. Bleaching : pH test
   fluidity test
   reflectance

   b. Dyeing :
   - visual test
   - chemical test
   - pH test
   - fastness to light
   - fastness to washing
   - fastness to ironing
   - fastness to crocking.

   c. Finishing :
   - appearance
   - pick
   - width
   - washing
   - handle
   - strength
   - shrinkage
   - crease resin

3. a. There is no agreement about the best instrument for colour matching up to now.

   b. Sewing test is carried out by sewing two pieces of cloth with high speed sewing machine and evaluate by visual method.

4. In order to get the same results as in the laboratory it is necessary to have good machinery and to weight the chemicals properly not only by approximation.

5. Laboratory facility is used both for testing and training. The cost of the laboratory works is less than 1% of the total cost. All dyestuffs and chemicals should be analysed first as each package might be different in quality.

6. It is necessary to compile good documentation to reduce the excessive work and cost for the same processes.

II. QUALITY CONTROL

Questions	: Miss Isminingsih	(I.T.T.)
	Mr. Iman Soetjipto	(Ditdjentoks)
	Mr. Arifin M.	(Ratatex)
	Mr. P.H. Human	(G.K.B.I.)

1. Although each department has its own testing section it is necessary in large work to have special people who deal with quality control.

2. To avoid the trouble of the following processes supervisor should report the origin and the kind of the faults.

3. To obtain the same product it is necessary to have attention on the pick up and the wet condition of the cloth as it will give different result even by using the same system or method of processes,

4. It is a good idea that each finisher and technician have a loupe to check the cloth construction and to determine the right following process.

5. Each package of the dyestuff and chemical should be tested.

6. Metal detector is the only apparatus to eliminate the small metal carried by the cloth and hence it is important to inspect the grey cloth, weaving and the machine.

III. PROCESSING

Questions	: Mr. Djadjang Hirawan	(P.T.G.)
	Mr. Nansal Chan	(Delimatex)
	Mr. Arifin M.	(Ratatex)
	Mr. P.H. Human	(G.K.B.I.)
	Mr. Ashari	(Texin)

1. The finishing machine for cotton for example an open jig and a steamer stenter cannot be used for synthetic fibres.
   Carrier dyeing system may be used with open jig, but it will take longer time. High temperature heating cannot be obtained from steam.
   Pin clip for synthetic fibre should be a head pin clip.

2. The steamer can be used for dyeing and also for bleaching or whitening.

3. In roller printing there is no correlation between the depth of the engraving and the depth of the shade and it is influenced by the washing process.

4. For scouring, bleaching and finishing each kilogram of the cloth needs approximately 45 litres of water.

5. To improve the lustre of the cloth printed with pigment it is necessary to check the scouring and bleaching and have a trial on mercerisation.

6. Mercerising process may be carried out with the grey or the bleached cloth and will give the same effect. If it is done with the grey cloth the caustic solution is dirty but the following scouring process will be mild.
   Heavy cloth is generally mercerised as grey. It is common in Indonesia to use chainless mercerising unit which gives less lustre.

7. It is emphasised not to use several brands of dyestuff.

8. The moisture content of the cotton fabric is about 8%. Dyeing and printing need dried but finishing not so dried. It is better to run the cloth through a conditioning room before calendering.

IV. OTHERS

Questions : Mr. Harun Hardjito (P.N. Insan)
Mr. Madheta (Ditdjenteks)
Mr. Nusjirwan Salim (P.T. Sumber Sandang)
Mr. Djamil Usman (Ditdjenteks)

1. To calculate the production one may use meter or kilogram as units.

2. As approximation direct and indirect cost can be written as follows :

dyes	10%
chemicals	10%
salary/wages	30%
steam & power	25%
maintenance	7%
profit	25%
depreciation	-

3. It is difficult to determine an economic size of a finishing plant in Indonesia at this moment. A small plant will not yield good operating efficiencies and a very large plant is difficult to maintain at full capacity. In the U.K. the usual size was from 12,500,000 metres per annum to 25,000,000 metres.
There are now a few plant of operating at 30,000,000 - 50,000,000 metres per annum. In Indonesia it is essential to try to work the plant 24 hours a day, 7 days a week as capital is more expensive than labour.

4. The main limiting factors in the finishing plant are the styles and market demand. The tendency is now to integrate with spinning and weaving production. Capital available is of course always a limiting factor.

5. The equipment in Indonesia is a mixing of old and new. The new is sometimes very good. The way to deal with our data of machines is either scrap or modify. Old machinery well maintained can produce good finishing work.

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CONCLUSIONS OF THE SEMINAR "HOW TO IMPROVE PRODUCTIVITY IN FINISHING" HELD AT INSTITUTE OF TEXTILE TECHNOLOGY BANDUNG ON MARCH 30, 1972.

After considering the paper delivered by Mr. John E.H. Bennett, a UNIDO Expert and after discussing the problems concerning the condition of Textile Industries in Indonesia at this moment the seminar has drawn these following conclusions,

1. There is still a possibility to improve productivity in the finishing plants in Indonesia.
2. To improve the productivity in finishing works these following factors should be fulfilled :
   1). Laboratory facility in finishing works is very important because either the quality or quantity of the production can be planned through the laboratory works.
   The investment of the laboratory equipments is large, but in turn it can be used as saving and moreover it is only less than one percent of the total production cost.
   2). Documentation of the process in detail is very important so as to avoid any identical trial in the future and consequently to reduce the production cost.
   3). It is necessary to have a good mill organisation acceptable by technologists and the engineer should be combined as an integral part of the management team.
   4). Training should be conducted both for staffs and direct labours. Laboratory is the training place for staff.
   5). Dyeing & Printing departments are the keys of the finishing works and cleanliness of the plant and good maintenance of the machinery should get attention seriously.
3. To obtain high productivity there should be a system in implementing those above factors effectively.

The conclusions have been made for the benefit of developing the Indonesian Textile Industries.

CHAIRMAN
OF THE STEERING COMMITTEE OF
THE FINISHING SECTION,

(SANTOSA S.Teks.)

SUATU USAHA MENINGKATKAN PRODUKTIVITAS
PADA PABRIK TENUN

1. PENGANTAR KATA

Tulisan ini merupakan ringkasan dari apa jang telah saja sampaikan pada Seminar untuk para Ahli2 Tekstil jang telah diadakan di Bandung pada tanggal 30 Maret 1972 oleh Projek UNIDO.

Pada waktu itu saja hanja berkenan berbitjara selama $3\frac{1}{2}$ djam sadja, sehingga saja terpaksa membatasi diri pada topiks saja jang singkat dengan problem teknologi jang praktis dan sederhana, jang sangat diharapkan dan dibutuhkan oleh para Ahli Tekstil disini.

Tentu sadja adalah sangat perlu untuk memperhatikan pentingnja Administrasi, Marketing, dsb.; tetapi dengan alasan tersebut diatas terpaksa kami tunda hal tersebut pada kesempatan lainnja.

2. KEISTIMEWAAN INDUSTRI TEKSTIL

Dibandingkan dengan industri2 lainnja, industri Tekstil merupakan industri jang labour intensive; ini berarti bahwa baik kwalitas ataupun kwantitas dari produksi tergantung tidak hanja pada peralatannja tetapi tergantung djuga pada karyawannja sendiri. Dalam hal ini, industri Tekstil mempunjai dasar jang berbeda dari industri peralatan lain, misalnja industri Kimia.

3. KEISTIMEWAAN DARI INDUSTRI TENUN

Pada sebuah mesin Pintal jang memiliki 400 spindle, tidak akan pernah berhenti hanja karena satu benang putus, akan tetapi 399 spindle lainnja tetap akan memproduksi benang.

Berbeda dengan proses pemintalan ini, sebuah mesin tenun berhenti misalnja, 5000 benang akan berhenti semua hanja disebabkan putusnja satu benang lusi sadja, ini berarti bahwa 4999 benang lusi lainnja berhenti tidak berproduksi. Perbedaan antara Pertenunan dan Pemintalan inilah jang tak dapat dikesampingkan.

Dengan kata lain, tidaklah begitu mudah untuk menaikkan produksi pertenunan; karena agar produksi pertenunan dapat berdjalan continue maka tak sehelai benangpun boleh putus. Saudara haruslah berusaha agar djangan ada benang jang putus walau sehelaipun supaja produktivitas pertenunan baik. Tidak ada usaha lain jang dapat menaikkan produksi, jang dalam hal ini kebutuhan kwalitas raw-yarn dan lusi pada beam sangat penting dan menentukan.

Seperti telah diterangkan diatas, beam ini dihasilkan buruh jang digunakan dalam proses Persiapan dan kwalitas dari padanja terutama ditentukan oleh aktivitas dari buruh itu.

4. PENTINGNJA KWALITAS DAN KWANTITAS PRODUKSI PERTENUNAN JANG TAK DAPAT DIPISAHKAN

Bila sehelai lusi putus, mesin tenun dan produksi akan berhenti bersamaan; putusnja benang tentu sadja akan menjebabkan tjatjat2 kain misalnja, lusi hilang, pakan menjilang dsb.

Dalam hal benang pakan putus, keadaan akan sama dengan pada lusi putus. Apabila mesin tenun lantjar, produksipun akan berdjalan terus dan tjatjatpun tidak akan terdjadi ketjuali ada sebab2 lain. Itu semua berarti tak seorangpun dapat menaikkan produksi pertenunan tanpa perbaikan mutu kain dan djuga mutu kain jang baik dapat ditjapai hanja dengan produktivitas Pertenunan jang baik.

Djadi semua peningkatan2 dari produksi, kwalitas dan ongkos dipertenunan hanja tergantung pada berkurang putusnja benang selama proses; keadaan ini tidaklah dilebih-lebihkan. Setiap Teknokrat Pertenunan jang berpengalaman di dunia setudju akan hal ini.

5. PENTINGNJA KWALITAS RAW-YARN

Pada setiap industri, kwalitas bahan baku adalah sangat penting; hal ini tidak perlu dikatakan lagi. Tetapi industri Pertenunan terutama, hal ini tidak akan pernah dapat dikesampingkan. Bila terdjadi ada sehelai benang jang bermutu kurang diantara 5000 benang lusi lainnja, maka semua 4999 benang lusi lainnja akan ikut berhenti hanja karena adanja sehelai benang jang putus sadja.

Semua Ahli Teknologi Pertenunan Dunia jang berpengalaman akan mengerti bahwa lebih dari 60% sebab berhentinja mesin tenun disebabkan adanja tjatjat2 pada raw-yarn-nja.

6. PENTINGNJA PROSES PERSIAPAN

Kita dapat melihat bahwa terlalu banjaknja benang putus disebabkan kesalahan jang ada pada proses Persiapannja, misalnja sambungan jang kurang baik pada pengelosan, tidak tjukup dan kurang baiknja pengandjian, waste benang, lusi jang kendor dan debu2 serat dll. Tanpa memperbaiki kekurangan2 pada Persiapan, tak seorangpun dapat mengelakkan terdjadi mesin tenun berhenti dan penurunan kwalitas kain pada saat jang bersamaan.

Tambah lagi kami dapat melihat bahwa banjak pabrik jang telah membuat benangnja mendjadi turun mutunja karena proses Persiapannja sendiri. Hal ini adalah sangat mengedjutkan dan menggelikan bagi mereka jang mengerti. Pada umumnja di Negara ini, terdjadi bahwa benang jang bermutu kurang lebih dibuat kurang lagi oleh pengerdjaan jang dilakukannja sendiri. Misalnja djalannja benang dimuka dan didekat slit-gauge atau slub-catcher pada mesin kelos tidak lurus, bergerak menggaruk dan menjebabkan lebih berbulu karena sudut dari slit gauge; kadang2 benang melalui tjelah jang tadjam menjebabkan menurunnja kwalitas dan putusnja benang jang seharusnja tidak perlu terdjadi

Pernah saja temui seorang Manager Produksi jang berkata kepada saja bahwa mutu benang jang dikerdjakan di pabriknja sangat rendah sehingga dia tidak dapat menaikkan efisiensi pertenunannja. Tetapi ketika kami datang kesana untuk survey, saja dapatkan bahwa mutu benang jang rendah telah lebih dikurangi lagi oleh tjara pengerdjaannja sendiri.

Seorang Manager lain pernah berkata pada saja bahwa: "Kami tidak memiliki tjukup modal untuk meng-import dan memasang mesin jang up-to date, karenanja kami tidak dapat memperoleh efisiensi Pertenunan jang tinggi".

Tetapi dari hasil survey saja, ternjata bahwa efisiensi Atm 1970, 2% lebih rendah dari pada efisiensi Atm th. 1940 & th. 1960.

Sebabnja adalah bahwa kalau dilihat dari benang dan proses Persiapan untuk kedua matjam Atm tersebut adalah sama, beam tenun dan palet mempunjai kwalitas jang sama; tetapi training dari tukang tenun pada Atm th. 1970 lebih kurang tjukup dibanding dengan jang pada Atm th. 1940 & th. 1960.

Dengan demikian memperlihatkan kepentingan jang menentukan adanja proses Persiapan dan training dari pada buruhnja.

7. PENTINGNJA PEMELIHARAAN MESIN

Dalam hal pemeliharaan mesin jang kurang tjukup dan kurang benar, Saudara tidak akan pernah dapat menaikkan produktivitas dan kwalitas Saudara.

Kenjataan pentingnja hal ini tidaklah perlu kami tekankan; tetapi sampai kini banjak pabrik kurang memperhatikan persoalan ini jang pada achirnja mereka tidak dapat memperoleh produktivitas jang selajaknja. Karena bila mesin2 baru dipasang oleh para ahlinja, semua bagian2 mesin tersebut akan berdjalan lantjar sehingga mereka merasa tidak perlu adanja pemeliharaan mesin, tidaklah lagi memperhatikannja untuk waktu jang lama dan tidak memesan spare-partnja. Sesudah demikian, sebagian besar spare-part mendjadi rusak dan efisiensi dengan tjepat menurun sedangkan mereka tidak pernah melatih para ahli mesinnja, tidak pernah mengembangkan tjara2 pemeliharaan dan tidaklah pula memesan spare-part2nja jang perlu; sehingga mereka tidaklah dapat berbuat apa2 untuk mengatasi keadaan jang menjedihkan ini. Dalam keadaan demikian mereka hanja berkata: "Kami tidak memiliki tjukup uang untuk membeli mesin2 baru, karenanja kami tidak dapat menaikkan efisiensi kami".

Untuk menghindari keadaan jang demikian, dari mula dan mulai saat ini, kita perlu Pemeliharaan dengan hati2.

Pada umumnja ada tiga matjam pemeliharaan mesin sebagai berikut:

(1) Pengaturan Pemeliharaan dan Peminjakan.

Pentingnja bagian2 mesin jang bergerak harus diatur dan diberi minjak setjara periodik dengan bantuan gauge dan skala, bagian-bagian jang usang diganti dengan jang baru. Kalau tidak demikian bagian2 jang berputar tersebut akan berada pada posisi jang salah sesudah beberapa lama bekerdja, dan gerakan tersebut mendjadi tidak efektif lagi.

Sebagai tjontoh adalah, gerakan pemukulan teropong harus disetel 2 kali sebulan, kekuatan dan waktu pukulan harus diukur dengan tepat dan diatur; roll pemukul, bos-pemukul, hidung pemukul, tongkat pemukul, sabuk penahan dan picker harus diperiksa dan diganti bila perlu; dan posisi teropong waktu berada dikotaknja harus diukur dan diatur.

(2) Reparasi.

Bila salah satu bagian mesin ada jang rusak ataupun patah, haruslah segera diperbaiki tanpa menundanja.

Untuk perbaikan ini, Saudara perlu memiliki statistik dari penggunaan spare-part2 jang penting setiap bulan atau setiap tahun dsb., dan memesannja dulu setjara periodik pada pembuat mesin jang bersangkutan.

(3) Pemeliharaan preventif.

Untuk menghindari terdjadinja ketjelakaan kerusakan mesin dan untuk memperpandjang umur mesin, pemeliharaan preventif ini perlu sekali.

Sebagai tjontoh adalah setiap mesin tenun harus diperiksa disetel dan diminjaki setiap pergantian beam ditempat-tempat dimana hal itu tidak mungkin dilakukan pada saat mesin bekerdja, dan terutama setiap 6 bulan hal tersebut harus dilakukan untuk hal2 jang lebih banjak lagi. Untuk pemeliharaan overhoul mesin-tenun perlu dilakukan setiap 3 - 5 tahun sekali tergantung pada kondisinja.

8. PENTINGNJA PEMBERSIHAN

Pembersihan di Pemintalan dan pertenunan untuk mendapatkan kwalitas dan efisiensi jang baik, dan bukan untuk memberikan pandangan jang menjenangkan bagi tamu jang datang.

Terutama fly-waste menjebabkan benang putus dan akan mentjegah perbaikan kwalitas dan efisiensinja banjak sekali.

Proses2 persiapan dimana bobbin-kelos beam dan mesin2, penuh dengan fly-waste tidak akan pernah berhasil memperoleh beam ataupun palet jang baik dan achirnja tidak akan pernah berhasil meningkatkan efisiensinja.

Fly-waste dibersihkan dan dihilangkan setjara periodik oleh operatornja dan terutama oleh pekerdja chusus jang ditentukan.

Tentu sadja djalan jang terbaik adalah dengan menggunakan mesin pembersih jang up-to-date sebagai vacuum cleaner, tetapi saudara djuga dapat melakukannja dengan tangan, fans, sapu2 bambu dan djerami, dan sebagainja.

Pentingnja pembersihan di Persiapan dan djuga di Pertenunan tak seorangpun dapat mengesampingkannja.

9. PENTINGNJA TRAINING

Sampai sekarang kuntji pekerdjaan di Pabrik Pertenunan masih dikerdjakan dengan tangan, misalnja di proses pengelosan, kelos akan berputar dan benang digerakkan oleh mesin, tetapi bila benang putus, maka penjambungan biasanja harus dilakukan oleh operator; dengan demikian apabila mereka tidak terlatih baik maka sambungan benangnja kurang rata dan tidak begitu kuat dan pula tegangan benang jang dikerdjakan tidaklah tjukup untuk menghindari perbedaan tegangan lusi.
Semua tjatjat ini akan menjebabkan menurunnja efisiensi mesin tenun pada achirnja.

Bagaimanapun djuga saja dapat menekankan disini bahwa betapa penting dan perlunja latihan dari para buruh, lebih dari pemasangan mesin jang up-to-date; sebagai pengalaman saja selama 20 tahun di Pertenunan.

10. PENTINGNJA DIADAKAN TESTING

Pabrik Saudara tentulah bukan suatu Institut, Akademi ataupun Universitas; dengan demikian saudara tidaklah perlu memiliki peralatan testing jang ber-matjam2, mahal2 dan rumit.

Tetapi se-tidak2nja saudara membutuhkan untuk mengetest kwalitas raw-yarn dan benang kandjinja, sifat2 alam dari bahan kandji, viscositas, deradjat pH dan temperatur dari bubur kandjinja.

Dalam hal ini, peralatan tersebut dibawah seharusnja dibeli dan dipasangkan pada Laboratorium saudara, jaitu :

1) Alat pengetest kekuatan benang tunggal (tensile Tester) dengan pandjang benang jang di-test 50 cm.
2) Alat pengetest tahan gosok untuk benang jang dikandji.
3) Alat analysa kimia
4) Alat pengukur viscositas & stop watch.
5) Kertas pengetest deradjat pH.
6) Thermometer.

Semua alat2 termaksud tidaklah mahal dan saudara akan dengan mudah dapat membelinja dan semuanja sangat berguna untuk memperbaiki produktivitas saudara.

11. PENTINGNJA PENGAMATAN LANGSUNG OLEH MANAGER PRODUKSI SENDIRI

Seorang Manager Produksi, jang saja maksudkan adalah Ahli Teknologi Tekstil tertinggi pada pabrik jang selalu sibuk dan sukar meluangkan waktunja untuk mengamati langsung; walaupun demikian dia tetap perlu sesering mungkin mengerdjakan pengamatan tersebut sendiri.

Hanja dengan daftar pengamatan jang dilakukan oleh bawahannja, dia tidak dapat mengerti se-ketjil2nja sebab dan situasi sesungguhnja efisiensi pertenunan dan berhentinja mesin tenun : dengan demikian dia tidak dapat mengambil djalan jang terbaik untuk memperbaikinja.

Dan djuga selama pengamatannja jang langsung dia dapat meneliti kegiatan para buruh, kondisi perawatan mesin dsb., untuk mendapatkan keterangan2 bagi perbaikan2 selandjutnja.

12. BAGAIMANA TJARANJA MEMPERBAIKI PRODUKTIVITAS PADA PABRIK TENUN

Apabila saudara sekarang sudah betul2 mengerti prinsip2 jang diterangkan diatas, maka dalam mengatasi persoalan2 sudahlah dengan sendirinja akan mengikuti tjara2 sbb. :

L a n g k a h   p e r t a m a

Mentjari Efisiensi Pertenunan Saudara dengan Tjara Penghitungan Langsung (Snap-Reading).

Manager pabrik perlu datang sendiri diruang pertenunan dan langsung datang ke mesin2 untuk dapat menghitung djumlah mesin jang djalan, sesering mungkin, pada pagi, sore dan malam hari untuk kemudian menghitung %-age efisiensinja.

L a n g k a h   k e d u a

<u>Mentjari djumlah frequensi absolut berhentinja mesin.</u>

Manager memilih sebuah grup dari ± 20 mesin jang dipilih setjara random dan berdiri didekatnja selama satu djam untuk mentjatat berapa kali mesin berhenti disebabkan oleh lusi dan jang disebabkan oleh pakannja.

L a n g k a h   k e t i g a

<u>Mentjari sebab musabab berhentinja mesin.</u>

Manager datang langsung ke mesin2 sebagai pada langkah pertama dan mentjatat factor2 sebab berhentinja mesin2.

L a n g k a h   k e e m p a t

<u>Mendapatkan waktu berhentinja setiap mesin dan kegiatan tukang tenun</u>

Manager berdiri pada suatu tempat diruang pertenunan dan memperhatikan berapa lama setiap mesin jang berhenti dibiarkan tanpa reaksi tukang tenun. Pengamatan ini seharusnja dilakukan sesering mungkin.

L a n g k a h   k e l i m a

<u>Menganalisa data2 hasil pengamatan tersebut.</u>

Manager memerintahkan pada bawahannja untuk menghitung dan membuatkan daftar hasil dari pengamatan langsungnja. Dengan daftar tersebut akan dapat dimengerti sebab jang sebenarnja mengakibatkan rendahnja efisiensi pertenunannja.
Mungkin manager akan merasa heran mengetahui dari fakta bahwa sebab utama dari rendahnja efisiensi dipertenunan adalah mutu jang kurang dari beam2 lusi dan ketidak mampuan serta kegiatan jang irasionil dari tukang tenun.

L a n g k a h   k e e n a m

<u>Melatih tukang tenun dan menundjuk pekerdja chusus untuk menjambung lusi rusak, membongkar pakan dan memasang palet untuk ATM otomatis.</u>

1) Melatih tukang tenun.

Tukang tenun harus bekerdja tidak hanja tjepat tetapi harus dapat berfikir rasionil. Kebanjakan tukang tenun terlalu menjibukkan diri pada penjambungan lusi jang banjak rusaknja sehingga membiarkan ATM lain jang djusteru hanja sehelai lusinja sadja jang putus; dalam hal ini tentu sadja mereka lebih perlu datang pada ATM jang berhenti dengan sebab jang sederhana dulu dan terus mendjalankannja lagi, dan baru kemudian pergi ke ATM jang berhenti dengan sebab jang lebih rumit.

Dengan kata lain, mereka perlu dilatih lagi untuk selalu ber hati-hati pada semua mesin jang diawasinja, bahkan meskipun mereka sedang mengerdjakan sesuatu pada salah satu ATM-nja; agar didapat efisiensi mesin jang maksimum.

2) Menundjuk pekerdja chusus.

Untuk mendapatkan efisiensi mesin jang tinggi, kita perlu mempersingkat waktu mesin berhenti seketjil mungkin; jang berarti tukang tenun perlu mengkonsentrasikan kegiatannja untuk mendjalankan lagi mesin jang berhenti setjepat mungkin.
Bagi tukang tenun, menghilangkan waktu untuk menjambung lusi jang rusak, membongkar pakan di mesin dan djuga memasukkan palet pada teropong ATM otomatis dll., tidaklah mungkin dilakukan sendiri; untuk itu harus dikerdjakan oleh pekerdja chusus.

L a n g k a h   k e t u d j u h

Memperbaiki proses pengandjian.

Tidaklah hanja resep kandjinja sendiri, tetapi tjara mentjampurnjapun harus dilakukan dengan hati2, dan sudah barang tentu bahan kandjinja sendiri.

Benang (raw-yarn) pada umumnja sangat berbulu jang ada di Indonesia dengan demikian penutupan jang sempurna dengan film dari kandji dengan kuat harus diperoleh untuk mengatasi pembentukan mulut lusi dan gosokan sisir waktu pengetekan di mesin, dan djuga penetrasi pada benang harus baik; kalau tidak demikian kandji dipermukaan benang akan hilang sia2.

Pada industri Tekstil dikenal dua matjam pengerdjaan pengandjian jaitu kandji benang lusi dan kandji di finishing. Kepentingan kedua matjam pengandjian tersebut adalah sangat berbeda; pengandjian lusi dilakukan untuk menambah kekuatan dan melindungi ketahanan gosok benang dari gerakan2 mekanik, sedang pengandjian di finishing untuk kain2 tenun diberikan untuk tudjuan perdagangan seperti tampak lebih baik dan berat kain jang memenuhi dsb.

Bagi finishing, tapioca ini sangat baik untuk dipakai karena mudah dibuat pasta, tjemerlang dan djuga sangat murah.
Tetapi bagi pengandjian benang lusi, tapioca ini tidaklah dapat dikatakan baik dengan berbagai alasan sebagai berikut :
1) Daja adhesinja lemah.
2) Viskositasnja tidaklah stabil dan menurun dengan tjepatnja pada saat pemasakan dan sesudahnja.
3) Lapisan Filmnja dalam keadaan kering tidak kuat.
4) Daja mengisap airnja tinggi, dan bila humidity pada saat proses menenun terlalu tinggi maka tahan gosoknja dengan tjepat menurun sehingga benang kandjian mendjadi sangat lunak dan berbulu.
5) Pengasaman sesudah mendjadi pasta lebih tinggi bila dibanding bahan kandji alam lainnja, dan viscositas turun dengan tjepat.
6) Daja penetrasi pada benang rendah sehingga kandji hanja berada di sepandjang permukaan benang dan mudah hilang pada saat pembentukan mulut lusi dan pengetekan.

Di Inggris, mereka pernah memakai tapioca untuk mengandji lusi sewaktu bahan kandji lainnja mendjadi mahal pada sekitar tahun 1903, tetapi efisiensi pertenunan turun dengan sangat besar, dan sesudahnja mereka tidaklah pernah lagi menggunakan tapioca untuk mengandji lusi lagi, demikian beberapa buku mengatakannja.

Akan tetapi karena tapioca adalah salah satu produksi Dalam Negeri saudara, maka kita perlu menggunakannja sebanjak mungkin, dengan hati2 memperhatikan hal2 sbb.:

1) Tapioca mempunjai kwalitas jang berbeda-beda tergantung dari tempat dihasilkan, musim panenannja dsb. Kita perlu mengembangkan Standar pemasakan dan pemeriksaan bahannja.
2) Waktu pemasakan dan temperaturnja haruslah difikirkan dengan masak-masak dibandingkan dengan bahan kandji lainnja.
3) Penetrasinja tidaklah begitu banjak, karenanja pemberatan dan djumlah roll pemerasnja harus ditambah.
4) Bahan anti gosokan, seperti wax perlu ditjampurkan.
5) Obat pembasah djuga harus ditjampurkan.
6) Kandji bekas, misalnja telah dimasak sehari sebelumnja tidak boleh dipakai.
7) Karena mutu tapioca jang kurang tersebut dan tendensi % age fluctuasi penjerapan kandji pada benang akan sangat bervariasi; karenanja kita perlu menambah kandji tapioca lebih banjak bila dibandingkan bahan kandji lainnja. Paling tidak 15% sampai 20% untuk kain2 shirting.
8) Sebagian tapioca perlulah digantikan dengan bahan kandji jang lebih baik lainnja seperti PVA, kandji djagung dsb.

L a n g k a h   k e d e l a p a n

<u>Memperbaiki proses Meng-hani.</u>

Apabila beam Hani kurang baik, maka beam tenun tidak akan pernah mendjadi lebih baik. Didapatnja kwalitas beam hani jang terbaik merupakan rahasia dari efisiensi tenun jang tinggi, dan membuat semi nimal mungkin berhentinja mesin Hani adalah rahasia untuk mendapatkan kwalitas terbaik dari beam Hani.

Sistim penggantian kelosan/cheese pada proses ini sangatlah penting selain kwalitas kelosnja sendiri. Peralatan pemberhentian mesin dan pendjaga putusnja lusi sangat perlu untuk dipelihara dengan sangat hati2.

L a n g k a h   k e s e m b i l a n

<u>Memperbaiki proses mengelos.</u>

Sebagaimana diterangkan pada langkah ke-8, untuk mendapatkan efisiensi pertenunan jang tinggi maka kwalitas dari kelosan perlulah diperbaiki.

Perlunja proses ini bukanlah hanja membuat gulungan jang lebih besar dari bobbin pemintalan jang ketjil, tetapi djuga untuk menghilangkan tjatjat benang seperti adanja slub, fly-waste dari Pemintalan dan bagian2 jang lemah benang dsb.; oleh slit gauge dan tegangan benar. Dengan demikian slit gauge tentu sadja harus distel sesuai dengan nomor benang dan kwalitasnja, semua djalan jang dilalui dan tempat2 jang bersinggungan dengan benang haruslah diperiksa agar tidak terdjadi bahwa mutu benang jang kurang akan mendjadi lebih kurang lagi karena prosesnja sendiri.

Alat penjambung benang haruslah digunakan karena penjambungan dengan tangan merupakan sebab utama rendahnja mutu kelosan.

Alat pemberhentian mesin harus djuga distel agar pengerdjaan djalan-lantjar, kalau tidak gesekan jang kurang baik antara drum dengan kelosan akan menjebabkan selain berkurangnja mutu benangnja djuga kesukaran penguluran lusi di proses meng-hani.

L a n g k a h   k e s e p u l u h

Menambah djumlah gulungan benang setiap Palet.

Hal ini akan banjak menaikkan efisiensi pertenunan selain kwalitas kainnja di beberapa pabrik, masalah ini dilupakan dan banjak digunakan palet jang berisi sedikit pada teropong.

Kekerasan gulungan benang dan djumlah lilitan benang setiap pitch harus diberikan dengan baik, bila tidak demikian akan menjebabkan kesukaran di teropong pada saat penenunan. Tentu sadja pada teropong perlu dirawat lebih hati2 terutama arah dan kedudukan dari pada spindle untuk meletakkan palet haruslah dibetulkan satu persatu untuk menghindari terdjadinja sentuhan permukaan palet pada teropong.

L a n g k a h   k e s e b e l a s

Merawat dan menjetel mesin setjara periodik.

Hal ini harus didjalankan untuk semua mesin dengan tjara jang benar dalam mempersiapkan spare-part2 jang diperlukan.

L a n g k a h   k e d u a b e l a s

Tindakan jang diambil kemudian.

Sampai efisiensi pertenunan mentjapai 85 - 90%, kita belum dapat menambah djumlah mesin setiap tukang tenun dan djuga tidak dapat menambah putaran mesin. Pertama-tama kita berusaha menaikkan efisiensi pertenunan pada kondisi sekarang, barulah kita dapat menaikkan baik djumlah mesin setiap tukang tenun maupun ketjepatan mesinnja; dan hal ini haruslah dilakukan setapak demi setapak. Dan achirnja kita mentjapai pada efisiensi jang tertinggi dari pertenunan dengan mesin dan peralatan sekarang; barulah kita perlu meminta investasi baru untuk mesin2 jang up to date.

13. K E S I M P U L A N

Adalah tidak beralasan dan kesalahan besar mengatakan bahwa kita tidak memiliki uang sehingga tidak dapatlah kita meningkatkan efisiensi pertenunan, hampir semua apa jang diterangkan diatas tidaklah membutuhkan uang.

Peningkatan dari pabrik tenun dapat ditjapai hanja dengan studi jang hati2 dan sabar, latihan dan pengawasan.

Semua negara jang madju industri tekstilnja telah berhasil hanja dengan tjara tersebut.

"Tidaklah ada djalan istimewa pada Pertenunan". Tak seorangpun memiliki sihir untuk menaikkan produksivitas pertenunan.

Setiap orang jang telah mengerti dasar jang diterangkan diatas; philosophy dan kemudian mentrapkan langkah ke 1 - ke 12, tentulah akan sanggup memperbaiki produksivitas dan kwalitas di pertenunan dan sudah barang tentu ongkos total akan berkurang banjak.

A. MANAGEMENT.

1. N a m a : Sumarno M.Sc.
   Utusan : I.T.T.

   Pertanjaan : a. Sedjauh ini Saudara belum mengulas tentang kesedjahteraan dari tukang tenun.
   Bagaimana pendapat Saudara dalam masalah ini.

   b. Saja minta Saudara dapat menerangkan lebih mendetail tentang "Snap Reading" di pertenunan dan tjara hitung djumlah benang jang putus di abrik tenun.

   c. Adakah Saudara mempunjai standard :
   1. Djumlah putusnja benang lusi (dengan berbagai nomor benang).
   2. Latihan bagi tukang tenun.

   Djawab : a. Pada saat ini, management dikatakan mempunjai tanggung djawab social pada kesedjahteraan pegawai sebagaimana halnja kepada pemegang saham, konsumer, dan regional comunity. Akan tetapi tanpa keuntungan jang tjukup anda tidak dapat bergerak berproduksi karenanja tidak dapat pula meningkatkan kesedjahteraan pegawai.
   Djuga dengan sebab tersebut, Saudara perlu meningkatkan produktivitas pabrik agar Saudara dapat memenuhi salah satu kewadjiban sosial seperti jang akan saja terangkan dibawah.

   Kita harus berusaha dengan sungguh2 untuk meningkatkan dan memadjukan kesedjahteraan pegawai, karena hal ini merupakan problem jang sangat penting; bukan hanja untuk kepentingan nasional sadja tapi djuga untuk kepentingan management itu sendiri.
   Bila kesedjahteraan pegawai sangat rendah dan amat menjedihkan, Saudara tidak dapat mengharap pada mereka untuk dapat bekerdja sama dalam meningkatkan produktivitas di pabrik Saudara; dan apabila produktivitas tidak tinggi Saudara tidak dapat meningkatkan kesedjahteraan mereka karena sedikitnja keuntungan dan modal.
   Kesedjahteraan pegawai dan produktivitas merupakan hal jang saling erat hubungannja dan tidak dapat dipisahkan.

   b. "Snap reading" adalah suatu tjara jang dapat dikembangkan karena termudah dan merupakan tjara jang sangat efisien untuk menghitung effisiensi produksi mesin.

Sebagai tjontoh, bila Saudara mengerdjakan 100 ATM di pabrik, dan sekarang 85 ATM sedang djalan sedang 15 ATM lainnja berhenti karena benang putus, dibongkar ataupun boomnja habis, dll.; maka efficiency mekanis pada waktu itu adalah 85%. Untuk memperoleh angka tersebut Saudara hanja perlu pergi keseluruh mesin2 tersebut dan menghitung berapa ATM jang sedang bekerdja.
Tentu sadja, hal ini merupakan masalah statistik dan probability; oleh karenanja frekwensi dari survey lebih banjak akan lebih baik untuk dapat diperoleh hasil observasi jang benar.
Misalkan, untuk mendapatkan efficiency pertenunan jang bekerdja 1 shift (8 djam), Saudara perlu survey se-kurang2nja 4 kali dengan tjara ini dan menghitung rata2 dari padanja.
Meskipun demikian angka jang didapat merupakan perhitungan kasar, karena efficiency akan selalu berubah dari waktu ke waktu. Tapi harga tersebut akan tjukup bagi Saudara dalam mengawasi pabrik.
Kita tidak perlu banjak memperhatikan perbedaan persentase jang ketjil, harga jang sebenarnja per detik hanja dapat diketahui oleh Tuhan sadja.

c. 1. Standar putusnja benang dipabrik2 tenun Djepang per ATM per 10 djam adalah sbb.:

a). poplin $\frac{40\text{'s combed} \times 40\text{'s combed}}{132 \times 70} \times 38''$ lb. kain

pakan sebanjak = 6 - 7
lusi sebanjak = 5 - 5½

b). shirting $\frac{48\text{'s combed} \times 44 \text{ combed}}{85 \times 84} \times 38''$ lb. kain

pakan sebanjak = 5½ - 6
lusi sebanjak = 5½ - 6

2. Standar training untuk tukang tenun :

a. Keterangan tentang arti pakaian dinas; waktu2 istirahat, dll.
b. Keterangan dan peringatan2 terhadap tempat2 jang berbahaja pada ATM.
c. Tjara menjambung benang.
d. Tjara memasukkan benang pada lamel, gun dan sisir tenun.
e. Tjara memasukkan palet.
f. Tjara memulai dan memberhentikan mesin.
g. Tjara menjambung benang di mesin.

h. Gerakan2 alat otomatis pengganti teropong2 palet.
i. Tjara membongkar kain jang tjetjat dimesin dan mendjalankan mesin kembali.
j. Tjara mengatasi tjetjat dari lusi.
k. Tentang matjam2, nama dan sebab2 tjetjatnja kain.
l. Tjara membersihkan mesin.
m. Tjara bergerak berputar melajani sepandjang ATM.
n. Melajani boom2/lalatan lusi jang sudah habis.
o. Mengatasi kebakaran.
p. Melajani alat2 listrik otomatis.

2. N a m a : Pawitro S.Teks.
Utusan : I.T.T.

Pertanjaan : a. Bagaimana tjara2 menentukan efficiency mesin tenun. Adalah hal tersebut berdasar atas, djumlah djam kerdja, djumlah djam kerdja effektive (sesudah dikurangi djam istirahat) atau djam kerdja mesin.
Dalam hal tersebut apakah waktu2 jang dibutuhkan untuk setting mesin perlu diperhitungkan.

b. Untuk menaikkan produktivitas pertenunan tindakan apa jang harus dilakukan pertama-tama;

- melatih tukang tenun/operator, atau
- meningkatkan kwalitas benang, atau
- meningkatkan efficiency mesin, atau
- lain-lainnja.

c. Pada pabrik2 tenun jang normal, berapa persenkah standar dari putusnja benang jang disebabkan oleh pakan dan oleh lusi, jang menjebabkan berhentinja mesin.

Djawab : a. Itu semua sangat bergantung pada tudjuan dan penggunaannja dalam mengontrol pabrik.

b. Pertama-tama Saudara perlu melatih operator dan meningkatkan kwalitas benangnja bersama-sama; tanpa tindakan2 ini Saudara tidak akan pernah dapat meningkatkan efficiency ATM.

c. Berhentinja mesin sebab pakan - 40%
Berhentinja mesin sebab lusi - 55%
Perawatan dan lain2 - 5%

3. Nama : Supojo
Utusan : Insin Djateng

Pertanjaan : 1. Faktor Man Power adalah sangat penting dalam menentukan produktivitas.
Bagaimana pendapat Saudara dalam hal ini, sesudah Saudara menindjau beberapa perusahaan di Indonesia dimana disamping kurangnja fasilitas2nja terdapat pula "Mental Attitude" jang kurang.

2. Untuk mengatasi masalah psychologis ini selain training, djalan lain apakah jang dapat ditempuh.

Djawab : 1. Tentang faktor Man Power di Indonesia sebagai pengalaman saja dibeberapa Negara jang sedang berkembang di Asia dan Afrika, maka Indonesia adalah lebih baik.
Pendidikan rumah oleh orang tua dan orang2 jang lebih tua adalah penting disamping training jang diselenggarakan di pabrik2 untuk dapat meningkatkan kelemahan2 attitude sebagai jang Saudara katakan.

2. Systim "insentif" jang benar; perlu dikembangkan lebih baik lagi dari pada apa jang ada sekarang.

4. Nama : S.Kusumosudirdjo S.Teks.
Utusan : Insin D.I. Jogjakarta.

Pertanjaan : a. Saudara telah menggolongkan Industri Tekstil sebagai industri jang labour intensif.
Berapa djumlah karyawan jang minimum sebagai limit pada Pertenunan; sehingga Saudara dapat menggolongkan sebagai Industri jang labour intensif.
Sebagai kenjataannja bahwa pada Pertenunan jang modern seorang tukang tenun dapat melajani lebih dari 20 ATM.

b. Dapatkah Saudara menerangkan pada kami; berapa persenkah minimum mesin berhenti di Negara2 jang berkembang; karena dalam hal setiap mesin berhenti akan menjebabkan menurunnja efficiency dan produktivitas.

Djawab : a. Pada waktu ini di Djepang, seorang tukang tenun dapat melajani 40 - 60 ATM dengan efisiensi jang ditjapai adalah 92-95%, tapi masih pula Industri ini disebut sebagai Labour intensif, dikarenakan

baik kwalitas maupun kwantitasnja masih tergantung pada aktivitas2 operator di Persiapan dan Pertenunan.
Saat ini, kita ahli2 Tekstil, hanja perlu membandingkannja terhadap Industri2 Mekanik Modern lainnja dan tidak perlu memasukkan industri2 keradjinan tangan dalam diskusi kita ini dalam mengklasifikasikan industri2.

b. 5 - 7%

5. Nama : Kridoharsojo
Utusan : Perteksi.
Pertanjaan : 1. Dapatkah Saudara memberikan dengan detail Organisasi dan diskripsi setiap djabatan jang dibutuhkan oleh Pertenunan; misalnja oleh sebuah Pertenunan jang memiliki 300 ATM tidak otomatis jang menghasilkan kain blatju sadja.

2. Saja kira Saudara akan sependapat dengan kami bahwa salah satu sebab dari tidak effisiennja sesuatu perusahaan disebabkan kurangnja tenaga jang seharusnja dibutuhkan dan tidak adanja Job-diskripsi.

Djawab : Untuk menerangkan hal ini akan memakan waktu jang lama. Kami kira dapatlah kami tunda dilain kesempatan.

6. Nama : Sardi Bk.Teks.
Utusan : Pinda Sandang Texin Tegal
Pertanjaan : Salah satu faktor jang berhubungan dengan masalah produktivitas adalah soal gadji.
Bagaimana pendapat Saudara dalam masalah ini, dan sistim penggadjian jang mana jang baik untuk Indonesia pada waktu ini.

Djawab : Menurut kesan saja sistim penggadjian di Indonesia adalah merupakan kompensasi sosial. Kompensasi sosial sendiri sebenarnja memang perlu dan sangat penting, tapi ini adalah kewadjiban Pemerintah.
Dipabrik menurut kami lebih banjak sistim insentif perlu dilaksanakan. Misalkan pembagian gula, minjak, beras dsb. setjara merata kepada karyawan adalah merupakan warisan kesukaran dan kekatjauan dimasa lampau.

7. N a m a : Achmad Sunaryo
Utusan : P.T. Primissima, Jogjakarta.

Pertanjaan : a. Menurut Saudara adakah ini sudah tiba waktunja bagi Indonesia untuk membuat standar tentang kwalitas kain (baik untuk kain2 mentah dan jang sudah difinish).

b. Apakah standar penggadjian dari operator supervisor dsb. tergantung pada kondisi mesin dan djumlah berhentinja mesin per djam.

Djawab : a. Saja kira demikian, tetapi standarisasi untuk kwalitas kain bukanlah soal jang gampang, ini adalah pekerdjaan jang memerlukan ketekunan.

b. Ja.

8. N a m a : Sjukri Effendi
Utusan : Delimatex.

Pertanjaan : a. Kami menggunakan mesin2 tenun lama pindahan dari pabrik lain (± usia 10 tahun). Menurut Saudara dapatkah pabrik ini memprodusir kain2 halus dengan kwalitas dan produktivitas jang tinggi.

b. Berapa lamakah kondisi pabrik ini dapat dipertahankan dengan adanja ATM2 tersebut.

c. Dapatkah kami menggantungkan diri pada pabrik ini di-waktu2 jang akan datang.

d. Apakah jang harus kami lakukan untuk mempertahankan kontinuitas djalannja produksi.

Djawab : a. Ini tergantung pada kondisi mesinnja. Di Djepang ATM umur 10 tahun tidak pernah dianggap tua.

b. Sekarang di Djepang masih menggunakan ATM berumur 50 tahun, dengan effisiensi lebih dari 90%.

c. Tentu sadja, tetapi maintenance harus dilakukan sebagai jang seharusnja.

d. Lihat pada paper Seminar.

9. N a m a : -
Utusan : -

Pertanjaan : a. Dapatkah Saudara memberikan faktor2 pembanding dari effisiensi jang disebabkan oleh :

- Raw material.
- persiapan
- proses pertenunan
- man power
- kondisi ruang.

b. Apakah terdapat hubungan antara gadji jang optimum dan labour efisiensi; jang berarti bila gadji terlalu tinggi malahan menurunkan efisiensinja.

Djawab : a. Raw material 55%
persiapan 30%
pertenunan 10%
kondisi ruang 5%
man power (ini harus termasuk factor2 lainnja).

b. Dibandingkan dengan pabrik2 lain sangatlah dipengaruhi oleh efisiensi karyawan dan moral.

B. TECHNOLOGI.

1. N a m a : Nukman Hasjim
Utusan : P.N. Insan-Djakarta.
Pertanjaan : a. Berapakah unsur normal dari accessories sbb.:

- sisir
- picker
- teropong
- kaju pemukul
(semuanja buatan Djepang).

b. Berapa besar perbedaan persentase produksi njata jang diketahui dari pick-counter dan dari efisiensi produksi.

Djawab : a. - Sisir - 2 tahun
- Picker - $1\frac{1}{2}$ - $2\frac{1}{2}$ bulan
- Teropong - 1 - $1\frac{1}{2}$ tahun
- Kaju pemukul - 6 - 12 bulan

b. Prosentase efisiensi produksi adalah merupakan fungsi dari R.P.M. mesin, djumlah djam kerdja dan lebar kain jang dihasilkan, tetal pakan.
Bila salah satu faktor dari padanja diukur dengan tjara jang salah, efisiensi akan berbeda dengan apa jang diketahui dari pick-counter.

2. N a m a : Santoso S.
Utusan : B.T.N.

Pertanjaan : a. Kami memproduksi kain dengan menggunakan ATM Sakamoto lebar 48 inch.
Dalam hal menenun kain dengan konstruksi :
- benang lusi = 45's T/C
- benang pakan = 45's T/C
- Sisir Ne 64/4
- picks 70/inch

Dapatkah Saudara menerangkan :
- apakah lebih baik menggunakan single reed atau double reed.
- bagaimanakah kami dapat mengatasi static electricity.
- bagaimanakah kami dapat mengatasi floating yarn pada kain anjaman plat.

b. Untuk mengandji lusi polyester manakah jang lebih baik dipakai Tapioca atau Corn Starch.

c. Kami mohon diterangkan bagaimana standar tjara mengetes viscositas.

d. Kami mohon diterangkan setjara detail tjara-2 mengandji untuk benang kapas dan T/C dengan proses beam sising.

Djawab : a. Single reed sudah tjukup.
Menurut pengalaman saja djika pengandjian tjukup untuk T/C electric tidaklah mendjadi masalah.
Floating yarn terdjadi disebabkan banjak hal.
Pemasangan barnas/kamran, pukulan teropong, pembentukan mulut lusi dsb. nja perlu ditjek.

b. Corn starch lebih baik daripada Tapioca untuk memperoleh lapisan film jang kuat dipermukaan benang dan penetrasi jang lebih baik kedalam benang.

c. Didalam pabrik alat2 pengukuran haruslah sederhana. Untuk mengukur viscositas, maka cisco-Cup adalah jang terbaik.

d. Daja lekat kandji terhadap polyester adalah sangat rendah bila dibanding terhadap kapas. Dalam hal ini PVA lebih baik dan seharusnja digunakan.
Djuga elongation daripada serat2 polyester adalah sangat tinggi dan sangat berbahaja bagi pertenunan; ini adalah perbedaan jang menjolok bila dibanding dengan kapas.

Lain daripada itu PVA - 217 dan Corn starch adalah adhesive agent jang utama jang digunakan dalam pengandjian T/C pada saat ini.

3. N a m a : Junus Buchari
Utusan : Fawatex, Bandung.

Pertanjaan : a. Apakah saran Saudara dalam hal resep pengandjian jang digunakan untuk mengandji benang 65% tetoron dan 35% Rayon dengan no. 40/2.
Sedjauh ini kami tidak puas atas resep kandji jang diberikan oleh beberapa expert dari Djepang dan Djerman Barat.

b. Untuk memproduksi Texture filament dengan menggunakan mesin2 ATM jang ada dan menggunakan benang lusi filament.
Bagaimanakah saran Saudara sebelum kami mendapatkan ATM jang chusus untuk filament.

Djawab : a. Resep.

R/	Corn starch	125	kg
	Maconol B-19	8,5	kg
	(synthetic oil dan parafin)		
	Acrilon	30	kg
	(synthetic adhesive agent)		
	Marposol T-30	12	kg
	PVA-217	35	kg
	Corgon - S	1,2	kg
	(water softener agent)		
	P.C.P.	0,1	kg
	Total	211,8	kg
	F.V.	1.420	liter.

Sesungguhnja resep ini digunakan untuk

Poplin T/C $\frac{40's \times 40's}{135 \times 70}$

Untuk sising 40/2 T/R, Saudara lebih baik menambah airnja sampai mentjapai 2.000 l. dan mengurangi sedikit corn starchnja.

b. Untuk memprodusir lusi Texture.

Persiapan

Tiga hal harus dilakukan dengan hati2 :
1. Djangan merusak elastisitas daripada benang.
2. Djangan membuat ketidak rataan shrinkage dengan memberikan tegangan jang tidak rata.

3. Berusaha mengatasi turunnja produktivitas jang disebabkan oleh turunnja shrinkage atau twisting torque.

- untuk (1) djanganlah Saudara memberikan temperatur dan tegangan jang ekstrim pada benang.
- untuk (2) berilah tegangan lebih dari 0.07 gr/den merubah-rubah ketjepatan pengelosan.
- untuk (3) sekarang telah dapat dihindarkan dengan pengandjian. Untuk memproduksi kain matjam ini pengandjian dilakukan untuk meningkatkan persiapan dari pada di pertenunannja.
  Pengandjian dikerdjakan dalam bentuk hank dan kemudian benang kandjian dikelos dalam bentuk cone dan beam.
  ATM untuk filament dan untuk short-fibre keduanja dapat digunakan untuk menenun. Tetapi sumbi dan strip-roller harus dirubah sesuai dengan jang dibutuhkan. Dan penguluran lusi perlu diatur benar2 dan disarankan tegangan lusi adalah 0.15 s/d 0.25 gr/den.

4. N a m a : Ibnu Saleh
   Utusan : G.K.B.I. Medari Jogjakarta.

   Pertanjaan : a. Sebagai jang disarankan oleh Mr. Hoshiyama, kami telah menurunkan gandar belakang ATM; dengan tjara ini ATM berdjalan lantjar. Tetapi picks/inch menurun dari 62 mendjadi 60.
   Bagaimana tjara mengatasi kekurangan picks ini.

   b. Dengan merubah konstruksi kain dari 32's x 30's mendjadi 32's x 36's apakah setting ini dapat dipertahankan.

   c. Dapatkah saudara memberikan program maintenance/repairation bagi mesin2 tenun.

   Djawab : a. Dengan hanja menurunkan gandar belakan saja tidak mengerti sebab terdjadinja perubahan total pakan dari 62 kepada 60 picks/inch.
   Tetapi kalau itu terdjadi saudara perlu mengurangi beban pada gandar melajangnja. Dan djuga mengatur dengan baik alat penguluran lusinja.

   b. Perubahan jang Saudara lakukan hanjalah pada nomer benang pakannja sadja dari 30's mendjadi 36's atau 20% lebih halus. Saudara dapat tetap mempertahankan letak gandar belakang tersebut untuk dapat mendjaga produktivitas jang tinggi.

c. Pertama-tama saudara harus berusaha dengan sebaik-baiknja untuk menaikkan kondisi maintenance ATM saudara sampai standar jang seharusnja. Tetapi seperti pada pengetjekan jang telah saja lakukan di G.K.B.I., ATM2 nja tidak dikatakan tua, dan saudara perlu mengikuti petundjuk jang diberikan oleh pembuatnja.

5. Nama : Misbach Sudur.
Utusan : P.T.G. Garut.

Pertanjaan : a. Dapatkah Saudara memberikan keterangan berapakah besarnja tegangan benang jang se-baik2nja pada setiap proses Persiapan.

b. Berapa besarnja larutan kandji dapat masuk pada benang.

c. Berapakah besarnja specifik gravitasi (B.D.) dari :
- Serat kapas pada kain grey
- Serat kapas pada kain tjelup
- Benang kapas sudah ditjelup
- Benang kapas sesudah dikandji.

d. Berapakah efisiensi jang maksimum dapat diharapkan dari ATM jang berumur lebih dari 40 tahun. Dan berapakah tjatjat jang mungkin dapat terdjadi.

e. Dapatkah Saudara memberikan saran resep pengandjian jang terbaik dengan tapioca untuk :
- Mengandji benang kapas Ne 30's
- Mengandji benang kapas Ne 50's
- Mengandji benang kapas Ne 70's

Djawab : a. Adalah tidak mungkin memberikan djawaban jang pasti terhadap tegangan benang dalam bentuk suatu harga tertinggi karena itu harus dihubungkan dengan type dan ketjepatan mesin, kwalitas dan nomer benang, dan matjam kain jang dibuat, dsb.nja.

1. Pengelosan

Tegangan harus sedemikian sehingga mudah bagi penarikan benang2 jang rusak, dan untuk mendapatkan kekerasan jang tjukup dari hasil kelosannja.

2. Pengandjian

Draft jang maksimum dalam proses pengandjian harus dibatasi sebesar 1%. Bila tegangan benang terlalu besar maka elongation benang jang tinggal mendjadi terlalu rendah dan putusnja benang selama proses Pertenunan akan meningkat sekali.

b. Prosentase kandji jang diserap harus bertambah bila tetal lusi dan pakan bertambah, dan bila lusi lebih halus. Untuk pengandjian dengan tapioca dan benang2 hasil dalam negeri jang benang baik, sebagai standar penjerapan persentase kandji adalah sebagai berikut :

- Untuk konstruksi kain kasar 6 - 12%
- " " " medium 10 - 15%
- " " " halus 15 - 20%

c. Perhatian penanja adalah untuk memperoleh diameter benang sbb. :

Ne	Diameter (inch)
100's	0,00383
80's	0,00427
60's	0,00445
50's	0,00540
40's	0,00606
30's	0,00700
20's	0,00847
10's	0,01200

d. Efisiensi pertenunan tidak tergantung pada kondisi ATM tetapi djuga pada benang, proses Persiapan dan kondisi ruang, dsb.
Dalam hal kondisi ATM lebih banjak tergantung pada perawatannja daripada hanja umurnja.
Tak seorangpun dapat mendjawab masalah ini. Tetapi bila ATM berumur 40 th., ini dirawat dengan baik dengan tjukup spare parts, boom lusi dan palet dengan kondisi jang baik serta tukang tenun telah dilatih dengan baik, saudara dapat mengharapkan efisiensi lebih dari 90%, bahkan dalam hal ini dengan satu orang tenun melajani 40 ATM.

e. Resep :
R/
- Tapioca 50 kg
- PVA-117 17 kg
- Softening agent, mis. Meconol T 1,5 kg & B-19 2,5 kg
- Penetration agent, mis. Teepol 0,5 kg
- Water softener, mis Calgon S 0,8 kg
- Antiseptic agent, mis. PCP 0,1 kg
- pH adjustment agent, mis. Soda ash. to pH 6.8

- Air :

untuk	30's shirting	600 liter
"	50's poplin	500 liter
"	70's loan	400 liter

C. LAIN-LAIN.

1. Nama : Salura S.Teks.
Utusan : I.T.T.

Pertanjaan : a. Saja belum mengerti apa jang Saudara maksudkan step no. 2 dalam hal :
- frekwensi
- pengelompokan ATM, karena adanja kenjataan bahwa pada suatu pabrik terdapat ber-matjam2 asal ATM.

Kami mohon saudara membuatkan tjontoh problematik dan menerangkannja dalam pertemuan ini untuk kepentingan para industriawan.

b. Sesudah meningkatkan efisiensi apa jang harus kita lakukan kemudian.
- Menaikkan djumlah ATM per operator.
- Atau menaikkan RPM daripada ATM.

Apakah alasan saudara dalam hal ini.

Djawab : a. - Frekwensi absolut dari berhentinja mesin dapat dibatalkan, dan mudah dilihat dengan berapa kali mesin berhenti pada sesuatu periode waktu tertinggi. Hal ini adalah faktor jang sangat penting untuk mengontrol Pertenunan, karena efisiensi pertenunan terdiri dari frekwensi ini dan rata2 waktu berhenti mesin setiap mesin berhenti.

- Pengelompokan mesin dalam survey frekwensi ini haruslah dilakukan sesuai dengan perhatian saudara dan matjam kain atau mesin, dari situasi Pertenunan jang sekarang akan saudara observasi.

- Bila terdapat berbagai matjam ATM misalnja hanja pertenunan dengan 10 mesin, saudara boleh memilih hanja 10 ATM tersebut.

b. Itu semua tergantung pada kondisi dari operator dan maintenance ATM-nja. Bila ketjepatan ATM setjara kasar sudah tidak diperoleh : 145 Rpm (lb. 75"); 150 Rpm (lb 60"); 160 Rpm (lb 50") dan 175 Rpm (lb 44"), djumlah ATM per operator lebih baik dinaikkan dulu.

<u>DUKUNGAN</u>. :

a. Testing adalah salah satu alat untuk pengontrolan. Tetapi kita lebih sering mendengar pengusaha mengatakan : " Saja sudah ber-tahun2 mendjalankan pabrik ini dan memperoleh keuntungan tanpa sebuah alat testing-pun."
Saja setudju sekali pada pendapat Saudara bahwa kita perlu sabar dan perlu waktu untuk mejakinkan mereka bahwa lebih banjak keuntungan akan diperoleh dengan mengusahakan adanja alat2 tersebut diatas.

b. Kami harap saudara menengok kembali pada point saudara no. 3; dalam hal ini kami sependapat dengan saudara atas beberapa hal :
- Kwalitas dari benang dan Persiapan terutama tergantung pada aktivitas operatornja. Dalam pada itu bila saja boleh menambahkan; bahwa sumber utama tidak hanja dari karjawan sadja tapi djuga pada :
  - Bahan baku dari benangnja; bahwa spesifikasi serat jang baik jang dibutuhkan untuk dipintal untuk konsumsi Dalam Negeri.
  - Problem pengaturan Humidity dari proses - proses utama.
  - Problem dari Management pabrik.

c. Dalam hubungannja dengan point-6, " Kesadaran adalah faktor utama dari problematika jang ada".

Hal ini diperlukan tidak hanja dari operator sadja tapi dari Manager atau pemilik pabrik djuga.
Bagaimana Operator dapat memperbaiki benang jang putus dengan baik tanpa melatih mereka; bagaimana operator sadar atas [illegible] akibat kerusakan jang diakibatkan kesalahan setting dari slit-gauge/slub catcher tanpa memberi kesempatan memperbaikinja, operator menghabiskan waktunja untuk beladjar tanpa kesempatan mempromosikannja.
Tentu sadja hal ini adalah masalah finansiel, personal human relation atau dengan kata lain " Management ".

<u>OPOSISI</u>. :

Saja tidak sependapat dengan saudara, bila Tapioca dikatakan bahan kandji jang tidak baik. Hal ini tidak hanja karena dihasilkan di Dalam Negeri atau sangat murah, tetapi karena ternjata dari hasil thesis para lulusan I.T.T.
Dengan menggantinja oleh bahan kandji lainnja adalah merupakan masalah biaja. Saja akan setudju bila saudara akan menjarankan Standar Tapioca untuk keperluan Pertekstilan.

<u>SARAN</u> :

Dengan analisa tjatjat2 kain dapat menentukan dan menetapkan masalahnja. Inspeksi tjatjat kain adalah sangat penting. Standar tjatjat djika ada harus dipelihara.

2. N a m a : Sudjajoto S.Teks.
Utusan : -

S a r a n : a. Perlunja training.

Sampai sekarang kita tidak memiliki Sekolah Tekstil Menengah, oleh karenanja saja mengusulkan sebaiknja kita menjelenggarakan Sekolah Tekstil Menengah di Indonesia, terutama di Pusat setjepat mungkin, sehingga akan dapat diperoleh ahli-ahli Tekstil Menengah.
Selain hal tersebut diatas perlu diselenggarakan lebih banjak praktikal training untuk tekstil terutama untuk hal2 tertentu, seperti untuk pemintalan, pertenunan, peradjutan, penjempurnaan dan tjara-tjara perawatannja (untuk 1 tahun).
Itu bisa diselenggarakan dipabrik-pabrik setempat.

b. Perlunja testing.

Berilah kami kesempatan untuk mengusulkan sebagai tambahan; saja kira ada sesuatu systim quality - control untuk sebaiknja dipergunakan di-pabrik2.

c. Perlunja kwalitas benang.

Saja perlu mengingatkan saudara untuk memperhatikan prosentase extension benang selama proses dari persiapan sampai pertenunan.

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LAPORAN HASIL SEMINAR
TJARA2 MENINGKATKAN PRODUKTIVITAS PERTENUNAN
30 MARET 1972
DI INSTITUT TEKNOLOGI TEKSTIL BANDUNG

Dengan memperhatikan prasaran tunggal beserta pendjelasannja dari Mr. T. Hoshiyama, Expert UNIDO dalam bidang Pertenunan dan setelah para peserta mendiskusikannja dengan mendalam dan dengan mempeladjari masalah masalah jang erat hubungannja dengan kondisi Industri Pertenunan di Indonesia dewasa ini serta mengingat perkembangannja dimasa mendatang; seminar dengan bulat dan sepakat telah mengambil kesimpulan sebagai berikut:

1. Bahwa dengan kondisi jang ada pada Industri Tekstil Pertenunan dewasa ini, produktivitasnja masih dapat ditingkatkan lagi dengan usaha jang sungguh2, hati2 dan sabar serta pengawasan jang lebih baik.
2. Dengan adanja sifat2 chusus pada Industri Pertenunan, maka dirasakan perlunja para Ahli Tekstil chususnja Ahli Teknologi Pertenunan memahami dan menghajati dasar2 falsafah Industri ini.
3. Langkah2 untuk meningkatkan produktivitas setjara ilmiah perlulah dimengerti untuk dapat diterapkan didalam kehidupan Industri Pertenunan sehari-hari.
4. Mengingat operator merupakan unsur jang sangat menentukan produktivitas Pertenunan, maka latihan ketrampilan (training) perlu dilakukan setjara intensif dan teratur.
5. Setiap Pertenunan perlu memiliki alat2 Testing jang minimal harus ada dalam Laboratoriumnja agar produktivitas dapat didjaga dengan baik.
6. Menekankan perlunja pimpinan produksi setiap hari datang sendiri kedalam pabrik untuk dapat segera mengevaluasi pelaksanaan produksinja.
7. Menekankan pentingnja kebersihan dalam pabrik untuk memperoleh kwalitas dan efisiensi produksi, karena dengan mendjaga kebersihan pabrik dapat diharapkan meningkatnja produktivitas.
8. Menekankan pentingnja proses Persiapan, karena hanja dengan kwalitas jang baik dari hasil proses Persiapannja, akan dapat diharapkan diperoleh peningkatan produktivitas Pertenunannja.
9. Seminar menjarankan kepada semua fihak jang berkepentingan, terutama kepada Institut Teknologi Tekstil untuk terus mengadakan penelitian jang seksama terhadap Tapioca sebagai bahan kandji; mengingat starch ini merupakan produksi Dalam Negeri jang murah dan mudah didapatkannja.

Sekian laporan ini kami buat, dengan harapan semoga dapat bermanfaat bagi perkembangan Industri Tekstil chususnja Pertenunan kini dan dimasa masa mendatang.

PANITIA SEMINAR
STEERING COMMITTEE BAGIAN PERTENUNAN

(WIBOWO MOEDOKO S.Teks.)
Ketua.

TJARA MEMPERBAIKI PRODUKTIVITAS DALAM PROSES FINISHING.

1. Sebelum saja mulai mengandarkan soal2 tentang perbaikan produktivitas dalam proses finishing, saja kira akan lebih baik bila kita bahas beberapa segi jang umum dan kesukaran2 dalam finishing ditindjau dari sudut ilmu pengetahuan dan seni. Kemudian disinggung hal2 jang chusus tentang teknologi dan fungsi2 management jang seharusnja kita perhatikan bila produktivitas akan dimadjukan atau diperbaiki.
Dalam tulisan saja ini saja tak dapat berbuat banjak selain memberikan garis2 besarnja sadja. Meskipun demikian saja mengharapkan bahwa dari copy jang bapak2 terima jang kemudian diikuti dengan diskusi2 maka akan diperoleh beberapa manfaat jang berguna untuk kita semua. Sebelumnja saja minta maaf bahwa saja tak dapat memberikan uraian dalam bahasa Indonesia tetapi Sdr. Rasjid akan menjalinnja dalam bahasa tersebut.
Dalam pembukaan kata, saja menggunakan kata seni. Finishing selalu dapat dituturkan sebagai suatu seni dan ilmu pengetahuan.
Ilmu pengetahuan selalu madju terus seperti jang dikemukakan oleh Lord Kelvin bahwa ukuran adalah permulaan dari ilmu pengetahuan. Sekarang kita telah dapat mengukur perbedaan warna. Tetapi kita masih berhadapan dengan penilaian2 jang berdasarkan pegangan jang tidak terukur, seperti pegangan kain; djuga penilaian dengan mata seperti kenampakan.
Pada dasarnja hal2 tersebut diatas adalah udji2 jang subjektip jang dapat dilawankan dengan pengukuran2 setjara objektip, jang sesungguhnja menggambarkan soal rasa jang seringkali menimbulkan hal2 jang sulit dalam industri finishing. Dalam bidang2 pemintalan dan pertenunan hal tersebut diatas tidak didjumpai meskipun mereka djuga mempunjai persoalan2nja sendiri tetapi tidak membitjarakan soal rasa lagi pula tidak langsung dengan langganan. Tidak demikian dengan pentjelupan dan finishing jang selalu mendapat ketjaman pertama tentang kain, meskipun pada achirnja ternjata kesalahan tersebut terletak pada pemintalan dan pertenunan.
Sebagai tjontoh kita telah mengetahui tentang variasi2 dalam pemintalan dan pertenuanan dan kita selalu segan2 untuk mengkritiknja.
Sebaliknja orang awam tak akan malu2 mengemukakan pendapatnja tentang clolour matching. Demikian pula beberapa langganan jang mungkin butawarna ataupun tidak pernah memeriksakannja, padahal 8% dari penduduk dunia laki2 mempunjai penjimpangan warna, akan mengetjam tentang colour matchingnja terutama sekali apabila warna tersebut tidak dapat diterima di pasaran.
Itulah sebabnja maka orang2 finishing sangat menghendaki adanja colour matching dengan peralatan jang mungkin dapat bekerdja dengan toleransi jang pasti seperti dalam mesin2. Hal ini tidak hanja pada soal warna sadja tetapi djuga pada persoalan pegangan dan rasa; seorang finishing mentjari suatu kwalitas jang sempurna jang mungkin dengan akibat mengeluarkan biaja jang besar dan kesabaran jang tinggi.
Semua ini merupakan udji2 subjektip jang penting. Sekarang sudah terdapat udji2 objektip jang selalu bertambah banjak djumlahnja jang harus dikerdjakan seperti misalnja udji tjutji, udji mengkeret, udji gosok, udji tahan sinar, tahan terhadap dry-cleaning, tahan terhadap air laut, tahan terhadap tjuatja dan djamur, tahan air, tahan kerut, tahan api, dll.

Disamping kesukaran2 tersebut diatas terdapat pula soal mode dan perubahan2 misalnja timbulnja serat2 baru, zat warna baru, tjara pengerdjaan baru, finish jang baru, permintaan tentang sifat2 anti-kotor, dan achirnja adalah soal pabrik supaja djalan terus dan memperoleh laba.

2. Dalam pembukaan ini Bapak2 mungkin setudju bahwa persoalan dalam finishing adalah banjak dan beraneka, dan djumlah perubahan inilah jang menondjol dalam pekerdjaan finishing. Hal2 jang saja kemukakan diatas tadi merupakan perubah2 luar atau foreign policy variables atau the home grand variables, dan sekarang kita menindjau pada perubah2 dalam jang sebetulnja lebih menampak, misalnja soal serat2 jang ber-djenis2, zat warna, zat kimia, vlot, temperatur, proses, mesin jang ber-beda2, patron, warna, dll. Soal2 inilah jang akan saja tindjau lebih landjut dari kertas kerdja saja ini, seperti pentingnja dan perlunja pengontrolan. Tempat dan pusat pengontrolan ini adalah dalam laboratorium. Saja ulangi lagi tempat dan kuntji untuk kontrol dari semua perubah2 tersebut adalah laboratorium.

3. Produktivitas dan kerdja orang finishing jang ekonomis, menurut hemat saja, tergantung pada hasil kerdja di laboratorium jang efisien, dan dari sanalah seharusnja segala kerdja bertumpu.
Suatu laboratorium jang beralatkan dan berstaff jang baik merupakan urat nadi dan pusat segala pekerdjaan.
Beberapa tugas laboratorium diantaranja :

a. Tjara kerdja di laboratorium jang terperintji dan benar.
b. Hubungan antara tjara2 laboratorium dan kerdja di pabrik.
c. Pengontrolan jang tegas terhadap semua proses di pabrik.
d. Pengontrolan terhadap zat warna, zat kimia dan serat2.
e. Tempat latihan supervisor.
f. Udji ketahanan, monitoring test, dan hubungan dengan I.T.T.

Saja sungguh2 ingin menekankan faktor pengontrolan dari laboratorium ini, karena dalam kundjungan saja di pabrik2 di P. Djawa ini ternjata pentingnja laboratorium itu bukannja merupakan suatu biaja over-head, tetapi termasuk biaja produksi dan erat pertaliannja dengan produktivitas.
Memulai pertjobaan dengan menggunakan kain jang banjak lagi mahal dengan tidak melalui pertjobaan di laboratorium adalah mahal dan tak dibenarkan. Tentu sadja kita dapat menggantungkan diri pada zat2 warna jang sudah mempunjai nama baik karena warna standar dan kwalitas dari hasilnja; tetapi hal ini tidak selalu akan berhasil. Saja dapat memberikan beberapa tjontoh dimana zat warna2 dan bahan2 kimia bernilai dibawah standar. Suatu tjontoh jang masih segar diingatan saja dimana kami mendapat kesukaran dengan bintik2 warna hidjau waktu mentjelup dengan zat warna bedjana kuning. Achirnja kami menemukan bahwa bintik2 tersebut disebabkan oleh zat warna hidjau untuk shading, karena sudahlah umum, bahwa suatu zat warna itu distandarisir dengan penambahan zat warna lain untuk shading seperti apa jang biasa dilakukan dalam pentjelupan atau printing. Tjontoh ini dapat merupakan pekerdjaan jang mahal oleh karena tidak mempergunakan pekerdjaan di laboratorium untuk mentjarinja.

Segi lain jang hendak saja adjukan meskipun tidak demikian saja tekan kan adalah kesempatan untuk latihan anggaran staff didalam laboratorium.
Setiap orang muda jang baru sadja selesai kuliah dari universitas atau dari I.T.T. kemudian terdjun ke pekerdjaan finishing seperti halnja anak ketjil. Saja katakan bahwa dia masih hidjau. Ia masih memerlukan waktu pertjobaan, waktu untuk menjelaraskan pengetahuan jang dia peroleh dari bangku kuliah dengan pekerdjaan praktis. Ini bukan hanja merupakan sesuatu jang patut diketahui sadja, tetapi mendidik dia dengan latihan apa jang terdjadi didalam tugas tersebut, menuntun dia dalam produksi jang besar dan dalam persoalan2 produktivitas.
Maka pentinglah untuk dia supaja tinggal di laboratorium selama satu dua tahun sebelum memberikan padanja suatu tanggung djawab.
Pentjelupan dan printing akan madju mengarah kepekerdjaan insinjur kimia laboratorium kemudian merupakan pilot plant jang dilengkapi dengan peralatan jang ketjil sesuai dengan proses2 di pabrik.
Luas kerdja di laboratorium akan bervariasi dapat ketjil atau besar maka perlulah menindjau I.T.T. sebagai pusat laboratorium. Mereka wenang diadjak berbitjara dan diminta nasehat tentang staf, tjara kerdja dan prosedur. Maka hendaklah didjalin hubungan erat antara pekerdja dengan I.T.T. demikian pula sebaliknja.

4. Saja dapat berbitjara tentang laboratorium lebih pandjang lagi, tetapi akan saja teruskan tjeramah ini pada topik berikutnja jang manjangkut produktivitas, jakni organisasi pekerdjaan. Organisasi adalah suatu fungsi dari management dan harus mendjadi perhatian bagi semua supervisor dan teknolog2 jang berada dalam suatu team management.
Organisasi adalah suatu bentuk jang membagi pekerdjaan diantara orang orang dalam usahanja untuk mengkoordinir (mengatur) sesuatu tudjuan tertentu.
Seseorang tidak dapat mengerdjakan segala sesuatunja tanpa membagi antara fungsi dan tanggung djawab. Di Indonesia sedjauh jang telah saja lihat pekerdjaan2 diorganisasikan (diatur) pada sistim klasik (Classical system) dengan suatu rantai penugasan (perintah) jang tegas, sesuai dengan sistim militer (army style). Disini ada manager utama(general manager) dan beberapa departemen dengan kepala bagian seperti bagian pemutihan, pentjelupan, pengetjapan. Suatu hal jang mengherankan adalah bahwa saja belum pernah mendjumpai sesuatu atau seseorang jang mengurus soal quality control.
Diagram berikut ini dapat disarankan untuk suatu pabrik dengan ukuran sedang.

General Manager

Office Manager (Administrasi) | Work Manager (Produksi) | Engineer (Teknik) | Quality Control (Evaluasi)

Chemist (Ahli Kimia) | Bleacher (Pemutihan) | Head Dyer or Colourist (Ahli tjelup) | Finisher (Ahli finish) | Make up Despatch (Pengiriman)

Pada setiap pekerdjaan perlu adanja spesialisasi tentang tanggung djawab jang sedjauh mungkin; hal ini tidaklah mudah dan akan bervariasi sesuai dengan ukuran pekerdjaan.
Saja berpendapat bahwa disini diperlukan adanja seorang pengawas teknik (technical supervisor) jang mengurus semua hasil finishing, jakni bertanggung djawab terhadap hasil produksi kain setelah pentjelupan pentjapan, seterika kalender, penarikan dengan stenter, dan semua proses finishing setjara mekanika dan kimia, proses anti mengkeret dan anti kusut, quality control dari pegangan, kenampakan dan dimensi kain.
Dinegara-negara jang telah madju ahli finishing merupakan seorang anggota penting didalam staff. Ia mempunjai mata jang tadjam, rabaan dan pegangan jang sensitif terhadap kain, dan ia menjelenggarakan perpustakaan jang lengkap dengan tjontoh2 dan laporan2 pengiriman hasil produksi jang telah selesai. Ia bertindak sebagai ahli quality control (pengendalian mutu) dari hasil produksi achir.

5. Marilah kita meninjau djalannja suatu proses tertentu. Kita penganggap bahwa pekerdjaan rutin telah diselenggarakan oleh Pimpinan produksi, urusan laboratorium dan dokumentasi jang telah terbentuk.
Sudah mendjadi tradisi dalam pekerdjaan finishing bahwa setiap kain selalu disertai oleh dokumen (order) jang menundjukkan semua proses jang terdjadi setjara terperintji dan berurutan. Dengan kata lain untuk setiap djumlah kain harus dengan sendirinja dapat menundjukkan urutan proses jang harus dikerdjakan.
Setelah pemeriksaan kain grey, diteruskan dengan proses pembakaran bulu dan penghilangan kandji. Supervisor harus mengetjek hasil perhitungan kandji dengan melakukan pengetesan, misalnja dengan pengetesan jodium untuk tepung kandji.
Perlu diperhatikan bahwa kain untuk pentjelupan dan pentjapan harus bebas kandji. Perlu djuga diperhatikan bahwa kainnja tidak boleh terlalu lama berada dalam keadaan basah untuk menghindari bahaja djamur.
Proses selandjutnja jang lasim adalah pemasakan dan pemutihan bergantung pada djenis bahannja. Tjara jang digunakan akan bervariasi dari batch, semi kontinu, kontinu dalam keadaan untaian atau terbuka.
Harus dipikirkan pula bahan kimia untuk pemasakan dan pemutihan dan deradjat (tingkat) pengerdjaan jang diperlukan.
Pengetesan dan pengawasan terhadap pengontrolan bahan2 kimia harus dikerdjakan setjara rutin. Adalah sia2 dan tidak ekonomis untuk memulai pekerdjaan berikutnja tanpa dijakini apakah hasil pekerdjaan sebelumnja telah memenuhi persjaratan kwalitet jang ditentukan.
Dari pemasakan dan pemutihan kadang2 diikuti dengan proses merserisasi. Proses ini mempertinggi kilau, kekuatan serat kapas, dan afinitet terhadap sat warna dan mengatur bentuk benang pakan.
Proses finishing merupakan tahap jang penting maka perlu adanja perhatian jang besar terhadap ketjepatan mesin, waktu perendaman dalam kaustik soda, dan tegangan pada kainnja. Perlu djuga mengawasi konsentrasi dan temperatur dari larutan kaustik soda, pentjutjian dan pelurusan kain jang kusut.
Tjontoh harus diudji terhadap kilau, deradjat konvolusi dan stabilitas dimensi. Sebagaimana kita ketahui bahwa serat kapas akan menjusut dan penampang melintangnja akan berubah dari bentuk gindjal mendjadi hampir bulat.

6. Bagian pentjelupan merupakan kuntji proses didalam produktivitas suatu pekerdjaan finishing, dimana perhatian harus lebih ditjurahkan karena banjaknja variasi2 jang terdjadi. Tjara pentjelupan jang biasa untuk kapas adalah menggunakan jigger dan padding atau foulard, setjara batch, semi kontinu, kontinu, pad batch untuk sat warna reaktip dingin, continuous pad steam ranges atau indigosol ranges.
Bagian pentjelupan merupakan bagian jang paling susah untuk diatur karena dibagian ini tumpukan kain jang telah diputihkan harus dibagi-bagi dalam beberapa matjam proses dengan beberapa matjam warna.
Perlu diadakan perentjanaan dan perhatian setjara terperintji karena disinilah tempatnja pengolahan atau proses2 jang sangat memakan biaja. Zat warna dan bahan kimia sangat mahal harganja dan para ahli tjelup harus mendjaga (mengusahakan) supaja keuntungan jang diperoleh tidak menurun baik setjara perhitungan teoritis maupun praktis. Tetapi sajahgnja proses pentjelupan akan menampakkan tjatjat pada kain dari proses jang terdahulu, seperti tjatjat dalam pemintalan, kesalahan dalam pertenunan dan kelemahan2 pada persiapan. Bertambahnja djumlah variasi mengakibatkan adanja pengutamaan dalam hal pengontrolan dan perhatian sampai hal2 jang ketjil jang diperlukan. Hal ini dapat kita rumuskan dalam lima " M " jakni methods (tjara), machines (mesin), materials (bahan), money (uang) dan men (tenaga kerdja).
Method (tjara)nja harus betul, machin (mesin)nja harus sesuai dan terpelihara baik, dengan sistim penggunaan air dari pembuangan air jang baik, dengan pengatur temperatur jang dapat di-rubah2.

Dalam proses jigger, pekerdja merupakan orang terdidik maka hendaknja dilatih setjara chusus. Tukang timbang dan tukang pelarut sat warna serta obat2-an memegang peranan penting dalam fungsi produktivitas maka haruslah berganti dari tjara menggunakan ember dan sekop jakni tjara kasar dan praktis, kepada tjara jang lebih teliti.
Gulungan kain harus diketahui beratnja dari bak pentjelupan harus diketahui volumenja supaja perbandingan vlot dapat distandarkan, hal ini berlaku untuk jigger dan haspel.

Perlu diadakan tjontoh warna dari warna muda ke warna tua dan sebaliknja, untuk mentjegah penundaan waktu, pendidikan dan pembilasmesin jang tidak perlu.
Apabila kita beralih dari proses batch ke semi kontinu dan kontinu, maka persoalan beralih pada mesin2nja, sehingga pemeliharaan mesin merupakan faktor pokok dari suksesnja produktivitas, jang paling perlu diperhatikan adalah kedudukan rol2 apakah dalam keadaan seimbang dan berputar dengan baik, bagaimana keadaan tjelah antara pad rol (pad-nip) dan apakah rol2 (bowl) tersebut sama kerasnja.

Padder atau foulard merupakan subjek jang menentukan, sehingga pemeliharaan mutlak perlu diperhatikan untuk mentjegah ketidak rataan sat warna harus diperiksa apakah ada kerusakan pada lapisan rol karena akan menjebabkan pengambilan sat warna (dye pick up) jang tidak sama rata. Ketidak rataan dan variasi warna djuga timbul apabila terdjadi bowl2 jang melengkung pada saat penekanan, pembebanan pada kain jang tidak rata, dan terdjadinja variasi warna karena perbedaan sifat dari tjampuran tjat. Sedangkan mesin tjelup kontinu harganja mahal dan membutuhkan perentjanaan dan perhatian jang teliti supaja dapat beroperasi setjara efisien dan ekonomis.

Kebanjakan jang saja sebutkan disini djuga berlaku untuk printing jang umumnja setjara kontinu atau semi kontinu, ketjuali tjara batik resist jang sudah terkenal itu.
Disini djuga harus ditjurahkan pengamatan jang teliti terhadap persoalan seperti pemilihan zat warna dan pengental, tjara pengerdjaan, pemeliharaan mesin, pembersihan dan pemeliharaan gedung jang baik. Latihan2 serta pengawasan terhadap pekerdja merupakan kuntji jang harus diperhatikan.

Proses printing tidak memperlihatkan kesalahan jang terdjadi dalam pemintalan dan pertenunan, tetapi kain harus menjerap dengan baik dan bebas dari linter serta benang2 jang terlepas. Rol2 engrave dari screen printing harus ditjek dengan teliti dan diudji dengan tjara print-outs. Pasta printing harus tertjampur dengan baik dan bebas kotoran2 dan butiran2. Kekentalannja harus ditest dengan alat jang sesuai. Doctor blade haruslah diasah dengan baik dan diperiksa setjara teratur. Perlu diperhatikan daja penekanan rakel dan mentjatat dengan teliti djenis, keras, bentuk dan daja tekan rakel.

7. Langkah selandjutnja pada bagian finishing, semua mesin pengering, oven pengering, steamer dan mesin pentjutji harus terpelihara dengan baik dan tetap bersih. Harus ada pengawasan jang teliti terhadap djalannja kain dalam proses dan segera diambil tindakan seperlunja apabila terdjadi kesalahan2. Disini pengawas jang baik membuat standar2 dan melatih pekerdja2 dengan tjara jang betul. Tak terdapat djalan jang memendek untuk mendapatkan efisiensi dalam pentjelupan dan printing jang baik. Perhatian jang sabar sampai ke-detail2nja merupakan sjarat untuk sukses.
Telah saja sebut dimuka akan pentingnja memiliki seorang ahli (teknisi) jang bertanggung djawab dibagian finishing, dengan mesin2 stenter, mesin pengering, calender, mesin pembasahan dan penjusutan(damping and shrinking machines) dan mesin pengurai (breaking machine). Disini pembersihan dan pemeliharaan alat2 merupakan hal jang lebih penting daripada di-tempat2 lainnja, karena disini kain sudah mendekati achir proses. Pekerdjaan harus direntjanakan dari warna muda ke tua dan kembali lagi ke warna muda. Tjiri2 dan sifat2 semua mesin harus difahami, seperti ketjepatan, tekanan antar rol2 (nip pressures), temperatur, kebutuhan akan perlengkapan pelurus pakan dan pengontrolan kelembaban. Kadang2 pada mesin stenter dipasangkan alat pengatur kelembaban setjara otomatis, dan kalau belum ada diandjurkan untuk membeli alat tersebut karena merupakan investasi jang berharga.
Hendaknja kain dikeringkan sampai tjukup kering sadja hingga dapat diperoleh kenaikan tertentu dalam produksi. Ada djuga alat pengontrol kelembaban dengan tangan jang didjual di pasaran dan alat ini sangat besar kegunaannja. Menurut pengalaman saja di Indonesia, hal ini kurang mendapat tjukup perhatian jakni terhadap faktor kondisi kain dan pengaruhnja pada pegangan. Untuk mendapatkan produksi jang maksimum pada stenter perlu diawasi apakah lint screen dibersihkan dengan teratur. Dari pengalaman, saja menjaksikan bahwa adanja lint screen jang kotor dapat menurunkan efisiensi stenter sampai 50%.

Kalender harus ditjutji setiap minggu dan ditjek keadaan luarnja seperti adanja djarum asal dari tenunan, dan lempengan2 logam. Sepandjang pengalaman saja sungguhlah mengherankan apa jang saja temukan dalam kain, seperti djarum2, djepit2, paku2 dan petjahan2 dari alat tenun.

Segala sesuatunja jang menjangkut pada bowl (rol jang berlapis lunak) adalah penjebab kerusakan, dan tak seorangpun mau membeli kain jang berlubang-lubang.

Harus ada alat2 pirometer selama proses sehingga temperatur pada bowl kalender jang panas dapat ditjek. Tekanan nip harus diperiksa dengan teratur dengan kertas karbon. Seperti telah saja sebutkan, perlu djuga mengetjek tegangan arah pakan dan pengatur lebar. Menurut pengalaman saja hal2 jang paling banjak mendapat tjelaan dari para langganan jaitu adanja pakan jang melengkung. Hal ini adalah kesalahan2 jang sangat mengesalkan dan kerap kali disebabkan karena hasil pertenunan dengan tepi jang tegang dan kendor. Tetapi dapat djuga disebabkan oleh stenter clip jang rusak atau terlalu banjak tegangan selama proses.

Setiap ahli finish jang baik selalu membuat tjatatan2 tentang hasil finish dan membuat perpustakaan dari tjontoh dan data2, dan ia berusaha untuk sedapat mungkin mengulang proses dengan kwalitas kain jang sama.

Hal jang penting bahwa seorang pendjual atau suatu perwakilan untuk pemasaran bekerdja erat dengan pimpinan umum dan orang finishing. Mereka harus tahu tentang keinginan langganan dan finish jang dikehendaki kemudian hendaknja selalu memberi keterangan2 tentang tjorak, finish dan pengertian umum tentang perdagangan.

8. Bagian pengepakan dan pengiriman adalah tempat untuk pemeriksaan dan pengetjekan jang terachir. Di Inggeris dan Amerika biasanja pemeriksaan kain-djadi dilakukan pada papan atau medja kemudian menandai kesalahan2 dengan tali atau tanda berwarna.

Kain diberi nilai misalnja kesatu, kedua atau ketiga sesuai dengan djumlah tali jang dipasang untuk kesalahan dalam tenun, tjelup, atau tjap, misalnja grade kesatu tidak lebih dari lima tali untuk setiap 50 meter kain. Semua alat pentjatat pandjang kain dan mesin lipat harus ditjek setiap minggu untuk mentjegah kesalahan pengukuran.

Kehilangan berat sebanjak 5% merupakan hal jang biasa dan menghalangi produktivitas jang maksimum. Dari setiap tumpukan atau pewarnaan suatu party kain dipilih setjara merata untuk ditjek tentang pegangan, kenampakan, pick dan lebar kain jang kemudian dibandingkan dengan kain jang telah dikirimkan terdahulu. Sekarang inilah waktunja untuk memotong tjontoh jang kemudian harus disimpan dalam plastik disertai tjatatan2 tentang prosesnja setjara terperintji.

Bagian pengiriman adalah pekerdja terachir maka tjatatan jang baik sangat diperlukan. Dalam pengalaman saja, saja melihat kain2 keluar tanpa surat pengantar, dan demikian pula surat2 pengantar dikirimkan tidak dengan kainnja. Tjatatan jang lengkap tentang kerusakan2 kain haruslah disimpan dan demikian pula tentang pandjang kain. Kesalahan2 dapat terdjadi dari biasanja bertentangan dengan tjara kerdjanja.

9. Faktor lain jang penting dalam produktivitas adalah pekerdjaan pemeliharaan. Ahli2 mesin atau kepala bagian pemeliharaan haruslah merupakan bagian integral dari susunan tata laksana.
Telah dikemukakan bahwa pentjelupan dan printing lebih mendekati pekerdjaan insinjur Kimia dan haruslah terdapat hubungan erat antara technolog dengan ahli2 mesin.

Karena pada hakekatnja seorang technolog haruslah tahu tentang mesin2 sedangkan ahli hendaklah tahu pula tentang kain. Pemeliharaan adalah suatu masalah jang tak pernah berachir. Artinja mesin2 haruslah diminjaki tetapi minjak pelumas sendiri adalah kotor dan menodai kain.
Perhatian harus ditjurahkan pada pemeliharaan jang berentjana. Saja lihat sekarang mereka menggunakan tjara "breakdown maintenance" dengan tidak ada tjadangan spare part. Hal ini harus dihilangkan.
Pemeliharaan direntjanakan jang merupakan tjontoh jang mahal tetapi dapat dibenarkan. Pemeliharaan jang direntjanakan berarti pemeliharaan untuk pentjegahan. Kemudian haruslah dibuat rentjana2 untuk pemeliharaan dan pimpinan mengusahakan terlaksananja rentjana tersebut.
Ini berarti pengamatan semua mesin2 setjara teliti serta pengaturan pengetjekan setjara berkala, misalnja mingguan, bulanan, bahkan tahunan dan teratur, seperti halnja pemeliharaan pada mobil atau speda motor agar supaja memperoleh hasil jang maksimum. Ini soal organisasi dan saling pengertian antara bagian tata laksana dan ahli mesin.
Bagian2 dari mesin adalah penting dan supaja diadakan penjediaannja tidak dengan mengeluarkan biaja2 jang dibebankan pada anggaran.

Pemeliharaan dengan memberhentikan mesin adalah bertentangan dengan produktivitas. Pemeliharaan mesin2 dapat digambarkan seperti pemeliharaan rumah dengan baik. Kita harus mempunjai tempat kerdja dan waktu bekerdja dengan teratur dan bersih. Pekerdja2 akan mengambil tjontoh dari supervisor dan anggota2 pimpinan. Tempat jang bersih akan memberikan kain jang bersih pula. Ahli mesin dapat memberikan tjontoh jang baik dengan tjara menjimpan alat2nja, potongan2 kaju dan bambu ditempat jang betul.

10. Suatu faktor lain jang sangat penting dalam produktivitas jang sering kali dilalaikan jaitu soal latihan jang tidak sadja dilakukan oleh anggota staf tetapi djuga oleh pekerdja2. Saja kira dan demikian djuga orang2 lain berpendapat bahwa latihan merupakan sumber produktivitas jang besar terutama dinegara-negara jang telah berkembang.
Sekarang setiap orang bertambah sophisticated, mereka membeli radio dan speda dan biasanja ingin bekerdja ber-sama2. Bila seseorang tahu tentang pekerdjaannja dia akan lebih menjenanginja. Maka pekerdja2 haruslah dididik tentang pekerdjaannja, kemudian dilatih untuk mengerdjakan dengan tjara jang benar. Djika mereka dilatih baik mereka akan sangat berguna untuk menghindari kesalahan2 dan dapat pula memperbaikinja bila terdjadi suatu kesalahan. Djika mungkin dibentuk anggota staf jang bertanggung djawab untuk mengadakan latihan dan dia mengatur segalanja tentang latihan tersebut. Latihan untuk anggota staf dipusatkan dalam laboratorium seperti jang telah saja sebutkan.
Setiap teknolog atau kepala harus bertanggung djawab untuk melatih pada bagiannja. Ini berarti bahwa dia merupakan seorang ahli dalam bidang pekerdjaannja dan mampu memerintah atau mengerdjakan setiap mesin dibagiannja.
Pentjelupan dan printing bukanlah suatu kerdja jang menggunakan banjak pekerdja seperti halnja pada pemintalan atau pertenunan tetapi lebih penting bila dia merupakan ahli dalam pekerdjaannja. Maka djustru itulah orang finishing harus selalu up-to-date dengan mengumpulkan buku2 jang terbaru, madjalah2, kursus2 dan kalau mungkin mengundjungi pabrik2 lain, demikian pula minta bantuan dari organisasi

UNIDO dan Dr. Oweiss menaruh perhatian tentang soal2 latihan seorang ahli soal latihan segera akan didatangkan. (?)
Kemudian akan diadakan latihan2 untuk pimpinan tinggi, pimpinan menengah dan djuga untuk operator2.
Seorang ahli tentang latihan akan mendidik peserta2nja dalam pabrik kemudian mereka akan mendidik para supervisor dan achirnja supervisor tersebut akan mendidik operator2.
Latihan untuk pimpinan tinggi akan diadakan dengan bantuan suatu dana untuk keluar negeri dan diberikan oleh ahli2 jang lain.

Perentjanaan dan Pengawasan Produksi :

Sesungguhnja merupakan fungsi tata-laksana. Tetapi karena setiap pimpinan teknologis merupakan bagian dari kesatuan kegiatan tata-laksana maka perlulah untuk menginsafi pentingnja faktor2 perentjanaan dan pengawasan produksi agar supaja dapat memperoleh produktivitas jang maksimum. Hal ini berpangkal pada penggunaan sumber2 jang produktif sedjauh mungkin, penjesuaian antara kerdja dan mesin2, penilaian tjara kerdja dan kerdjanja sendiri. Haruslah dibuat tjatatan tentang produksi, waktu berhenti dan pengerdjaan ulang, agar supaja kesalahan kesalahan mudah diamati dan tanggung djawab dapat dinjatakan dalam segi mutu dan segi pemeliharaan. Haruslah terdapat perentjanaan data2 setjara terus menerus. Djika mungkin target2 diberikan kepada semua bagian dan sering diadakan rapat untuk melaporkan tentang kelantjaran dan kematjetan rentjana.

11. Achirnja terdapat fungsi biaja. Bagian biaja menjiarkan tentang produktivitas dan bergantung pada umpa-balik dari berbagai bagian, supervisor dan bagian mesin. Mereka bertanggung djawab atas pengumpulan dan penjampaian bahan2 baik jang masuk dan jang dikeluarkan dan pula berhubungan erat dengan soal upah dan harga. Apabila tidak dikerdjakan perhitungan biaja setjara teliti maka kerdja kita seperti seorang buta dan mudah sekali kita bekerdja keras jang tidak menghasilkan suatu kemadjuan.
Bagian ini bertugas membuat target anggaran dan rentjana dan kemudian menilai produktivitas jang njata. Biaja2 jang pokok dalam pentjelupan dan printing adalah uap, tenaga, sat warna dan sat2 kimia, upah dan gadji dan pula pemeliharaan. Semua staf hendaklah menjadari pentingnja soal ekonomi dalam segala sudut.

Pengeluaran2 tersebut diatas dapat merupakan hal2 jang besar dalam pelimbahan, kain jang rusak atau turun mutunja, pembuangan sia2 dari sat warna dan bahan2 kimia, perbaikan dari kain2 jang tak sempurna karena terlalu atau kurang pemutihan, tjelup atau printing jang djelek.

Penjebab hal2 diatas adalah banjak dan beraneka, tetapi semuanja akan memberikan pemborosan pada pemakaian uap, tenaga, uang, usaha dan sumber2 produktif lainnja.

Sekian uraian saja. Saja tidak membahas setiap hal sampai mendalam tetapi harapan saja bahwa uraian saja ini tjukup sebagai bahan pemikiran dan mendorong Bapak2 untuk berusaha mendapatkan produktivitas jang lebih besar dalam bidang usaha Bapak.

Pertanjaan :

1. Persjaratan apakah jang diperlukan bagi seorang supervisor teknik jang baik ?
2. Sistim dokumentasi apakah jang Bapak sarankan dalam pekerdjaan2 di-finishing ?

------hls------

TANJA DJAWAB BIDANG FINISHING .

I. SEKTOR LABORATORIUM

Penanja : Nj. Purwanti Kusno (I.T.T.)
Nn. Isminingsih (I.T.T.)
Sdr. Hendrodyantopo (I.T.T.)
Sdr. Iman Soetjipto (Ditdjenteks)
Sdr. Arifin M. (Ratatex)

Persoalan jang disinggung

1. Instrument laboratorium jang harus dimiliki untuk minimum sise unit:

- colour matching lamp
- ultra violet
- tungsten
- balance
- microscope
- foulard.
- pH meter
- washing wheel
- viscometer
- strength tester
- mangle
- Jig
- Heater
- baking chamber
- steamer
- dyeing pots

Kemudian untuk jang besar2, dilengkapi dengan condition (moisture) room, dan djuga diusahakan pengumpulan buku2.

Tjatatan : Apa jang dikemukakan Mr. Bennett terlalu banjak dan terlalu besar investasi jang dibutuhkan.

2. Djenis test jang perlu dikerdjakan, ialah :

Bleaching : - pH test
- fluidity test
- reflectance

Dyeing test : - visual test a.l. taste
- chemical test.
- pH
- fastness to light
- fastness to washing
- fastness to ironing
- fastness to crocking.

Finishing : - appearance
- pick
- washing
crease resin
- width
- handle
- strength
- shrinkage.

3. a. Pertanjaan chusus mengenai instrument jang terbaik untuk colour matching test - belum ada persesuaian.

b. Mengenai sewing test ialah mendjahit dua helai kain disatukan dengan high speed sewing machine. Dilihat pengaruhnja setjara visuil.

4. Agar hasil jang diperoleh dalam proses operasi menjamai hasil di-Laboratorium maka perlu adanja equipment jang baik dan penimbangan harus teliti djangan hanja dikira-kira.

5. Kegunaan laboratorium disamping untuk testing, djuga untuk training. Biaja laboratorium biasanja dibawah 1% dari total pembiajaan. Laboratorium dipandang perlu dan dalam pemakaian dyestuff dan obat-obatan kimia perlu ditest terlebih dahulu karena belum tentu baik, tiap package bisa berlainan kwalitetnja.

6. Dokumentasi sebagai pelengkap laboratorium perlu untuk mengurangi pemakaian tenaga & biaja untuk process jang sama.

II. QUALITY CONTROL.

Penanja	:	Nn. Isminingsih	(I.T.T.)
		Sdr. Iman Soetjipto	(Ditdjenteks)
		Sdr. Arifin M.	(Ratatex)
		Sdr. P.H. Human	(G.K.B.I.).

Persoalan jang disinggung

- Walaupun tiap2 bagian sudah mempunjai testing section, untuk large work, perlu tenaga chusus untuk quality control.
- Untuk menghindari kesalahan pada tahap2 selandjutnja, supervisor dapat melaporkan asal-usul/djenis kesalahan.
- Menurut djenis dan system unit produksi jang dipergunakan, product jang dihasilkan tidak akan sama, maka untuk memperoleh hasil jang sama a.l. perlu perhatian terhadap daja pick up & kebasahan kain.
- Sebaiknja tiap finisher & technician perlu mempunjai loupe, sehingga konstruksi kain selalu diketahui agar dapat ditentukan process jang tepat untuk menjempurnakannja.
- Tiap package dyestuff dan chemical harus ditest.
- Alat untuk menghindari terbawanja benda2 metal memang tidak ada lain hanja metal detector.
- Maka untuk menghindari hal itu perlu dilakukannja inspection pada kain grey dan weaving dan mesin ditjek.

III. PROCESSING.

Penanja	:	Sdr. Djadjang Hirawan	(P.T.G.)
		Sdr. Nansal Chan	(Delimatex)
		Sdr. Arifin M.	(Ratatex)
		Sdr. P.H. Human	(G.K.B.I.)
		Sdr. Ashari	(Texin).

Persoalan jang disinggung

- Alat2 finishing untuk cotton seperti Jigger terbuka, dan stenter (uap) untuk mengerdjakan kain synthetic dapat disimpulkan tidak mungkin.
  Dengan carrier system memang dapat dikerdjakan pentjelupan pada Jig terbuka tetapi lama. Dengan uap tidak mungkin diperoleh high temperature heater.
  Pin clip untuk kain synthetic perlu berkepala.
- Penggunaan steamer disamping untuk dyeing process dapat djuga digunakan dalam bleaching/whitening.
- Pada printing tidak ada korelasi dalamnja engraving dengan tua - mudanja warna, tetapi lebih terpengaruh oleh proses pentjutjiannja.
- Untuk proses scouring, bleaching dan finishing kira2 diperlukan 45 liter air untuk setiap kilogram bahan.
- Untuk memperbaiki kilap kain jang diprint dengan zat warna pigment hendaklah diteliti dahulu proses scouring dan bleaching kemudian diadakan pula pertjobaan untuk proses mercerisasi.
- Mercerising jang dilakukan baik pada grey ataupun setelah bleaching hasilnja sama, hanja bila dilakukan pada grey, caustic akan kotor, tetapi akibatnja proses scouring mendjadi ringan.
- Kain berat biasanja dimercer sewaktu masih grey. Di Indonesia umumnja dipakai chainless mercerising unit jang akan memberikan kilap jang kurang.
- Djangan terlalu banjak brand jang dipakai pada pemakaian dyestuff.
- Moisture ± 8½%
  Dyeing & printing perlu kering.
  Finishing djangan terlalu kering.
  Sebaiknja dilakukan conditioning room sebelum di calender.

IV. ASPEK LAINNJA.

Penanja	:	Sdr. Harun Hardjito	(P.N. Insan)
		Sdr. Madetha	(Ditdjenteks)
		Sdr. Nusjirwan Salim	(P.T. Sumber Sandang)
		Sdr. Djamil Usman	(Ditdjenteks).

Untuk menghitung produksi dapat dalam meter atau kilogram.

- Untuk manhour direct & indirect cost dihitung :

dyes	10%
chemicals	10%
salary/wages	30%
steam & power	25%
maintenance	7½%
profit	25%
depreciation	-

- Besarnja finishing plant jang ekonomis di Indonesia sukar ditentukan.
  Pabrik jang ketjil akan memberikan efisiensi jang kurang sedang kan pabrik besar sukar memberikan kapasitas jang penuh. Di Inggris ukuran pabrik jang umum adalah memproduksi 12,500,000 meter sampai 25,000,000 meter per tahun.
  Waktu sekarang terdapat djuga jang berproduksi antara 30-50,000,000 meter per tahun. Di Indonesia pentinglah untuk mentjoba bekerdja 24 djam per hari dan 7 hari per minggu karena model lebih mahal dari pada pekerdja.

- Faktor2 jang harus diperhatikan dalam finishing adalah tjorak dan permintaan pemasaran. Sekarang terdapat ketjenderungan untuk mengintegrasikan dengan pabrik2 pemintalan dan pertenunan.
  Dalam hal ini modal jang tersedia tentu sadja merupakan faktor jang harus diperhitungkan.

- Peralatan finishing di Indonesia merupakan tjampuran jang lama dan baru.
  Mesin2 baru kadang2 baik, sedangkan mesin2 tua jang dipelihara baik akan memberikan hasil jang baik pula.

LAPORAN PADA SEMINAR "HOW TO IMPROVE PRODUCTIVITY IN FINISHING"
TANGGAL 30 MARET 1972
DI INSTITUT TEKNOLOGI TEKSTIL BANDUNG

Setelah mendengar prasaran dari Mr. John E.H. Bennett, Expert UNIDO, dan setelah diadakan diskusi setjara menjeluruh antara pemrasaran dan 31 peserta seminar, maka sidang mendapatkan hasil2 rumusan sebagai berikut :

1. Productivity pada bidang industri Finishing masih dapat ditingkatkan.

2. Dalam usaha peningkatan productivity pada bidang Industri Finishing perlu dipenuhi faktor seperti dibawah ini :

   1). Adanja laboratorium pada perusahaan Finishing dianggap sangat penting karena kwalitas dan kwantitas produksi dapat direntjanakan melalui proses2 dalam Laboratorium. Investasi alat2 Laboratorium adalah tjukup besar, tetapi hal ini dapat untuk penjediaan dimasa-masa jang akan datang, sedangkan beaja jang mendjadi beban dalam total cost masih dibawah 1%.

   2). Dokumentasi tentang proses setjara mendetail sangat penting, karena dapat mentjegah berulangnja pekerdjaan pertjobaan jang sematjam, sehingga dapat mengurangi beaja produksi jang akan datang,

   3). Organisasi perusahaan jang dapat diterima oleh para technolog sangat diperlukan. Para engineer diikutsertakan djuga setjara integral dalam management team.

   4). Training bukan diperlukan hanja untuk para staff, tetapi djuga untuk para karyawan langsung (operator).

   5). Dyeing department merupakan kuntji dalam perusahaan finishing, oleh karena itu pemeliharaan kebersihan dan maintenance jang sempurna perlu mendapat perhatian jang mendalam.

3. Untuk mentjapai productivity jang tinggi perlu adanja system penggunaan/pemanfaatan faktor2 tersebut pada ad 2, setjara efektif.

Sekian laporan ini dibuat dengan harapan semoga dapat bermanfaat bagi perkembangan Industri Tekstil, umumnja dan Finishing chususnja di Indonesia.

PANITIA SEMINAR
STEERING COMMITTEE BAGIAN FINISHING

(SANTOSA S.Teks.)
Ketua.

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UNIDO – INDONESIA

04460
(3 of 17)

PROGRESS REPORT
PART II

UNDP SPECIAL FUND PROJECT (SF/INS - 71/531)
FOR TEXTILE INDUSTRY REHABILITATION AND
DEVELOPMENT PROGRAMME
IN
INDONESIA

DJAKARTA, AUGUST 7, 1972.

EL-SAYED M. OWEISS
TEXTILE PROJECT MANAGER
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UNIDO – INDONESIA

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1) TITLE PAGE

COUNTRY	:	INDONESIA
PROJECT CODE	:	SF/INS - 71/531
EXECUTING AGENCY	:	U.N.I.D.O.
COUNTERPART AGENCY	:	DIRECTORATE GENERAL FOR THE TEXTILE INDUSTRIES.
DATE PLAN OF OPERATION SIGNED	:	3rd APRIL, 1972
DATE FIELD WORK STARTED	:	18th OCTOBER, 1971
DATE PROJECT OFFICIALLY DECLARED OPERATIONAL	:	1st NOVEMBER, 1971
SCHEDULED DATE COMPLETION OF FIELD WORK	:	END OCTOBER 1975
REPORTING PERIOD	:	1st MARCH 1972 UP TO 31st JULY 1972.

2) SUMMARY

Operations during this period were partly logistically and administrative but mostly technical as explained in the next paragraph.

3) ACTIVITIES AND RESULTS

a. Signature of plan of operation

The plan of operation has been signed at the 3rd of April 1972 instead of being signed before 1st July 1971.

b. Report Cycle

The first progress report has been drawn the 5th March 1972 to cover the duration from the start (1st November 1971) up to end of February 1972.

The present progress report (part II) after receiving the official cycle will cover the period after the end of the 1st progress reports (1st March up to the end of July 1972) as mentioned in the schedule of the reporting cycle.

The 3rd semi annual report, will start accordingly from 1st August 1972.

c. Fellowships Programme

It was scheduled in the plan of operation, that the 35 fellowships of 6 months each will be trained as following :

14 fellowships in the second half of 1971
6 in the 1st half of 1972
13 in the second half of 1972
3 in the 1st half of 1973

Total 35.

All the 35 fellowships have been selected by the Government with our assistance.

Twenty two of them the forms of fellowships hawe been filled and handed to U.N.D.P. office here, who had sent them immediately to section for Asia and the far East in Vienna.

The forms for the 13 remaining fellowships, according to the Government of Indonesia information, will be handed soon when they will be filled by the candidates and approved by an official Indonesian member.

N.B. There was a proposal to sent 6 from the candidates for a higher level training and longer period but the Government has recently decided to follow the programme as it is in the plan of operation.

d. **The Survey**

In the plan of operation there is a survey to determine the long term policy of the Textile Industry in Indonesia. It was scheduled to be finaliesed in October 1971.

It has been finished and the final report had been handed to the Government in May 1972. Copies of this report are now in hand of the H.Qs., in Vienna, U.N.D.P. in Djakarta and in the hand of the Indonesian Government.

The report consists of two volumes. The first deal with the technical policy and the second with marketing. The first I describes the conditions of the mechines in the different textile sectors showing the modern, what need modernization and what is obsolete.

It shows also the actual and potential capacity and a proposed growth during ten years ended in 1980.

The report stressed on the necessity of training for all levels of power forces. In the marketing volume the report deals with the raw material, the future pattern, the demand at present and the growth during the period up to 1980. It recommends that the local production policy has to be planned to cover about 80% from the total market requirement during the period up to 1980 and to be considered at that level as self sufficient. In the following period Indonesia has to built itself to enter the foreign markets as one of the textile exporting countries.

e. **Experts**

In the field

During the duration of this report a spinning technologist Mr. Curran has arrived to the field in March 1972 the total number of experts in the field are now 3 technologists plus the Project Manager they are :

1. The Project Manager his assignment extended up to end of July 1975.

II. Spinning technologist Mr. Curran his initial assignment is for one year up to March 1973.

III. Weaving technologist Mr. T. Hoshiyama his assignment has been extended up to December 1974.

IV. Finishing technologist Mr. Bennett his assignment has been extended up to November 1973.

f. **Experts**

under arrival

Maintenance engineer Mr. Meligi who has been selected and approved by both UNIDO and the Indonesian Government will be soon in the field, according to the oral information from UNIDO HQs.

g. **Experts**

under submission to the Government

During our visit to HQs. in Vienna last June 1972 we have selected from the applications in the recruitment section the following :

I. The second spinning technologist from A.R. of Egypt.

II. A second weaving technologist on condition that he has enough experience in Jacquard looms from India.

III. A training expert from India an ex UNIDO Expert in this field.

N.B. All experts under I, II, III have been evaluated by Mr. Eraneva as mentioned to us oraly by the recruitment section and have to be submitted to the Indonesian Government for approval.

h. **Experts**

under evaluation

A cost accountant expert from Pakistan is under evaluation and after that to be submitted to the Indonesian Government for approval.

I. **Experts**

under selection

I. An expert for marketing under the management component.

II. A knitting technologist under the consultant component.

From our revision to the files of candidates in the recruiting section in Vienna, we did not find any suitable candidates for those two posts.

Mr. Leite promissed that in a near füture he can submit the candidates for the two above mentioned posts with qualifications as mentioned in their job discription first to Mr. Eraneva and after for us for evaluation before submitting them to the Government.

After implementation of the above mentioned agreements all the team of experts including the consultant component will be filled.

For comparison between the schedule in the plan and realization concerning the experts and other activities, see appendix No. I.

4) TECHNICAL ASSISTANCE

During the period of this report many technical assistances have been given to the textile factories with satisfactory results :

1. As mentioned in the progress report part I that we have agreed with the Government to give to the textile industry two kinds of assistance one is called regular assistance for a number of factories to be assisted regularly and to be considered as models to others; the second is called irregukar or temporary assistance.

It happens that some of the textile factories face some particular problems. In such a case like this we receive a request from the Government to give advice to these factories about the solutions of these problems during one or two short visits, we call these irregular assistances as visits or inspection.

2. Members of our team have in executing the programme to cover the following work :

   a. Survey

   b. Implementation and

   c. Following up.

3. The time to cover all this work in one factory varies from two to six months work, but not continuously, according to the kind and volume of problems.

   So we calculate in our programme about three to four months as an average for every factory to be assisted regularly or by other words three to four factories for the expert every year.

   This beside the inspection or irregular assistances and seminars to be conducted by the experts.

   Below are the technical assistances given during the reporting period.

   A. Tegal TEXIN Spinning, Weaving and Finishing factories :

      A complete survey has been made by the three technologists Mr. Curran for spinning, Mr. T. Hoshiyama for weaving and Mr. John. E.H. Bennett for finishing. This survey has been distributed in May 1972 under the title :

Technical Report part I. A copy of this report is attached.

The implementation has been started in weaving and finishing Texin factories with a satisfactory result.

The production in weaving has increased in quantity by about 30% and in finishing where the factory was in trial condition it is now in production at about 96.000 metres per week against less than 20,000 per week at the beginning of our assistance.

The quality in both weaving and finishing has been improved.

There is no following up in the spinning waiting for the arrival of the second spinning technologist, but we do not anticipate in the spinning any big improvement neither in quantity nor in quality. This is due to the conditions of the spinning machinery which are nearly all are obsolete and need replacement.

B. Better utilization of the facilities in the majority of the spinning factories in Indonesia.

This has been reported in an ad-hock technical report part 3 which has been drawn by the Project Manager and distributed also in May 1972. Another copy is attached. In this report the writer has dealt with two problems, the first is the conversion of about 60,000 twist spindles, which are idle, to ring spindles.

The conversion is elastic and the mechines can be transfered from one case to the other easely.

The second is by using the suitable cotton fibres which enables some of the factories to decrease the T.M.(twist multiplier) and increase the R.P.M. (Revolution per minute). Both increase the production over the present potentiality by about 25%. Those two advices will enable Indonesia to realise its target in production with a reduction in the number of the new spindles and this leads also to a reduction in the new investment. This reduction can be estimated by about 45 millions US $.

The experiments of this advice has been carried on in one of the spinning factories (Bandjaran Spinning Mill) since October 1971 and the result is satisfactory.

These advices have been put now in execution and the production of this factory has already increased in June and July by about 10% and still going up.

C. G.K.B.I. : This factory is an integrated one, spinning, weaving, and finishing. Recently a following up survey has been drawn and a substantial improvement in productivity has been realized.

A statistical report about this factory will be drawn and distributed during the present period.

D. Primary survey has been made and the recommendations are under implementation at present in P.T.G. Garut weaving and finishing factory, one of the biggest in Indonesia. The report with the results will be distributed during the present period.

E. The following factories have been visited several times during the reporting periods by the experts. Primary reports have been drawn but the final with the results will be drawn in future : These factories are :

Tjilatjap, Bendjaran, Setjang, Lawang, Grati, Senajan, Pardedetex spinning factories.

Asratex, Pardedetex, Sukur, Samudra, Matraco, Kari Sianipar, Sima, Timatex weaving factories.

Ratatex, Kamadjajatex, Delimatex, Indosinga, Inpema, Balitex, Radjut Djatim Surabaja finishing factories.

These factories have been visited and inspected by the members of our team, discussions and instructions have been given to the technical staff about how to solve some of their problems.

In spinning, we are concentrating now our assistant on three factories they are : Tjipadung, Palembang, Bekasi spinning mills, because they are in need of more effort than the others.

Our spinning technologist Mr. Curran estimates the time required to complete his assistance to every one of those factories by six months.

F. Seminars. Two succesfull seminars have been held during the reporting period in the Institute of Textile Technology in Bandung. The first was conducted by the weaving and finishing experts. Its subject was "How to Improve the Productivity in Weaving and Finishing".

The participants were the technications of the weaving, and finishing factories.

The second seminar has been conducted by our three technologists in spinning, weaving and finishing. Its subject was on textile education and the participant were the lecturers of both the Institute of Textile Technology and of the Institute of Technology Bandung. Copies of technical reports part 3 & 5 on these two seminars are attached.

There was during this period two missions initiated by the Directorate General of the Textile Department where all the experts have participated in them. They have visited the textile factories in East and West Islands of Indonesia to advice them about the solutions of some of their individual problems as well as to study the future pattern in these areas.

The advices given and the results of these studies are in technical report part 4, a copy attached.

5) GOVERNMENT CONTRIBUTION IN CASH

The Indonesian Government has paid all the three first installments completely in due time as following :

Date of Payment	Total	Notes
27-9-1971	Rp. 5.292.000,--	First Installment
28-9-1971	" 13.600.000,--	Second "
10-3-1972	" 2.029.000.--	To complete the two first installments
15-6-1972	" 14.732.500,--	Third Installments
Total	Rp. 35.653.500,--	

The above payments have been deposited to the credit of the UNDP contributions acount No. UNDP 65 with Bank Indonesia in Djakarta. The coming installment which is the fourth and last one will be due in July 1973.

6) GOVERNMENT CONTRIBUTIONS IN KINDS

a. **Offices** no change in this item during the reporting period.

b. **Cars** two additional sedan cars have been provided to the Project, the number now are 5 cars, 4 sedan cars and one micro-bus.

c. **Equipment**

In the Plan of operation it has been mentioned as a part of the Government contribution that 36 items were available in the Institute of which 14 items had been supplied under the Dutch bilateral grant another 18 items from Dutch bilateral Grant also will be supplied later. Two other items had been supplied under the Belgium bilateral Grant and 2 items will be supplied later.

The situation now, is that all equipment which were supposed to be delivered from the Dutch bilateral Grant have already arrived to the Institute of Textile Technology Bandung, except the 4 following items which have been canceled.

Those are :

No. 1 1 Laboratory drying and heat setting unit for 100 cm material width.

No. 2 1 Laboratory pressure dyeing unit for 100 cm material width.

No. 3. 1 Laboratory steamer for 100 cm material width.

No. 4. Shirley - Analyser.

The following 2 items from the Belgium bilateral Grant still not yet arrived.

Those are :

No. 1 High speed cotton loom 122 cm.

No. 2 Loom 163 cm for synthetic yarns.

Beside there are 16 additional items have been supplied to the Institute of Textile Technology under new Dutch and Belgium bilateral Grant.

Detailed are in annex number 2.

d. **Local Staff**

No change or remark on the local staff component during the reporting period. The situation is still similar as mentioned in the progress report part I.

7) **U.N.D.P. CONTRIBUTION**

a. **In cash**

i. We have no details about the U.N.D.P. cash contributions which are generally transfered by HQs in New York.

ii. Sallaries allowances and subsidies which are paid to experts and staff by U.N.D.P. here, according to U.N.D.P. financial section information in Djakarta, amounted to US $ 49,192.00.

b. **In kinds**

i. Nothing yet has been supplied from the equipments to be financed from UNDP contributions waiting for the arrival of other Technologists to collect the equipments required for the different textile sectors within the budget amount for this component.

ii. The vehicle of the Project Manager has been bought by UNIDO HQs and it is now in the custom under clearance.

c. No change in the other items of expenses to be financed from the UNDP contributions.

8) **ANALYSIS AND EVALUATION**

It can be said that the Project is getting the support from the parties concerned to assure its success. The following are the remarks on this item :

a. There is a delay in the start of the Project, so there is different in the schedule of the different activities.

b. There is a delay in the arrival of the experts to the field. But we have arranged with HQs, their quick arrival.

c. The major items of equipments delivered by the Government, correspond to the current requirements of Project operation.

d. The major results that have emerged from the technical assistants are improvement in the production of some factories plus reduction in the investment required for the implementation of the Textile section according to the five years Development Plan (Repelita), as reported in the attached ad-Hoc and other technical reports.

e. Form of 22 out of 35 fellowships have been sent to HQs., to take the necessary steps, towards their training. The upgrading programme for the operators in factories beside the supervisor will take place immediately after the arrival of the Training Expert.

f. No important change either the substance or scheduling of Project Operation can be proposed in this stage of the Project.

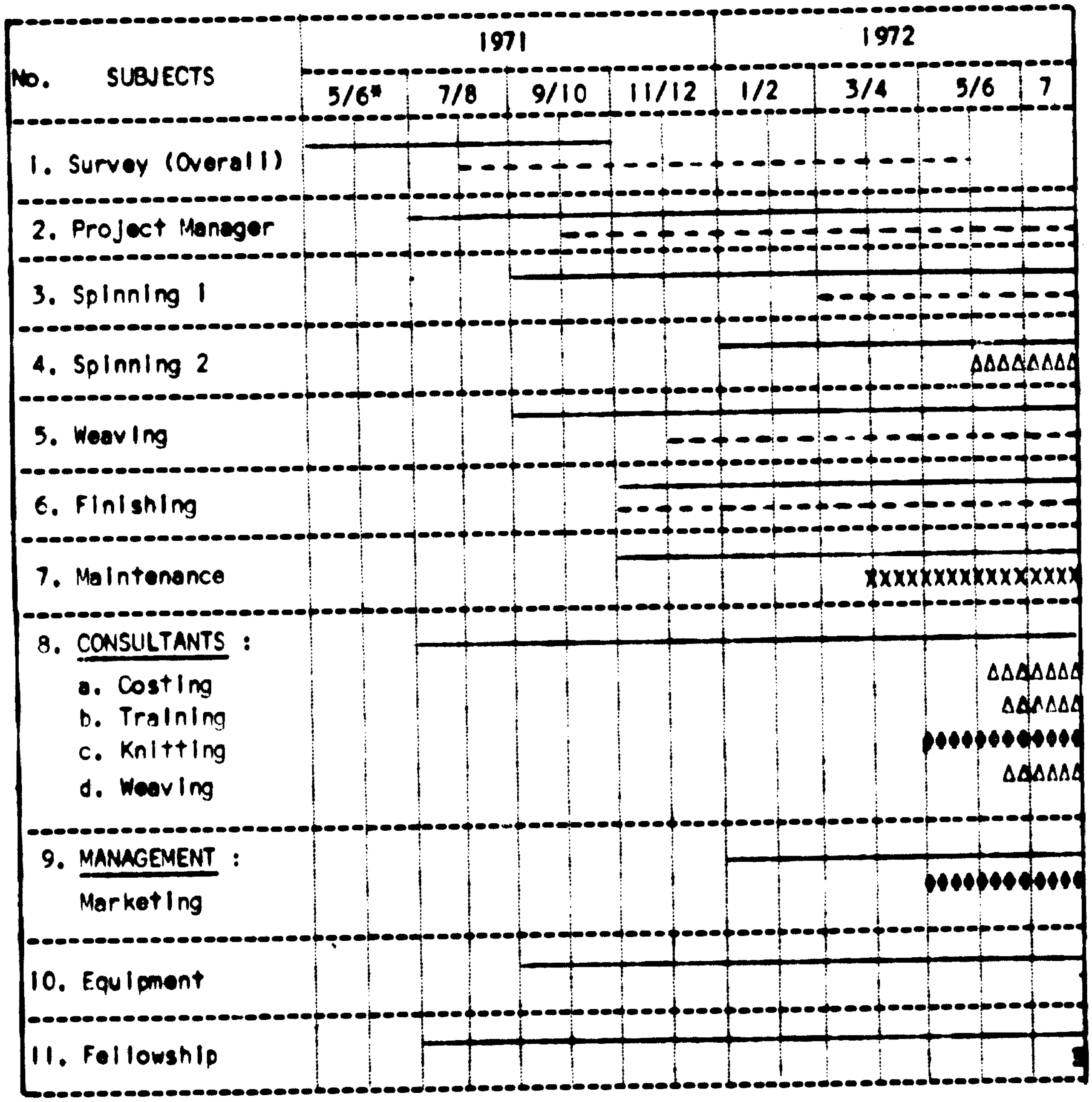
Technical Assistant

Under Belgium Bilateral Grant besides the list of equipment in appendix 2.

There is a textile technologist provided by the Belgium Government to assist the Institute in dyeing for two years. There will be no overlapping between this assistant and our project.

APPENDIX I

PLAN & REALIZATION OF THE UNDP - UNIDO SF. PROJECT INS - 71/531 IN INDONESIA



NOTES

———————— : Schedule

- - - - - - - - : Realization or in the field.

XXXXXXXXXXXX : Selected by UNIDO & approved by Government, but not yet arrive to field.

ΔΔΔΔΔΔΔΔΔΔΔΔ : Selected & Evaluated by UNIDO or PM, but not submitted to the Government for their arrival.

◆◆◆◆◆◆◆◆◆◆◆◆ : Job description circulated but not yet evaluated by UNIDO or PM.

*) MAY/JUNE

Ξ : Selection of Fellowship.

APPENDIX II

ADDITIONAL LIST OF EQUIPMENT FROM DUTCH BILATERAL GRANT
(ALREADY AVAILABLE AT ITT)

---

1. I set Thermohygrograph
2. I set Shuttle accelerometer and speedometer

   I set Loom timing gauge

   I set Heald discrepancy gauge

   I set weft unwinding tension meter
3. I set Wear accelerometer
4. 2 sets Monsanto crease recovery tester
5. I set Package density tester - Vezel Inst. (Shore)
6. 100 pc No.70 solid Carbon electrodes for Fade-O-Meter
7. 100 pc No. 20 Cored Carbon electrodes for Fade-O-Meter
8. I set Daylight lamps set Phillips/Hanau
9. 2 sets Automatic drying ovens
10. I set Verrassing oven
11. 2 sets Mettler Snelwegers (I set not yet available)
12. I set Bundesman tester.

ADDITIONAL LIST OF EQUIPMENT FROM BELGIUM BILATERAL GRANT
(ALREADY AVAILABLE AT ITT)

---

1. I Waterbath type I for high temperature dyeing machine
2. I Waterbath type IV A & B
3. I Centrifugal Hydro extraction Essortmat
4. I Boxdryer.

B-586

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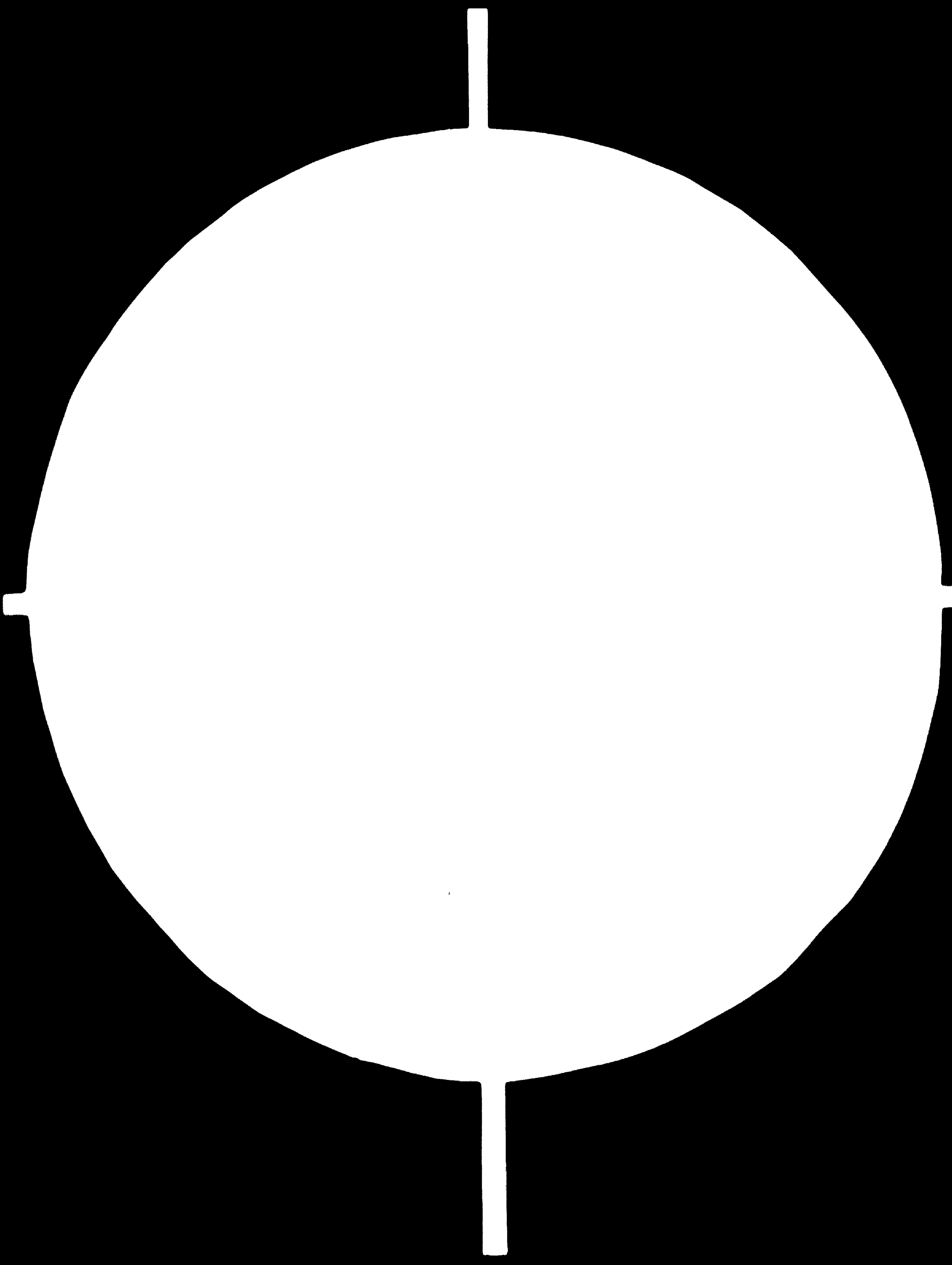
AD.86.07
ILL5.5+10



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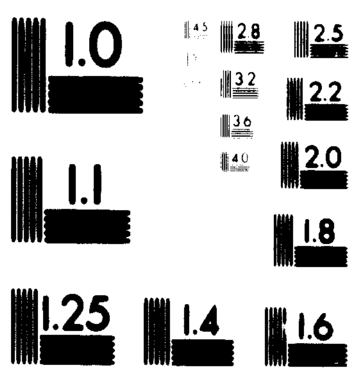

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STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
(SPECIAL FUND PROJECT / INS - 71/531)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report No. 4

Genoral survey initiated by the Director General of Textile Industry on the future pattern of textiles in some East and West islands of Indonesia with particular attention directed to the production and marketing facilities

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

Djakarta, May 5, 1972

EL-SAYED M. OWEISS
Project Manager.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
(SPECIAL FUND PROJECT / INS-71/531)

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S.

EL-SAYED M. OWEISS
Project Manager.

Djakarta, May 5, 1972

INTRODUCTION

The object of this report is to give the results of the work of the two missions.
The first mission visited Bali, Timor, Celebes, Ambon and East Java Province from April 12 - 22 and was composed of

The Director General of Textiles
The Project Manager of the Textile Special Fund Project
Mr. John E.H.Bennett - Finishing Expert UNDP
Mr. Abdul Gani Adam) Textile Department
Mr. Iman Sutjipto Oemar) Officials

The second mission visited Sumatra from April 8 - 19, 1972 and was composed of

Mr. Santosa) Mr. Djumena)	Textile Department Officials
Mr. Wibowo	Director of Research I.T.T.
Mr. Hoshiyama	Weaving Expert UNDP
Mr. Curran	Spinning Expert UNDP

Reports on these visits by the three experts are attached.

R E P O R T S

ON THE TEXTILE SPINNING MILLS VISITED DURING A FACT FINDING TOUR OF SUMATRA BY A TEAM COMPOSED OF TWO UNIDO EXPERTS AND THREE MEMBERS OF THE TEXTILE TECHNOLOGICAL INSTITUTE OF BANDUNG

Submitted to Dr. S. OWEISS

by

Arthur E. CURRAN
UNIDO Spinning Expert

GENERAL REPORT BY A.E. CURRAN ON THE MISSION TO SUMATRA BY A TEAM COMPOSED OF TWO EXPERTS FROM UNIDO AND THREE MEMBERS REPRESENTING THE MINISTRY OF INDUSTRIES AND THE INSTITUTE OF TEXTILE TECHNOLOGY, BANDUNG

1-0 The members of the Mission were as follows :

Mr. T. Hoshiyama, UNIDO Weaving Expert,
Mr. A.E. Curran, UNIDO Spinning Expert,
Mr. Surianata Djumena, Ditdjenteks,
Mr. Wibowo Murdoko, I.T.T.
Mr. Santosa, Ditdjenteks.

2-0 The object of the mission was to examine the cloth available in the various towns of Sumatra, Palembang in the East, Padang and Medan in the Centre, and Banda Atjeh in the West. At the same time it gave the UNIDO Experts an opportunity of inspecting the various textile mills in the territory.

2-1 Conclusions drawn after inspection of the various mills are contained in separate reports - from Mr. Hoshiyama for the weaving, and Mr. Curran for the spinning, whilst Mr. Surianata Djumena, Mr. Wibowo and Mr. Santosa will be reporting on the cloth situation on the various markets.

3-0 Routing and Dates

3-1 The first place to be visited (from 7th to 9th April, 1972) was Palembang, and here the team split up for the two experts to examine textile mills and the others to visit the cloth markets.

3-2 At Padang, the next place visited (9th to 12th April) there are three weaving mills, which the experts visited. Mr. Surianata Djumena left the main body of the mission to travel to Bukit Tinggi, whilst the other members again inspected the cloths on the local market in addition to visiting the weaving mills.

3-3 Medan was the next place visited and there, due to the circumstances, it was decided to re-arrange the itinerary as Mr. Hoshiyama had to travel to Balige, which is one of the main weaving centres. Mr. Curran travelled to Siantar with Messrs. Wibowo and Santosa to see the rami spinning plant. Mr. Djumena, having accompanied Mr. Hoshiyama to Balige, returned too late to go with Mr. Wibowo and Mr. Santosa to Banda Atjeh.

3-4 Having completed their part of the mission, Messrs. Hoshiyama and Curran returned to Bandung, via Djakarta on 18th April, 1972 and the remainder of party followed on the 20th April.

4-0 Market reports will be submitted jointly by Mr. Surianata Djumena, Mr. Wibowo and Mr. Santosa; Weaving Factory reports by Mr. Hoshiyama; Spinning Mill reports by Mr. Curran.

REPORT NO.1 - PADEL PALEMBANG, Palembang, Sumatra.

REPORT NO.2 - TJABANG SANDANG, Pematang Siantar, Sumatra.

REPORT NO.3 - T.D. PARDEDE TEXTILE LTD., Medan, Sumatra.

REPORT NO.4 - PARDEDE TEXTILE WASTE SPINNING & WEAVING PLANT, Medan, Sumatra.

LIST OF CONTENTS OF REPORT NO.1

	Section	Paragraph
Visiting Team and Purpose of Visit	1-0	1
Summary	2-0	1 to 3
Problems	3-0	1 to 3
Cotton Used	4-0	
Description of Existing Plant	5-0	1 to 10
Description of Laboratory Equipment	6-0	
Breif Notes on Building	7-0	1 to 3
Production	8-0	1 to 2

REPORT ON VISIT TO PADEL, PALEMBANG, 8th APRIL, 1972

By A.E. CURRAN
UNIDO Spinning Expert, accompanied by the following:

1-0 Mr. Hoshiyama, UNIDO Weaving Expert,
Mr. Suriancta Djumena, Ditdjenteks,
Mr. Wibowo Murdoko, I.T.T.
Mr. Santosa, Ditdjenteks.

1-1 Purpose of visit was to examine the mill and the plant to see what assistance would be required by the staff to bring the plant up to good efficient condition of production and quality.

2-0

2-1 The efficiency of this mill is quite low, being in the region of 60%, the trouble mainly being due to a shortage of spares. Five spinning machines out of 76 were stopped for major spares, but there are also many individual spindles stopped on the remaining frames - up to 80 spindles on some frames. This type of stoppage far outweighs the cost of the spares in lost time and production, so every endeavour must be made to purchase the required parts and to get the plant into proper running condition.

2-2 These remarks also apply to the accessories required at the Cards. In this section they have no grindstones for sharpening the points of the metallic clothing and are also short of stripping brushes, consequently the cards require both stripping and grinding to be put into proper order.

2-3 This is a fairly new mill - 1965 - air conditioned using refrigerated equipment, so instead of the 60% efficiency it should be running in the order of 90%, but this cannot be obtained if the spare parts are not available.

3-0

3-1 As this was only a short visit, it has not been possible to do any research work on blowing room plant settings, but the form of the laps from the scutchers leaves much to be desired. A lap should be an homogeneous sheet of cotton, whereas here they are made up of tufts and curls of cotton which can be picked from the sheet with ease. The staff has been requested to check all the beater settings, particularly those of the Kirschner beater of the scutcher, to see if they conform to the manufacturer's instructions.

They have also been requested to make some changes to the air inlet settings as the fault lies between the mechanical settings beater to pedal roller, grid bars, etc. and the amount and place of air intake to the beater and cages. This plant is completely enclosed in safety lock doors and, therefore, it is very difficult both to re-set and to observe effects with the plant running.

3-2 Once a satisfactory lap has been obtained, then quite a large amount of work is necessary on the Cards. In the meantime every effort should be made to have correct settings. However, without properly maintained grinding equipment the Cards cannot give much improvement in the web. Attention should be drawn to the high value in nep count which in some instances is 195 against a set standard of 50. Even the standard can be considered to be a high value - 20 would be more reasonable.

3-3 With Blowing Room and Cards in proper working order and spares supplied to the Ring frames, there is no reason why this mill should not obtain good production efficiencies.

4-0 Cottons used - 20s Ne Count.
1" Middling.
1" S.L.M.
1" M.L.S.
40s Ne Count.
1 3/32" Middling.
1 1/16" S.L.M.

5-0 <u>Description of Existing Plant</u>

5-1 Spinning plant manufactured by Textiema, 1965.
Blowing Room plant - consists of two Opening lines, each having 4 Blenders, one of which is used for re-workable wastes.
4 Blenders.
1 Feed Lattice.
1 Hopper Feeder.
1 Super Cleaner

One Opening unit comprising :
1 Hopper Feeder.
1st 24 inch diameter Procupine Beater pair cages.
2nd Procupine Beater followed by a fine opening unit consisting of:
1 Hopper Feeder.
1 Fime Opener with three spiked beaters working as a unit.

This is followed by the Scutcher unit, two of which are fed by a two-way distributor.
1st Hopper Feeder.
2nd " "

1 Kirschner Beater Scutcher with auto lap doffer.
Lap weight 16 ozs. per yard into 20s Ne Count.
13 ozs. " " " 40s " "

5-2 Carding
76 Cards having 14" dia. by (900 mm) high.
Cylinder diameter 1285 mm. Speed 180 rpm.
Doffer " 665 mm. " 12.5 rpm.
Taker-in " 256 mm. " 475 rpm.

5-3 The cylinder and doffer clothing is of metallic wire; the flats, of course, sett wire, having a knee. New flat clothing is available for 60 Cards, as that in use is in very poor condition.
Card Production 6 Kgs/hour.
Hanks Ne 0.12 (for 20s); 0.15 (for 40s).

5-4 Draw Frames

34 machines set in two passages 17 x 2 = 34.
Low production type though of reasonably modern appearance.
Drafting 4 over 4 rollers set in two zones, 6 ends up in each passage; two deliveries per frame.
Sliver cans 14 inch dia x (900 mm.) high.
Hanks Ne 0.12 (for 20s); 0.15 (for 40s).

5-5 Speed Frames

18 machines each of 80 spindles.
Drafting 4 over 4 rollers set in two zones.
Frame particulars - 12 frames 300 mm. lift x 140 mm. dia.
6 " 300 mm. " x 125 mm. dia.
Hanks Ne 0.65 (for 20s), spindle speed 600 rpm.
Ne 1.5 (for 40s), " " 600 rpm.

5-6 Ring Frames - 76 Frames.
32 of 388 spindles 75 mm.gauge; 250 mm.lift 50 mm. ring dia.
16 of 388 spindles 75 mm.gauge; 250 mm.lift 48 mm. ring dia.
28 of 420 spindles 70 mm.gauge; 230 mm.lift 45 mm. ring dia.

5-7 Drafting

Double Apron top arm weighted 3 over 3 rollers.
Variable speed can controlled motors.
Travelling Cleaners (not working, short spares).
Pneumafil broken end collectors.
Counts 20s Ne 8.500 rpm. spindle TPI 19.1 Range standards 16.7 to 20.4.
40s Ne 9.500 rpm. spindle speed TPI 24.3. Range standards 24.3 to 29.7.

5-8 Doubling or Twisting Frames

20 frames (not in use).
Each 336 spindles, gauge 85 mm. 60 mm. Ring dia.

5-9 Cone Winding

9 machines split drum type, each 80 drums.

5-10 Hank Reeling
4 machines by Croon & Lucke, Germany.

6-0 Laboratory

Ustor Even-ness tester and recorder.
Conditioning Oven.
Wrap Reel motor driven 2.
Analytical Fibre Balance.
Bear sorter.
Sheffield micronair and shadowgraph.
Microscope.
Fibre single strength tester - not working (incomplete).
Analytical yarn balance.
Twist tester.
Quadrant balance - 6
Hydrostat - not working.
Black board warp wheel.
Saco Lowell lap tester.
Roving warp reel.

7-0 Both laboratory and mill have refrigerated air condition.
7-1 Floors are good but some slight damage.
7-2 Building - sawtooth roof construction. In good condition.
7-3 Building underdraw, lighting etc. good.

8-0

8-1	Production	5.345 tons	20s - 24 hours.		60% efficiency.
		1.536 "	40s		
8-2	Planned	6.945 tons	20s.		
		1.774 "	40s.		

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REPORT ON VISIT TO THE RAMI PLANT AT SIANTAR, SUMATRA,

on 15th April, 1972

by A.E.CURRAN, UNIDO Spinning Expert, accompanied by the following:

1-0 Mr. Wibowo Murdoko, I.T.T.
Mr. Santosa, Ditdjenteks.

2-0 One of the purpose of our visit was to enable Mr. Wibowo to introduce the staff to the processing of wild silk fibre. A small quantity as sample was taken along with us, but the main tests will be conducted after the delivery of a 100 kilo bale which was then in transit to the plant.
Reports on the results of these tests will be made at a later date.

3-0 Problems Discussed

3-1 The plant started production in 1958 and at that time there was rami available to maintain normal production. However, at the present time there is not sufficient rami grown to meet requirements and evidently no plans in the agricultural policy to step up the amount grown. This is causing the mill great difficulty and preventing the plant from maintaining an economic production plan.

3-2 In order to maintain some production and to meet plant costs, Cashmilon is being processed from "top" form through the Gill draw boxes and through to the spinning frames, whilst some winding plant is being utilised for the winding of cotton yarn into hank form from cone.

3-3 The short (waste) fibre section is being used to spin rayon yarn. This, however, means that the Degumming, Softening and Dressing sections of the plant are lying idle, except for a small part being used for the dyeing of yarn. It is a great waste to have capital plant in this condition.

4-0 The delegation was met by Mr. J.A.Sitompul, the plant director, and Mr. Pasaribu, the mill manager.

5-0 Description of Existing Plant

On walking round the plant, the following machines and route of processing were tabulated.

5-1 The plant consists of 6,000 ring spindles - 4,00 in the long fibre section and 2,000 in the soft (or short) fibre plant. The latter fibre, incidentally, is that obtained at the Large Filling Machine where the long fibre is separated from the short, thereafter to divide into two separate and distinct processes.

5-2 Stage 1. Degumming : Kier boiling with 10% solution of sodium hydro oxide.
3 kiers having a capacity of 600 lbs per kier.
Boiling is for a few hours.

5-3 Stage 2. Stamping : 650 kgs. 7 hours.

5-4 Stage 3. Washing

5-5 Stage 4. Breakers : Roller system.
6 machines having a total capacity of 750 kgs.
7 hours.

5-6 Stage 5. Finishers : Using an oil-based softening agent; 750 kgs.
7 hours.

5-7 From here the rami proceeds to the <u>Dressing Section.</u>

5-8 Stage 6. Two Softening Machines; using an oil-based softening agent. 750 kgs. 7 hours.

5-9 Stage 7. Conditioning Room. R.H. 70 to 80%
Room temperature 23° to 25°C.
Capacity 4,800 lbs. 24 hours.

5-10 Stage 8.

	Fine Counts	Coarse Counts -from short fibre (waste)
	Large Filling Machine 8 machines 850 lbs. 7 hours. Flasse 1.	Small Filling machine. 900 lbs. 7 hours. Flasse 2.

5-11 Stage 9.

	Circular Dresser	Circular Dresser
	5 machines 850 lbs. 7 hours. Flasse 1.	2 machines. 300 lbs. 7 hrs. Flasse 2. Rayon fibre mixed with rami waste. 70% rami strippings; 30% rayon.

5-12 Stage 10. Preparatory Spinning
Long Fibre Spreader 1st pass.
" " " 2nd "
After this stage the present plant starts the production of the Cashmilon from Japan.

Flat Cards 10 machines.

5-13 Stage 11. Setting Machine. Draw Frames in two passages,
900 lbs. for 3 machines, 4 over 4 drafting.
Sliver or tops.

5-14 Stage 12. Drawing Machine. Speed Frames, Sliver fed.
Gill fallers.
900 lbs. 7 hours. 4 machines.
"Sets", each "Set" 4 deliveries.
with 8 ends up at each.
Draw ratio 8 to 12.

5-15 Stage 13. Second Passage Drawing. Ring Frames.

5-16 Stage 14. Flyer or Roving frame.
Drafting by Gill fallers.
8 frames each with 48 spindles.
Bobbins parallel build.
Production 150 lbs. 7 hours, per frame for medium counts, i.e. No 30s (Bast fibre count).
Gill fallers 36 in working position.
Single front steel cotton roller, synthetic top.

5-17 Fine Rover for higher counts.

5-18 Stage 16. Fine Spinning Section. Count No 30s.
Production 990 lbs. 7 hours from 11 frames, each 400 spindles.
4,000 to 5,000 rpm. spindle speed.
TPI 9 to 14, Med. counts. Double apron drafting, vertical sone, approx. 6" long. Back steel roller, synthetic covered top. Front steel roller, synthetic covered top roller.
Staple length 5 to 6" medium; 6 to 8" fine.
(Cashmilon Metric Ct. 34s).

5-19 Stage 17. Cheese Winding. 4 machines each 100 drums.
1,800 kgs. 7 hours production.

5-20 Stage 18. Wet Doubling (Twisting).
5 machines, each 320 spindles; 3,500 spindle speed.

5-21 Stage 19. Siseing on to Reels (Hanks).
(Cellogen applied cold, yarn runs through funnel of sise).
Steaming from below reel.
15 machines. Production 1,200 kgs.

6-0 General Remarks, Building Etc.

6-1 The buildings and floors generally are in good condition. Each department is divided by internal walls.

6-2 The roof is of "sawtooth" construction, underdrawn, with roof lights let into the ceiling. There is also one row of windows set high into the walls.

6-3 There is no air conditioning. R.H. varies between 70 and 90%, average 80%.

6-4 Temperatures vary between 29-30°C. day and 27-28°C. night.

6-5 Elevation 350 metres.

6-6 Decoration is old and somewhat dirty; some building repairs are necessary, whilst roadways are in urgent need of repair.

6-7 The plant, especially the Preparatory Section, is in a poor state of maintenance; that which uses water is rusty; machines which are not in use are still loaded with rami fibre on the needles, etc.

6-8 Much of the Spinning plant is in need of maintenance, but there is a complaint about the lack of spares.

6-9 Plant manufactured by O.K.K. of Japan.

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Visit to T.D.Pardede Textile Mills,
Medan.

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REPORT

By A.E. CURRAN, UNIDO SPINNING EXPERT, ON A VISIT MADE TO
T.D. PARDEDE TEXTILE MILLS, MEDAN
on 13th, 15th and 17th April 1972.

1-0 This visit was made during a tour of Sumatra with the following team:

Mr. Hoshiyama, Unido Weaving Expert
Mr. Surianata Djumena, Ditdjenteks Djakarta
Mr. Wibowo Murdoko, I.T.T. Bandung
Mr. Santosa, Ditdjenteks Djakarta.

The object of the mission was to examine the various textiles available on the market in Sumatra and the industry available to meet market requirements.

2-0 Personnel met : Mr. T.D. Pardede
Mr. S.R. Napitupulu
Mr. E. Hurd (American Advisor).

3-0 SUMMARY

3-1 The mill has many production difficulties, basically due to the lack of good maintenance and technical supervision. The technical staff lack the necessary skills to make the plant efficient and blame the machinery, stating that it is old. Actually the plant is of fairly recent manufacture - 1961 and 1962, Howa of Japan.
After I had inspected the mill on 13th April, 1972 a meeting was arranged with Mr. Pardede for the morning of the 15th. At this meeting, which was also attended by Mr. Wibowo and Mr. Santosa, a verbal report was given and as a result I was asked by Mr. Pardede to give a lecture to the whole of his technical staff, pointing out to them the faults found at each stage and to give recommendations for correcting these faults; also to discuss during the lecture any modifications which could be implemented to improve both quality and efficiency.

3-2 The lecture commended at 10 o'clock on 15th April and closed at 13.30 p.m. It was then continued during the morning and afternoon of the 17th. A request was also made by Mr. Pardede for help from the Institute and UNIDO in getting his mill into good condition. He made a particular request for the services of a Spinning expert for one month, and stated he would be prepared to pay all the expenses incurred for such a visit.

4-0 QUALITY OF PRODUCTION

4-1 The yarn quality was found to be poor, having too many weak places very irregular and weak in strength.

Running conditions on the Ring Spinning frames were very bad - many ends were broken and spindles stopped, the rollers and clearers being badly choked with roving waste and laps.

4-2 P r o d u c t i o n.

Due to the above conditions, the production is quite low and the estimated efficiency could not be more than 60 to 70%. Some frames were stopped, seemingly for want of spare parts.

5-0 DESCRIPTION OF PLANT

5-1 The Blowing Room consists of two Opening lines, each having two Scutchers. Blending of cotton takes place on the floor in the space between the Blender feed lattices, where six girls take handsful of cotton from the bales and throw them into a stack. However, as feeding is also taking place from the stack at the same time as the girls are trying to build it, it is thought that no more than five or six bales are represented in any mixing. The Opening line has only one beating point, a Supercleaner, and the only other beater is the Kirschner beater in the Scutcher.

5-2 Previously the plant had a Garnett beater unit, but this had been taken out of use on the advice of Mr. Hurd. I strongly agree with this advice as this beater is much too fierce for a cotton opener and would break many fibres whilst it was in operation. (Such a beater should only be used in a low-quality waste plant). However, having removed that beater, there is a need for extra beating capacity in the line and this should take the form of a Porcupine-type beater.

5-3 Recommendations for this department are:

1. To utilise the open space between the Opening lines for blending, and to build two railed enclosures. Then to fill one by blending about 15 bales, and to fill the second by a blend of 15 bales whilst the first enclosure stock is being used to feed the Blender lattices. In this way all 15 bales are represented in a mixing and the space so utilised does not interfere with the work and transport within the department.
2. To purchase and install a Porcupine Beater into each line. Good second hand ones are easily available in Europe.

3. To make use of the vibrating panel in the Hopper Feeder (delivery) behind the Scutcher. This delivery is in the form of a chute and cotton passing through it should be in the form of a column. The vibration given to the cotton will force out the air and thus feed a compact sheet to the beater of the Scutcher.

5-4 C a r d i n g 140 Cards, Howa, 1961-2
64 covered with metallic wire
76 covered with flexible wire.

5-5 All the wire was found to be suffering from poor maintenance and the metallic wire was so damaged that it is doubtful if it is doing any useful work.

5-6 The flexible wire, although 10 years old, is not too worn but has been badly ground. On examining three sets of grinding rollers (2 quick traverse rollers per set) I found two rollers to be excentric and also the dises were loose on the shafts. The other four also had discs which were loose on the shafts. These grinding rollers should be capable of grinding up to 1/1000th part of an inch and so are a precision grinder. Those at this mill had at least 1/64 play on the shaft and due to the die and worm being worn, had far too much lateral play. This has made it impossible to set the discs to the wire and consequently impossible to grind correctly.

5-7 Bad grinding makes it impossible to get good settings and although a claim was made by the staff that doffer to cylinder setting was 5/1000, I quite easily got an 8s gauge in the setting.

5-8 Recommendations.

1. To have the grinding rollers repaired or to purchase new rollers.

2. To see that the emery fillet on the rollers is changed after 160 to 200 hours grinding or, better still, once per week on 3 shifts.

3. To see that the Operative Grinder is correctly trained and knows how to set the rollers.

4. Work out a plan for the Grinding of the Cards, so that each Card is ground every 180 to 200 hours. This plan should cover a six-monthly period and the technical staff see that it is followed up.

5. Make out a programme for the renewal of Card clothing. The metallic wire is very badly damaged, so those should be re-clothed first. The flexible clothing with good careful grinding could last a further twelve months. Plan to re-clothe all Cards over a period of two years, say one Card per week.

5-9 Note : Much has been said by the staff about metallic clothing, claiming that this is better than flexible as it does not require grinding or stripping. For this mill, and probably in Indonesia in general, where there is so much damage to metallic wire (which can only be made good by replacing with new wire) I think flexible wire is more serviceable. A new type of flexible wire is available from America and Europe which requires no more grinding or stripping than metallic and this should be tried. It is called "Self-stripping" wire and is being used as an alternative to metallic wire on High Production Cards. Conversions to high Production Cards have been studied for this mill, and although the mill would only require a total of 42 such Cards, the question of economics arises. Re-clothing of 140 Cards would cost approximately £ 72,000 sterling; conversion of 42 Cards would cost £ 105,000 sterling.

5-10 Drawing Frames.

Howa, Japan, 1961-2
18 Frames - 9 first passage, 9 second passage.
Hank sliver 0.13 Ne.
Drafting System - 5 rollers over 5. top arm weighted, graduated drafting.
4 deliveries each frame, 8 ends per delivery.
75 metres per minute delivery of sliver.

5-11 Recommendations.

1. The graduated drafting system has been condemned by research institutes for many years for causing irregularities in the sliver, so it is suggested that the back pair of rollers be completely removed, leaving 4 rollers over 4. These should then be re-arranged so that there are only two zones of drafting, one at the back and one at the front, the middle zone having no draft at all. 1.8 in the back zone and 4.44 front zone are examples of draft to use.

2. A number of top rollers synthetic rubber covered the surfaces grinding. Many are ridged, which causes irregularities. This condition should never be allowed; all rollers should be trued up to a fixed grinding programme and never allowed to show signs of wear.

3. Underclearers require attention. It is essential that these be kept in good condition as they assist in preventing roller laps, a condition which is easily brought about when processing sliver in high-humidity conditions.

4. As the frames are fotted with length measuring motions, a measured length of sliver should be run into the cans which corresponds to the exact length of a number of roving doffs at the speed frames. This mill then enable to speed frames to be creeled on a "block creeling system". (See "Speed" or "Flyer" frame section of this report).

5-12 Speed or Flyer Frames.

Howa, Japan, 1961-62.
12 frames, 80 spindles running at 560 rpm.
Hank roving 0.625 Ne for 20s counts Draft 4.8.
0.8 Ne for 40s counts Draft 6.2.
3 rollers over 3 dead weighting drafting system.
Creeling of sliver cans is by changing one line of cans at a time, i.e. 1/3 of total. Sliver left in old cans pieced to new and a number of layers of old sliver laid on the top of the new. This is a very poor method of creeling.

5-13 Recommendations.

1. These machines run badly and the main reason is that the bobbins made on the spindle are too soft. Mr. Hurd has already had one attempt to make them harder, but they need to be harder still. This can only be done by increasing another warp on the presser arm, and by getting the correct lifter and build wheels, with the drum strap in the correct position.

5-14 I suggest that a Fitter be sent from Bandung Textile Institute to work on this problem with instruction from me.
Soft bobbins cause irregularities in roving by stretching.
The staff was advised to warp two bobbins from one frame per week, taking each frame in turn. Then to warp and weigh the roving all through the bobbin from first layer to last and then to tabulate the results to see the change in weight every 15 or 20 yards of roving. The heaviest yards will be the correct hank; light wrappings being stretched roving.

5-15 2. "Block" Creeling to be adopted. Here the sliver in the Drawing Frame cans represents a given number of full roving bobbins (doffts). At each doff 5 empty sliver cans are changed for 5 full ones (one sliver can being equal to 16 roving bobbins); the changing of cans being progressive from one end of the frame to the other.
In this way creeling is only done when the frame is doffing, and as there are only a small number of cans to change at each doff it is done quickly.

5-16 Having decided to change a number of cans per doff, and knowing the length on the roving bobbin and the draft in the rollers, we have : Spindles per frame - number of cans to change - number of doffs required in a can. Length of roving on a bobbin (yards) x number of doffs required in a can - draft = length required in sliver can.

Example (Figures quoted are only estimates)

$$\frac{\text{80 spindles per frame}}{\text{5 cans to change}} = \text{16 doffs required in sliver can}$$

(Length of roving on bobbin, say 0.8 hanks = 672 yards).

$\frac{672 \times 16}{6.2 \text{ draft}}$ = 1734 yards per sliver can from the Draw Frames.

5-17 Ring Frames.

Howa, Japan.
75 frames, each 400 spindles, 2 inch di. ring, 8 inch lift.
Counts being spun 20s No from 0.625 Hk. roving draft 32.
40s No from 0.8 Hk. roving draft 50.
Spindle speed 8,000 rpm.
Turns per inch 20s weft 16.1 Warp 19.0
40s weft 22.0 Warp 25.2
Counts X strength 20s 2,400
40s 2,200

5-18 The following faults were observed, all of which lead to bad spinning.

1. Spindles out of centre.
2. Bobbin diameters too large.
3. Bobbins soft (suspect mixed travellers).
4. Pressure on top roller arms varied.
5. Ring rails out of line.
6. Lappet rails sticking.
7. Back bottom steel roller - slip stick movement.
8. Top and bottom rollers very dirty.
9. Clearers dirty and choked.
10. Broken end collector tubes choked.

Such conditions make it impossible for the spinners to manage their work.

5-19 R.H. 80% Temperature 27°C to 33°C. Humidity never drops below 70% R.H.

5-20 Recommendations.

1. The first essential is for good maintenance. A suitable system should be worked out so that each frame receives the maintenance required and recommended by the manufacturer.
2. At present a crash maintenance scheme should be put into operation, so that items 1, 4, 5, 6 and 7 are attended to.
3. For centreing the spindles the use of the plug should be discontinued and a full bobbin used, as I advised whilst at the mill.

4. All other items require extra assistance be given to the spinners, so that the frames are not allowed to become so dirty.

Mechanical aids should be used, such as :

a. Having all the spinners equipped with a brass picker to clear laps of rollers easily and quickly.

b. Electrically or pneumatically operated mechanical pickers, used by special operatives who patrol the frames keeping the rollers free of waste.

c. Mechanical overhead travelling blowers which blow off the dust and suck dust and waste from the floors.

d. Good routine collection of the waste from the broken end collector suction boxes.

e. More effort put into keeping frames and floors clean and tidy.

f. During maintenance of a Ring frame, all the gearing should be cleaned and checked to see that it is meshing correctly, particularly the roller drive gear. Roller necks should be cleaned and checked to see that the rollers are in correct alignment. Under clearers and top clearers fitting correctly and free to revolve.

6-0 Laboratory Equipment.

6-1 This is normal standard equipment for Hank and Count checking, with the addition of a moisture oven. More attention should be paid to the measuring of regularity and even-ness, so it is to be recommended that equipment be purchased for this, i.e. Saco Lowell tester for Lap regularity and Uster Even-ness Tester with recorder yarn regularity.

6-2 The main requirement is for good firm technical knowledge on the part of the staff. It is strongly recommended that an effort be made to strengthen the staff in this direction. The plant should be capable of much better results with the right technical know-how.

7-0 Air Conditioning Recommendation.

7-1 Some discussion took place in the meeting with Mr. Pardede with reference to air conditioning. There would be a great advantage by a chilled water (refridgerated) cooperative system. Ideal conditions for spinning are

7-2 Blowing Room and Carding 50 to 55% R.H.
Drawing and Speed (flyer) frames 55% R.H.
Ring Spinning frames 55 to 60% R.H.

7-3 There is doubt about the advantages of having these conditions in comparison to the 70% to 90% R.H. experienced at present.

7-4 To get a spinning mill up into the 90% efficiencies air conditioning is essential but with this plant there is a lot of work to be done and no air conditioning plant will help unless the general technology is available.

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Pardede Textile Waste Plant.

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R E P O R T

On visit to the Pardede Waste Plant on 15th April, 1972

By A.E. CURRAN.

1-0 Personnel met Mr. M.J. Harijadi, Manager.

2-0 SUMMARY

2-1 This plant uses the waste from T.D. Pardede Textile Mill, together with waste from knitting mill and other sources.
Production efficiency was not good but there was no particular urge by the staff to improve this. Out of six Condenser Card sets two appeared to be permanently stopped and no particular reason was given for this.

2-2 As is to be expected in a waste plant, the general conditions were dirty. Some of the plant was found to be rather primitive, particularly the winding of weft in the Weaving Section. Maintenance of the plant seemed to be rather poor.

3-0 SPINNING PLANT

3-1 The Spinning plant was manufactured by Toregoe, Japan, 1959, and consists of:

Blending and Breakers
2 knitgoods cutters
9 waste breakers (Garnett type cylinder)
4 part-devils
1 hard waste breaker

followed by:

2nd hard waste breaker in the Blending Room.

3-2 C a r d i n g
6 Condensor Card sets, each consisting of:
Hopper Feeder
1st Part card, cylinder 5 workers, 5 clearers,
Fancy roll, Doffer and Comb.
Lattice Spreader
2nd Part set, cylinder, 5 workers, 5 clearers,
Doffer and comb
Tape condenser four deck high.

3-3 Ring Spinning
8 machines, each 200 spindles; 1500 rpm. Counts 1.5 and 2.0 Ne.

3-4 After spinning the yarn goes direct to the weaving department, the production there being 2,000 pieces (2,100 kgs) in 3 shifts, 24 hours.

3-5 Weaving

This plant consists of:
Section warper using 34/2 fold unsized yarn. Weft is from their own spinning.
48 looms Hirano Seisakasho Ltd., Japan.
35 ends per inch, 24 picks per inch.
Manufacturing low-quality cotton blankets only, the higher quality being woven at the other mill.

3-6 Finishing

5 Raising machines
1 Brushing and Steaming machine,
then to inspection, cutting, repairing and packing.

4-0 FINISHING WORKS

On the same site is the Finishing plant for bleaching and finishing of knitted goods, mainly vests.

4-1 Bleaching

Kier boiling for 8 hours with caustic soda
6 Wash jig winches, Haas, Germany
Batch to bleaching
1st Washing in rope form
2nd " " " "
Bleaching - Chlorine using J box
Washing by hand
Drying (Haas).

4-2 The material was then transported across the street to the Making-up Factory.

First Section - Cutting the tubes to length for vests.
Second " - Cutting out to pattern
This is followed by sewing - 300 machines making about 1,500 vests per day.
Finally, making-up, inspection and packing.

4-3 In the same building is housed:

Tape Weaving - spindle tapes for Ring frames; 8 machines for weaving name tags in tape, these being jacquard looms, narrow width, of German manufacture.
A further section was Hand Printing, printing badges, towels, vests and plastic bags for pre-packing goods.

5-0 COMMENTS

5-1 Few comments can be passed in respect of these section. The Making-up and Sewing appeared to be extremely efficient and very busy; the remaining sections more leisurely and by no means efficient.

5-2 Plant maintenance appeared to be reasonable in the waste spinning mill, particularly on the Cards, where one Card "Set" was in the process of being ground.

TECHNICAL REPORT ON "MATRACO" WEAVING MILL PALEMBANG, SOUTH SUMATRA

April 8, 1972

Tamotsu HOSHIYAMA
Weaving Expert

TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

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1.. INTRODUCTION

I visited this mill on April 18, 1972 along with Mr. Curran, UNIDO Spinning Expert, Mr. Santosa, Director of Textile Department, Ministry of Industry, and Mr. Wibowo, Director of the Institute of Textile Technology, Bandung.

The following is the summary of my survey, discussion and recommendation for this mill.

2. BUILDING

Wooden and typical saw teeth roof one, and it has wire net window for ventilation at the top side of the roof, no air conditioner at all.

3. NUMBER OF LOOM

Old SAKAMOTO Cop change Automatic Loom 64" R/s	100 Nos
New SUZUKI Cop change Automatic Loom with Box Loader 64" R/s	25 Nos
Total	125 Nos

4. PRODUCTION

4-1 Cloth Kind

(1) $\frac{20\ s \times 20\ s}{52 \times 44} \times 36"$ Standard width shirting

(2) $\frac{20\ s \times 20\ s}{56 \times 48} \times 56"$ Wide shirting

(3) $\frac{20\ s \times 20\ s}{60 \times 52} \times 36"$ Standard width shirting

(4) $\frac{20\ s \times 20\ s}{56 \times 56} \times 56"$ Wide 1/2 Drill

(5) 20 s x 20 s Wide Mosquito Net

4-2 Amount per One Day

Total about 6,000 yards of the above mentioned cloths are produced every day (2 shifts - 13 hours).

5. RAW YARN

All of them are bought from " PATAL " Spinning mill, Palembang, in paper cone cheese and as mentioned above they are all 20^s cotton yarn.
The price is Rp. 75,700.00 per one bale. The raw cotton are all of American, but the yarn quality is not good and especially very nappy.

6. CONE WINDING

6-1 Machine & Number of Drum

Seven MURATA Cone Winders whose total drums are 20 x 7 = 140 d, by which the 20^s cotton yarn is wound from paper cone to wooden one.

6-2 Bobbin Peg & Rewinding Ballooning

The bobbin peg is too thin for paper cone bobbin, because it is made and installed for the small hole of ring spinning bobbin or wooden cone bobbin. For this reason the center direction of the paper cone on the peg does never point to the yarn guide, but it differs nearly 5 inches and the rewinding ballooning of the paper cone is very much deformed unsymmetrically, which causes unnecessary yarn breakage too frequently.
The setting of the peg bar should be adjusted so that the direction may coincide with the yarn guide, and the empty wooden cone bobbin needs to be put on the peg, over which the paper cone should be put in order to fix the position on the peg.

6-3 Slit Gauge

a All of the slit gauges are not used at all. I think the reason is that the raw yarn is brought into this mill in the state of paper cone already wound in the spinning mill, so the mill engineers don't admit the necessity of cleaning the yarn by cutting it at the defective points of the yarn with this slit gauge.
But this idea is very dangerous and harmful, because, as I will mention it in the coming chapter, I found so many yarn breakage in the warping process due to the inferiority of the cheese in the warping creel. So you have to, at first, inspect the condition of the cone winding process in the spinning mill whether they are using the slit gauge properly to cut and clean the yarn and are tying the yarn in the right way, and then, if not so, I guess it is very necessary you need to start to use your slit gauges properly.
The slit gauge clearance is recommendable for this mill 2-2.5 times than the yarn diameter, because the quality of the yarn is inferior for instance, 0.5 mm for 20^s, 0.4 mm for 30^s, and 0.35 mm for 40^s etc.
Anyway, now this mill is missing nonsensically the very valuable chance in the winding process to clean the yarn, to improve the cone quality, and finally to develop the productivity and quality of weaving.

6-4 Operator's Action & Necessity of Knotter

They are tying the yarn with their fingers and nails, so we can find so many irregular and inferior knotting portions - the knotted ends are sometimes too short and often too long, they should be 4 - 5 mm constantly, the knotted points are not done in the right way some of them are double and triple. They need to use the knotter for example, " Boyce's " or " Todo's " Weaver's Knotter, or more

simple and cheaper one. This investment on buying these knotters and on training the operators how to use them can definitely produce much more profit than the spent money to the mill by developing the productivity in the weaving.
The yarn tension should be given by the hand of operator at the time of each start of the cone rotation to avoid the slackening inside the cheese, which causes always troubles in the next warping and pirn winding processes.

7. PIRN WINDING

7-1 Machine & Number of Spindle

28 Murata # 100 Pirn Winders, whose total spindles are 4 x 28 = 112 spis.
They are new and in good condition.

7-2 Weft Bunch on the Pirn

For the automatic looms, this weft bunch on the pirn is very essential to avoid the double pick weft on the cloth at the changing point.
The mill engineers should frequently check the presence of this weft bunch remained on the exhausted weft bobbins inside the empty-bobbin boxes of the looms.
Generally speaking, for bobbin change system automatic looms, the length of the weft bunch should be four times of the denting space on the reed.
This weft bunch needs to be given on this pirn winder by adjusting the bunch builder.

7-3 Volume of the Pirn

To decrease the frequency of cop change and to raise the effisiency & quality of weaving, they need to increase the volume of the pirn.
For this reason they have to increase the average of the pirn volume, and, at the same time, to decrease the variation of the pirn outer diameters, otherwise some of them are too fat to be inserted into shuttles.
The wooden gauges for the outer diameter of the pirn need to be made according to the inner diameter of the shuttle, and they should be given to the mechanics and operators of the pirn winder to adjust mainly the winding yarn tension and spindle speed in uniformity.

8. WARPING

8-1 Machine

Kanamaru's ordinary type drum-driven warper with dropping-roller system and electric feeler stop motion. Yarn speed was 150 yds/min.

8-2 Cone cheese change system

This cheese creel is not magazine creel, but all of the cheeses on the creel are now of different size.
To avoid the unnecessary stoppage of warper and to get good quality beams, all cheeses should be changed at once.
For this reason, every cheese should be in the same size - the same yarn length when it is finished in the previous winding process.

8-3 Yarn Breakage

I had not so much time and could survey it only for 414 yds warping length at 584 ends and observed 8 yarn breakage, it means that the yarn breakage per 500 ends per 10,000 yds is 165.
This about 20 times of Japanese standard for 20^s cotton yarn.
This extremely more breakage of yarn is caused not only by the inferiority of yarn, but also by the defects both in the cone winding and this warping process itself.

8-4 Operator's Action & Necessity of Scissors

As above mentioned already, the yarn breakage and stoppage is so often - once every 50 yards - that operator's action has more influence on the quality of beam, that is to say, on the quality and productivity of weaving.
Spring-type scissors should be given to the operators and be used instead of their nails at present, and yarn tension needs to be given at warping start time just the same as in the cone winding process.

9. S I Z I N G

9-1 Machine

Hot air system ordinary type, but squeezing roller is only one pair.

9-2 Size Recipe & Mixing Process

M a t e r i a l	Quantity	Ratio
Water	400 L	-
Tapioca (Adhesive Agent)	40 Kg	(for water) 10%
CMC (Semi-Synthetic, Adhesive Agent)	1 Kg	(for water) 0.25%
Kemtex (Soluble Starch, Adhesive Agent)	1 L	(for water) 0.25%
T o t a l	442 Kg	-

This size recipe consists of adhesive agents only, they need to mix softening one - for example, Maconol B-19 & T (total 3 kg) or Animal Fat (3.5 kg).
I could not observe their mixing process, but they told me they boil the mixture for 45 min., it should be boiled at least one hour.

9-3 Supply of size Liquid to the machine

Now size liquid is directly supplied to the size box.
But in order to boil is sufficiently and to avoid the sudden change of liquid quality and temperature, it should be supplied into the cavity box at first then transfered to the size box by gear pump - these two boxes should always be boiled.

9-4 Temperature of Size Liquid in Size Box

It was about 35°C only, there was no thermometer on the spot.
It is extremely too low, there is no mill like this in the world which operates the sizing machine at this low temperature natural starch size liquid for cotton yarn.
To melt the cotton wax over the cotton fiber in order to promote the penetration of size liquid into the yarn body, and to stabilize the viscosity of Tapioca starch liquid, it needs to be kept nearly boiling during its operating time - 94°C.

9-5 Yarn Speed

If the yarn speed is too low, the size consumption taken-up by the warp is so little that the remaining time of size in the size box is too long, for this reason the size will be boiled too long time and it will cause too much the degradation of viscosity to have the sufficient adhesive power for fiber in the yarn.
And also the low speed causes too much squeezing effects on the sized yarn and finally insufficiently sized yarn.
Sometime yarn speed is made down due to the low pressure of steam, but according to the above mentioned reasons and others, the yarn speed should be always constant. The control of boiler is, in this point, very important.

10. DRAWING-IN

All of beams are drawn by hand, which is done by one pair of two girls.

11. WEAVING

11-1 Mechanical Effiency by Snap-Reading

(1) Old Sakamoto Cop change Automatic Loom, 64" R/s
77/100 x 100 = 77%.
(2) New Suzuki Cop change Automatic Loom with Box Loader,
64" R/s 13/25 x 100 = 52%.
(3) Total 90/125 x 100 = 72%.

11-2 Mechanical Condition

11-2-1 Old Sakamoto Loom

(1) Loom Speed

It seemed very irregular and different in every loom, but average r/m is about 130. For 64" R/S shuttle looms, the speed in common sense is 150 r/m, but the mechanical condition in this mill's looms is not so good that they should not raise their speed up to this point at present, after the maintenance is improved they can increase it.

(2) Cop Change Motion

For the shortage of spare parts, many of them are operated as ordinary looms. They need to be careful of ordering them to the loom maker as well as the change motion maintenance.

I saw many operators starting the transmitting-rod motion by their hands when weft pirns are nearly exhausted. But I saw some of them only lack in the very simple spare parts, for instance, weft feeler or connecting wire only, they had better collect the spare parts from looms and combine them to complete some change motions, till all necessary spare parts come from the maker.

(3) Picking Motion

In this picking motion, the force and timing are, of course, the most important factors. But in this mill, the adjustment of check-strap (leather-band) is a more urgent problem to be considered and maintained.

Almost all of them are put in the wrong way-plate spring pressure in both sides should be just the same, but many of them are quite different and they cause not only the bad shuttle flying but also huge consumption of check-strap, picker, stick and shuttle etc. As I demonstrated on the spot, they need always to control them much more carefully.

(4) Looseness & Absence of Bolts, Nuts and Bearings

I found many bolts & nuts loosened and also absent from the looms especially on the crank-shafts and slay-swords. They are being vibrated and consumed very much. Bearings also are seen to be loosened in the crank-shafts, which need to be shaped and tightened.

These maintenance does not require much money, but it is the best way to save the looms from terrible wear and tear.

(5) Cleaning Condition

There are so much fly-waste cotton over looms, they absorb oil from machine and finally the looms are very quickly worn. Special loom cleaners should be appointed to clean the looms regularly every day.

11-2-2 New Suzuki Loom

(1) Loom Speed

I was very surprised at their high speed. I measured them on the spot and found the average to be 185 r/m Sometimes, the loom makers recommend the high speed like this for wide space looms, but it can be realized only under the condition of good quality yarn, superior preparatory process and sufficient loom maintenance, etc.
In your mill, as already mentioned above, these conditions are not realized at present, for this reason your weaving efficiency is only 52% and the consumption of picking spare parts are terribly much, for instance, shuttle breakage is 30 pieces per one month and picking stick consumption is 14 pieces per three months per only 25 looms.
Immediately you have to decrease the loom speeds down to 150 r/m by making small motor-pulleys, then you can definitely get not only the much less spare parts consumption, but also the high production.

(2) NS Type Temple Cutter

This kind of temple cutter is very nice for the selvedge, but some of them are now not operating.

(3) Others

The condition is almost the same as the previous Old Sakamoto Looms.

11-3 Operator's Action

They have only two looms per one operator, they are not so busy. They should be almost always back side to correct the irregular yarn on the beam in order to improve the efficiency. But many of them are now only standing up in idleness doing nothing, this is very uneconomical and they need to be trained in the above mentioned way.

11-4 Relationship between Beam-Flange Space and Denting Space on Reed

For plain and twill weave, the beam-flange space should be about three inches (8 cm) more than that of denting on reed to avoid the selvedge yarn breakage. This "three inches" has nothing to do with the absolute denting space.

The denting space for new Suzuki loom is 156 cm, but some of their beam-flange space is only 143 cm - the beam flange is reversely 13 cm narrower than denting.

12. CONCLUSION

There are many problems to be solved in this mill as already mentioned above. Especially, decreasing the yarn breakage and stoppage in warping process by improving the cone cheese quality, raising the size liquid temperature in size box to promote the penetration of size liquid into the yarn body, and decreasing the speed of new Suzuki 64" R/s Looms are the most urgent actions to be carried out. There is no short way in weaving, if they want to improve their productivity, every step which I have mentioned and recommended in the previous chapters should be done one by one.

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TECHNICAL REPORT ON
"SUKUR" WEAVING MILL
PADANG, CENTRAL SUMATRA

April 10, 1972

Tamotsu HOSHIYAMA
Weaving Expert
TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMNET PROGRAMME
IN INDONESIA, UNIDO

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1. INTRODUCTION

I visited this mill on April 10, 1972 along with Mr. Curran, UNIDO Spinning Expert, Mr. Djoemena & Mr. Santosa, Director of Textile Department, Ministry of Industry, and Mr. Wibowo, Director of the Institute of Textile Technology, Bandung.

The following is the summary of my survey, discussion and recommendation for this mill.

2. BUILDING

Wooden and typical saw teeth roof one, and it has wire net window for ventilation at the top side of the roof, no air conditioner at all. In one building, all of the preparatory and weaving machines are installed.

3. NUMBER OF LOOM

New Suzuki Loom 64" R/s, 1 x 4	22 Nos
Old Suzuki Loom 70" R/s, 1 x 4	18 Nos
Old Suzuki Loom 36" R/s, 1 x 4	24 Nos
Total	64 Nos.

4. PRODUCTION

All of them are checked and monocoloured sarong whose density is about 60 x 68/inch and yarn count $42^s/2 \times 40^s$.

5. RAW YARN

The warp is American yarn $42^s/2$ (Rp. 117,500/Bale) and weft is Palembang yarn 40^s (Rp. 112,500/Bale). This American-made yarn is very cheap due to the Government subsidy. They are brought in hank state to this mill. The Palembang-made yarn 40^s cannot be said in good quality, it is especially very nappy.

To avoid the unreasonable competetion with local production of yarn, the Government is requested by Dr. E.S.M. Oweiss, Project Manager to decrease the subsidy on the imported yarn.

6. CONE WINDING

6-1 Machine & Number of Drum

(1) Kiryu Machinery Works QT Type Hank-Cone Winder

30 d x 1 machine	=	30 d
50 d x 1 machine	=	50 d
Total	=	80 d

very obsolete winders, the traverse cum splits are so much worn that the traverse motion is terribly vibrated. Yarn guide are all very old and have deep scratches to make the yarn more inferior. No slit gauges and stop motions at all.

(2) New Murata Hank-Cone Winder, 1970

20 d x 1 machine = 20 d

In good condition.

6-2 Unraveling of Hank before Setting into Winder Creel

After hank-dyeing, these hanks are usually entangled, so the operator of cone winder needs to unravel them very softly and carefully, otherwise the quality and productivity of cone will be very inferior and low, which cause the weaving efficiency dropping very much.

6-3 Operator's Action & Necessity of Knotter

They are tying the yarn with their fingers and nails, so we can find so many irregular and inferior knotting portions - the knotted ends are sometimes too short and often too long, they should be 4 - 5 mm constantly, the knotted points are not done in the right way, some of them are double and triple. They need to use the knotter, for example, "Boyce's" or "Todo's" Weaver Knotter, or more simple and cheaper one. This investment on buying these knotters and on training the operators how to use them can definitely produce much more profit than the spent money to the mill by developing the productivity in the weaving.

The yarn tension should be given by the hand of operator at the time of each start of the cone rotation to avoid the slackening inside the cheese, which causes always troubles in the next warping and pirn winding processes.

7. PIRN WINDING

7-1 Machine & Number of Spindle

(1) Leesona Disc Contact Ahead System Winder

20 spl x 1 machine	=	20 spl.
18 spl x 1 machine	=	18 spl.
Total	=	38 spl.

Very obsolete one, all spindles are terribly vibrated.

(2) Kiryu Disc Contact Ahead System Winder
40 spl. x 1 machine = 40 spl.
Just the same as the previous one.

(3) Murata 100 Winder
4 spl. x 1 machine = 4 spl.
In good condition.

7-2 Necessity of Maintenance & Replacement by New Machinery

These Leesona & Kiryu Winders are completely obsolete, and I think now they cannot buy any spare parts from the makers. Even if they could get them, they need to buy new complete machines in order to improve the weaving efficiency. We can find so many loom stoppage due to the inferior pirn caused by these terribly obsolete winders.

7-3 Necessity of Unification of Pirn Bobbin

Now they are using many kind & size bobbins, it is nonsense and harmful for mill controlling, these should be unificated into one kind and size.

8. W A R P I N G

8-1 Machine

Suzuki Sectional Warper 3 machines.

8-1 Cone Cheese Change System

To avoid the unnecessary stoppage of warper and to get good quality beams, all cheese should be in the same size - the same yarn length when it is finished in the previous winding process.

9. S I Z I N G

Hank sizing is done by hands in the big pan. 3 Kg. of Tapioca only is sized to 4 bundles of yarn (18 Kg). At least, animal fat (0.3 Kg) should additionally be mixed as softening agent even if the warp is twisted yarn at present.

10. W E A V I N G

10-1 Mechanical Efficiency by Snap-Reading

(1) New Suzuki 64" R/s 1 x 4 Loom
10/22 x 100 = 45.5%

(2) Old Suzuki 70" R/s 1 x 4 Loom
7/18 x 100 = 39 %

(3) Old Suzuki 36" R/s 1 x 4 Loom

6/24 x 100 = 25%

(4) Total 23/64 x 100 = 36%.

10-2 Mechanical Condition

They have no warp stop motion at all.

10-2-1 New Suzuki : 64" R/s

(1) Loom Speed

It is about 140 - 150 r/m at present. For 64" R/s, it is normal.

(2) Maintenance

The loosening of bolts, brass bearings are found so many cases. At least, when beam is exhausted these should be checked and adjusted, otherwise the loom will quickly be worn and the mill should spend so much money to buy many spare aprts and even new looms in the near future.

10-2-2 Old Suzuki 70" R/s

(1) Loom Speed

It is about 125-135 r/m at present. It is too low for 70" R/s loom, you can increase up to 145 r/m.

(2) Picking Motion

This is 13 1/2" at present, but it is too strong, should be decreased to 10 1/2". For this reason, their check-strap and shuttle swell are now too rigid, which cause so many consumption of not only these spare parts but also picker and picking-stick.

(3) Shuttle

The surface is very rough, which catches the weft and breaks it during weaving. This should be amended by sand paper.

Inside the shuttle, weft bobbin is rotating and not fixed. The fitting of bobbin to the holder inside the shuttle should be considered at the purchasing time and afterwards.

(4) Maintenance

The loosening of bearing and bolts are now causing the vibration of crank-shaft, rocking-shaft and slay sword, etc. These should more carefully be checked and maintained, but they need to be careful of overtightening by the wrong way.

10-2-3 Old Suzuki 36" R/s

(1) Loom Speed

It is now nearly 170 r/m, but 150-160 r/m is recommendable for this loom at present mechanically inferior condition.

(2) Others

Conditions are just the same as mentioned above.

10-3 Operator's Action & Necessity of Training

They have only two looms per one operator, they are not so busy. They should be almost always back side to correct the irregular yarn on the beam in order to improve the efficiency. But many of them are now only standing up in idleness doing nothing, this is very uneconomical and they need to be trained in the above mentioned way.

11. POLYESTER/COTTON WEAVING

I was asked about the possibility of Tetoron/Cotton Weaving in this mill. The difficulty of T/C Weaving exists mainly in sizing process, but so far as they use twisted yarn like now, even this sizing is not so difficult. Still PVA (217) should be used for T/C sizing materials, only Tapioca or the other natural starches are not sufficient for T/C, to stick each of the fiber more strongly.

The elongation of T/C yarn is so much that the tension should be controlled more carefully and uniformly in every process of preparation than the case of cotton yarn.

12. CONCLUSION

Their efficiency is now only 36%. The training of the workers and the practice of maintenance is the most urgent in this mill. And if I were the mill owner and had some capitals to invest, I will, at first, buy new pirn winding machine and weft bobbin, because now many loom stoppages are caused by the inferiority of these two, then having got profit, I will buy cone winding machine.

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TECHNICAL REPORT ON
"ASRATEX" WEAVING MILL
PADANG, CENTRAL SUMATRA

April 10-11, 1972

Tamotsu HOSHIYAMA
Weaving Expert

TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

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1. INTRODUCTION

I visited this mill on April 10 & 11, 1972 along with Mr. Curran, UNIDO Spinning Expert, Mr. Djoemena & Mr. Santosa, Director of Textile Department, Ministry of Industry, and Mr. Wibowo, Director of the Institute of Textile Technology, Bandung.
The following is the summary of my survey, discussion and recommendation for this mill.

2. BUILDING

A concrete building with zinc roof, and open air ventilation window at the top side of the roof. The floor is boarded with wood plate.

3. NUMBER OF LOOM

Chinese-Made 63" R/s shuttle change system Automatic Loom, with 16 Healds Dobby Motion 50 Nos., and without D.M. 28 Nos., Total 78 Nos., Installed in 1964 by Chinese Technicians.

4. PRODUCTION

Only 56 looms out of total installed 78 looms were then being operated, the rests were unloaded with beam but gradually being loaded. Long time all of them were stopped due to the capital shortage, and only one month ago they resumed to operate them. Ordinary $20^s \times 20^s$ cotton shirting is woven - 54" & 36", two kind of width.

5. RAW YARN

All of these 20^s cotton yarn are brought from "Patal" Spinning Mill, Palembang in the state of paper cone cheese.
The packing and transportation is not so good that many of these paper cone are crushed and deformed, the yarn are much damaged.

6. CONE WINDING

6-1 Machine & Number of Drum

(1) Chinese-Made QT Type Winder

100 d x 1 machine = 100 d.

(2) Chinese-Made Roto Coner

100 d x 1 machine = 100 d.

Both of these winders have stop motion tension device, and slit gauge.

6-2 Operating Condition & Operator's Action

They do not use these winder and put the above crushed paper cones directly on the warper's creel and pirn winder without rewinding.

All winders are stopped.

7. PIRN WINDING

(1) Chinese-Made Hacoba-Type Automatic Pirn Winder

4 spl x 15 machine = 60 spl.

(2) Murata #100 Pirn Winder

4 spl x 5 machine = 20 spl.

The pirn is a little soft, they had better wind them harder to increase their unit weight for improving the weaving efficiency. The spiral winding number is 13 per one stroke, which is moderate.

8. W A R P I N G

8-1 Machine

One Chinese-Made Ordinary Type Drum-Driven Warper with Magazine Creel of 630 cheeses. Electrical Stop Motion with Feeler on the Front Yarn Guide Bar of Creel (Schlafhorst Type).

8-2 Yarn Breakage

I could survey it only for a very short time on the spot, but it seems something like 500 breakage per 500 ends per 10,000 yds. (cf. According to the Mill's survey, it is 230 breakages). It is more 50 times of Japanese standard.

8-3 Condition of Cone on Creel

As already mentioned above, many of the cones are crushed and the yarn is damaged, many yarn breakages are terribly caused by this reason.

The cheese peg is for the small hole of wooden cone bobbin, so all these paper cones are down on the peg and the center directions point out to the very different way of porcelain guides on the bar.

This also causes many yarn breakage. The empty wooden bobbin needs to be put on the peg at first, then paper cone should be on it.

They are not adopting the magazine-creel cheese change system, but one by one the exhausted cheese is change by the operator, stopping the warper every time. All of the cheeses are not changed at one time, the sizes of these cheeses are all different. The full cheese size is too big in comparison with the creel distance (fixed type and unadjustable), for this reason the yarn is rubbing the cheese edge during running.

9. SIZING

9-1 Machine

One Chinese-Made Ordinary type Hot-Air Sizer. Squeezing Roller 2 pairs (Sizing Flannel & Calico Cloth), Cavity Box with Gear Pump.

9-2 Size Recipe & Mixing Process

Material		Quantity	Ratio	
Taploca	(Adhesive Agent)	40 Kg.	(For Water)	10%
Water Glass	(Adhesive Agent)	4 Kg.	(For Water)	1%
Cramul	(Softening Agent)	4 Kg.	(For Taploca & Water Glass)	0.9%
Paraffin	(Softening Agent)	4 Kg.	(-do-)	0.9%
Kaolin	(Anti Friction & Weighting Agent)	4 Kg.	(-do-)	0.9%
Water		400 L.	-	
TOTAL		452 Kg.		

I recommend them to increase Taploca up to 60 Kg. for improving the taking-up percentage and also to add 0.4 Kg. of $CuSO_4$ for mildewproof.

They have three mixing cistern made of cement with agitators. I could not see the mixing process, but they told me that they boil it 30 minutes in the cistern.

9-3 Temperature of Size Liquid in Size Box

I found only 55°C by glass thermometer. It is too low for melting the cotton wax over the fiber and also for keeping good viscosity of Taploca starch to prompt its penetration into yarn body. The size is now remained only on the surface of yarn.

For this reason, we can see many waste sized fibers under the front deviding rods and also in the weaving process - some of these fibers are more than 1/2" long.

This temperature needs to be always kept nearly boiled (94°C) in the size box.

9-4 Cleaning & Disposal,of Old Size Liquid

I stired up the bottom of size box with bamboo bar and found much old and settled-down size liquid was there. This is very dangerous and harmful for good quality sizing, today's size liquid should be thrown away and should not be used tomorrow, because Tapioca's degradation of viscosity for time-pass is extremely high and the stickness power drops very quickly.

The size box and cavity box, of course, need to be cleaned at the closing time every day.

10. DRAWING-IN

All of beams are drawn by hands of two girls pair.

11. W E A V I N G

All of these looms are now not automatic but ordinary due to the shortage of shuttle change motion spare parts.

11-1 Mechanical Effiency by Snap-Reading

(1) 54" Width Cloth Loom
$21/40 \times 100 = 52\%$

(2) 36" Width Cloth Loom
$12/16 \times 100 = 75\%$

(3) Total $33/56 \times 100 = 59\%$.

11-2 Absolute Frequency of Loom Stoppage

We surveyed it only for warp breakage on the spot for one hour at ten looms group, and found it 29 times.

It is about 6 - 7 times than Japanese standard.

11-3 Reason of Loom Stoppage

I surveyed it on the 31 stoppages as follows :

R E A S O N		No.	%
Warp	Smashed by Shuttle	1	
	Simply Yarn Broken or Yarn Absence	9	32.3
	T o t a l	10	
Weft	Yarn Exhausted	13	
	Yarn Broken	5	58.0
	T o t a l	18	
Maintenance and Repair		3	9.7
G r a n d T o t a l		31	100

The main reason for warp breakage is the inferiority of beams due to mainly the warping and sizing process as already mentioned, and for weft stoppage is, of course, due to the lack of automatic shuttle change motion.

11-4 Loom Speed

It was 155-160 r/m and rather high for 63" R/s looms in the bad condition as mentioned in the following paragraph, maximumly 150 r/m is recommendable.

11-5 Mechanical Condition

(1) Picking Motion

The plate-spring pressures in the both sides of check-strap are not the same, one side is much stronger than another, which cause the wrong shuttle flying and extreme consumption of spare parts - check-strap, picker, stick & shuttle, etc. As I demonstrated it on the spot, this should urgently be adjusted.

The top of picking-stick is much worn and hollowed, which causes also the wrong shuttle flying - these worn stick should immediately be changed.

(2) Front Snap Guard & Shuttle Top Guard

Almost all of them are broken and welded. This breakage is mainly caused by the wrong flying of shuttle as already mentioned and the wrong setting of these parts.

Once these thin cast iron parts are broken, the welding in the right direction is very difficult, and the irregularly welded parts cause again the wrong shuttle flying to happen the next damage of these parts.

(3) Loosening of Bolts, Nuts & Bearings

These are very frequently found in their looms. Periodical check and adjustment is essential to lengthen the life of loom. It does never cost much money.

11-6 Relationship between Both Spaces of Beam-Flange and Drawing on Reed.

For plain weave, the beam-flange space should be about three inches (8 cm) more than that of drawing on the reed to avoid the selvedge yarn breakage. This "three inches" has nothing to do with the absolute drawing space.

In this mill, the drawing space for 36" width cloth is 38 1/2", but the beam-flange space is now 51" (the difference is 12 1/2"), the latter should immediately be narrowed to 42".

For 54" - width cloth, the drawing space is 56 1/2", but the beam-flange space is now 61" - the difference is 4 1/2", which need not be amended so immediately.

11-7 Operator's Action

It is rather better than the other mills in Indonesia. But the usage of scissors and denting-pin (which have already given to them) should more be trained.

12. CONCLUSION

Contacting the Chinese loom maker, in any way they need to get the spare parts of shuttle change motion. Because of the absence of these parts, they are now losing much weaving efficiency.

The package & transportation method of paper cone cheese from Palembang to this mill should be improved immediately in order to get good beam. Even after this improvement, if the contents of paper coned yarn is still inferior - for instance, bad knotting and unremoving of slub yarn, etc. in the Palembang spinning mill, they need to re-wind them into wooden bobbin.

Anyway, to decrease the yarn breakage and stoppage in the warping process is the essence for getting beam and for improving the efficiency of weaving.

The sizing recipe, temperature and boiling hour of size liquid in the size box need to be changed as already mentioned above.

Following all these recommendations, they will definitely be able to improve their productivity, because their machineries are still new at present.

TECHNICAL REPORT ON
"SAMUDRA" WEAVING MILL
PADANG, CENTRAL SUMATRA

April 11, 1972

Tamotsu HOSHIYAMA
Weaving Expert

TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

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1. INTRODUCTION

I visited this mill on April 11, 1972 along with Mr. Curran, UNIDO Spinning Expert, Mr. Djoemena & Mr. Santosa, Director of Textile Department, Ministry of Industry, and Mr. Wibowo,,Director of the Institute of Textile Technology, Bandung.
The folowing is the summary of my survey, discussion and recommendation for this mill.

2. BUILDING

Wooden small building with open window for ventilation at the top side of the roof. In this one building, all of the machines are installed.

3. NUMBER OF LOOM

Suzuki 64" R/s, 1 x 4 16 Nos.

4. PRODUCTION

Checked Serong of $\frac{42^s/2 \times 20^s}{64 \times 64}$ 50" width.

2 shifts x 7 H = 14 H/day operation.

5. RAW YARN

The warp is American-made $42^s/2$ and weft is Palembang-made 20^s, both of which are brought into this mill in the state of paper cone cheese. The later cannot be said good one, especially it is very nappy. They are at first wound into hank, then hank-dyed and wound to cone.

6. CHEESE WINDING

6-1 Machine & Number of Drum

(1) Kiryu Machinery Works QT Type Hank-Cone Winder
30 d x 1 machine = 30 d.
Very obsolete one.

(2) Bandung-made Split Drum Type Hank Paralel Cheese Winder.

30 d x 2 machines = 60 d
50 d x 1 machine = 50 d
Total 110 d

The drum shaft are terribly vibrating, no stop motion & slit gauge at all.

6-2 Unraveling of Hank before Setting into Winder Creel

After hank-dyeing, these hanks are usually entangled, so the operator of winder needs to unravel them very softly and carefully, otherwise the quality and productivity of cheese will be very inferior and low, which cause the weaving efficiency dropping very much.

7. PIRN WINDING

(1) Murata#100 Pirn Winder

4 spl. x 3 machines = 12 spl.

(2) Unknown Maker Disc Contact Ahead System Pirn Winder

20 spl. x 1 machine = 20 spl.

8. W A R P I N G

One Wooden Home-Made Sectional Warper.
This is driven by human power.
The yarn breakage is very few, so the beam quality is good.

9. S I Z I N G

No sizing at all for $42^{S}/2$ warp at present.

10. DRAWING - IN

Old & new beam was being tied by human hands one by one.

11. W E A V I N G

11-1 Mechanical Efficiency by Snap-Reading

14/16 x 100 = 88% (One operator has one loom only).

11-2 Mechanical Condition

(1) Loom Speed

It is very irregular for each loom, from 124 r/m up to 140 r/m, because they imported only looms without motors and afterwards they collected them domestically.

(2) Maintenance

It is rather better then the other mills in Sumatra. This mill is a very small and primitive one, but every kind of control seemed good.

(3) Relationship between Beam-Flange Space and Denting-Width on Reed

For plain weave, the beam-flange space should be about three inches (8 cm) more than that of drawing on the reed to avoid the selvedge yarn breakage.
This "three inches" has nothing to do with the absolute drawing space.
In this mill, the drawing space is 53 1/2", but the beam-flange space is now 55" only, the latter should be 57".

12. USAGE OF PVA IN SIZING

As above mentioned already, they don't size the $42^s/2$ warp at present. But the mill manager asked me about the sizing by PVA. I agreed it and recommended him to use 5% of PVA and 0.5% of animal fat against yarn quantity. PVA is soluble in cold water and desizing is unnecessary in this mill, so even in this mill they can use it very easily. But of course, this size liquid should be boiled at least 30 minutes before sizing.

13. CONCLUSION

This mill is very small and some of the machines are primitive, but the mill controlling is rather better, so the weaving efficiency is higher than the other mills in Indonesia.
This efficiency will definitely be better after following my suggestions above mentioned.

TECHNICAL REPORT ON
"PARDEDE" WEAVING MILL
MEDAN, NORTH SUMATRA

April 13, 1972

Tamotsu HOSHIYAMA
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TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMENT PROGRAMME
IN INDOENSIA, UNIDO

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1. INTRODUCTION

I visited this mill on April 13, 1972 along with Mr. Curran, UNIDO Spinning Expert, Mr. Djoemena & Mr. Santosa, Director of Textile Department, Ministry of Industry, and Mr. Wibowo, Director of the Institute of Textile Technology, Bandung.

The following is the summary of my survey, discussion and recommendation for this mill.

2. SITE & BUILDING

This site is a very huge one, where not only the integrated mills, but a church, hospital, women's dormitory and staffs' houses are there. The building is an ordinary one with high roof.

3. NUMBER OF LOOM

(1)	Sakamoto	64" R/s	1 x 1	Loom	21 Nos.
(2)	Chinese-Made	63" R/s	1 x 1	Loom	10 Nos.
(3)	Chinese-Made	52" R/s	1 x 1	Loom	15 Nos.
(4)	Hirano Blanket Loom with Dobby Motion	75" R/s	1 x 4		42 Nos.
		Total			88 Nos.

4. PRODUCTION

(1) $\frac{20^s \times 20^s}{60 \times 60} \times 36''$ Standard width shirting.

(2) $\frac{34^s/2 \times R\ 2.5s}{15 \times 45} \times 165\ cm \times 195\ cm$ Rayon Blanket

Weaving operation : 2 shifts (10 H x 2 = 20 H).

5. RAW YARN

All of them are produced in this spinning mill and brought here in 9" length ring bobbin. The full ring bobbins are found only 10%, all of the rest 90% are oddy figured - this means the terribly high yarn breakage and trouble in the spinning process. In fact, I found averagely 83 idle spondles per one ring frame on the spinning spot - 20.6% spindles are idle (Some of them are due to yarn breakage, others to the absence of parts, etc.).

At the same time, as a matter of course, the quality of yarn is terribly inferior - uneven, full of slub and nap.

6. CONE WINDING

6-1 Machine & Number of Drum

(1) Murata Roto Coner

20 d x 2 machine = 40 d.

Tin plate made split gauges are there, and all of them are widely and obliquely opened.
Stop motions are existed there but uneffectively.

(2) Murata Roto Coner

110 d x 6 machines = 660 d.

Saw-teeth slub catchers are there, but opened about 3 m/m and oblique.
Stop motion are existed but uneffectively.
Tension washer's number are not uniform.
The vibration of cone is very much.

6-2 Slit Gauge

As already mentioned above, these slit gauges and slub catchers are completely unused. If they have a true intension to improve the weaving productivity, they have to be more careful of the usage of these devices.

Cone winding process exists not only for winding ring bobbin yarn into cone bobbin for warper's creel, but also for cleaning the raw yarn by cutting the defective portion with these gauges and catchers - this is a foundamental common sense of weaving.

For their inferior yarn, the clearance of slit gauge (blade type) is recommendable to be about 2.5 times of the yarn diameter, for instance, 0.5 mm for 20^s, o.4 mm for 30^s, and 0.35 mm for 40^s, etc. For saw-teeth slub catcher, 0.1 mm should be added to the above mentioned clearance for each yarn count.

6-3 Stop Motion

This is also very important to avoid the unnecessary rubbing of cheese surface against drum which causes both the degradation of yarn quality itself and the traverse-out of cheese.

Some of them are not operated due to the shortage of spare parts, but the others can be easily repaired and adjusted, at least the latter should immediately be made effective.

6-4 Bobbin Peg & Rewinding Ballooning

The center direction of ring bobbin needs to coincide with the yarn guide to make the rewinding ballooning of ring bobbin symmetrical for avoiding the unnecessary yarn breakage.
Each bobbin peg should be adjusted one by one in this point.

6-5 Operator's Action & Necessity of Knotter

They are tying the yarn with their fingers and nails, so many irregular and inferior knotting portions are found - the knotted ends are sometimes too short and often too long, they should be 4-5 mm constantly, the knotted points are not made in the right way - some of them are double and triple.

They need to use a knotter, for instance, "Boyce's or "Todo's" Weaver's Knotter. This investment can definitely produce much more profit by improving the productivity in weaving.

At the time of each start of cone rotation when the cone touches the drum, the yarn tension should sufficiently be given by the operator's hand in order to avoid the slackening inside the cheese, which always causes trouble in the next warping and pirn winding processes.

7. PIRN WINDING

Murata#100 Automatic Pirn Winder.

4 spl. x 6 machines = 24 spl.

All of the automatic bobbin supply device are disappeared and nothing remained.

8. WARPING

8-1 Machine

One Kawamoto Ordinary Type Drum-Driven System Warper with Turn-Over Type Cheese Simultaneous Change Device Creel.

8-2 Yarn Breakage

About every four yards, yarn breakage or cheese exhaustion causes the warper stoppage. This high frequency can never produce good quality beam and it drops very terribly the weaving efficiency at last.

8-3 Cone Cheese Change System

As already mentioned above, this warper is equipped with nice simultaneous cheese change system, but they don't utilize this one and the sizes of all cheeses are different and not the same - every cheese is used till it is completely exhausted and warper is stopped at each this time.

The sizes of all full cheese when doffed in the winding process should be just the same, and they need to be changed at once after some number of beams are warped.

8-4 Relative Position of Cheese on Peg and porcelain Guide on Bar

The central direction of cone on the peg does not point to the porcelain guide on the bar, so the unwinding ballooning of cone is not symmetrical and it always rubs the edge of cone.

The distance between the cone cheese and the porcelain guide can be adjusted in this kind of warper, it should be done so that even at full cheese time the unwinding ballooning may not touch the cone surface.

8-5 Operator's Action & Necessity of Scissors

As above mentioned already, the yarn breakage and stoppage is so often - once every 4 yards - that operator's action has more influence on the quality of beam, that is to say, on the quality and productivity of weaving.

Spring-type scissors should be given to the operators and be used instead of their nails at present, and yarn tension needs to be given at warping start time just the same as in the cone winding process.

9. S I Z I N G

9-1 Machine

One Kawamoto Hot Air System Ordinary Type, with only One Pair Squeezing Roller.

9-2 Size Recipe & Mixing Process

Material		Quantity	Ratio
W a t e r		500 L.	-
Tapioca	(Adhesive Agent)	75 Kg.	(For Water) 15%
Chine Clay	(Weighting & Anti Friction Agent)	1.5 Kg.	(For Tapioca) 2%
$CuSO_4$	(Antiseptic Agent)	0.2 Kg.	(For Tapioca) 0.27%
Formalin	(Antiseptic Agent)	250 cc	(For Tapioca) 0.33%
Glycerine	(Softening Agent)	100 cc	(For Tapioca) 0.13%
Ramasheet	(Softening Agent)	1,000 cc	(For Tapioca) 1.3%
T o t a l		578 Kg.	-

I could not see this mixing process on the spot, but they told me they boil the mixing size liquid for 30 minutes only in the mixing cistern.

They have only one small clay-pan upstairs and one mixing cistern downstairs.

9-3 Temperature of Size Liquid in Size Box

It was about 50-60°C only, they had not a thermometer on the spot at all. This is too low, so the size is never boiled sufficiently and its colour is very white and dull, never bright. It shows an insufficient boiling for geratinization of Tapioca starch and causes the extremoly poor penetration of size liquid into the yarn body. For this reason, I found so much fly-waste of sized fiber on the spot of weaving.

This temperature should immediately be raised up to about 95°C.

The cavity box also needs to be utilized for boiling the size liquid sufficiently, now it is idle.

9-4 Tension of Yarn

I have never seen the high yarn tension like this mill's.

To decrease the yarn tension during sizing is one of the essences for improving the weaving efficiency.

In the weaving process, the warp yarn is very strongly shocked by shedding and beating-up motions, for this reason the sized yarn needs to hold the sufficient elasticity, otherwise it will immediately & frequently be broken. But if you give high tension to the yarn in the sizing process, the elongation of raw yarn cannot be remained - this breaking elongation percentage of size yarn should be at least 4-5%.

10. WEAVING

10-1 Mechanical Efficiency by Snap-Reading

(1) Shirting

13/32 x 100 = 40.6%.

(2) Blanket

Many times all of these blanket looms are stopped due to the shortage of weft supply. At one time when the weft supply is sufficient 10/34 x 100 = 29.5%.

10-2 Mechanical Condition

Mechanical condition of all looms is terribly nonsense, for example, check-straps for Sakamoto and Chinese-Made loom are disappeared, even weft fork is also taken away.

I have no word to comment on the weaving in this mill.

10-3 Operator's Action

They have only two shirting looms per one operator, they are not busy. They should be almost always backside to correct the irregular yarn on the beam in order to improve the efficiency, but now many of them are only standing up in idleness doing nothing - this is very uneconomical and they should be trained in the way above mentioned.

11. CONCLUSION

The technical situation of this mill is terribly nonsense. If they have a real intension to level up this mill, they have to study the problems on the spot more eagerly and try to absorb more practical knowledge from others more humbly.

TECHNICAL REPORT ON
"KARL SIANIPAR" WEAVING MILL
BALIGE, NORTH SUMATRA

April 14, 1972

Tamotsu HOSHIYAMA
Weaving Expert
TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMENT PROGRAMME
IN INDOENSIA, UNIDO

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1. INTRODUCTION

I visited this mill on April 14, 1972 along with Mr. Djoemena, Director of Textile Department, Ministry of Industry.
Balige is a small town situated about 250 Km South-East of Medan, and it is one of the weaving industry centers in South Sumatra.
There are many small weaving mills in this townm and this "Kari Slaniper" is the biggest one.

2. BUILDING

Concrete building with zinc roof, the floor is cemented.

3. NUMBER OF LOOM

1). Suzuki	36" R/s	(1938)	10 Nos.
2). Sakamoto	36" R/s	(1955)	5 Nos.
3). Sakamoto	44" R/s, Cop Change Automatic	(1955-1962)	33 Nos.
4). Sakamoto	64" R/s, 1 x 4	(1955-1972)	25 Nos.
5). Bandung-Made	66" R/s with Dobby Motion	(1962)	50 Nos.
Total			123 Nos.

4. PRODUCTION

Checked Sarong, Matting, Drill, Shirting and Mosquito Net, etc.

5. RAW YARN

American-made $42^s/2$ & 50^s, Pakistan-made 20^s & 30^s.
Sometimes they use Pardede Mill made yarn, but they told me this yarn is expensive and inferior in quality.
American yarn comes in the state of paper cone, and Pakistan one in paper cone and hank.
For grey cloth, the above mentioned paper cone is directly used in the warping, for checked cloth the grey yarn is reeled to hank by man-power reeler and hand-dyed than wound to cone.

6. CONE WINDING

6-1 Machine & Number of Drum

Murata Roto Coner, 1962 20 d x 4 machine = 80 d.
Stop motion & slit gauge are completely equipped.

6-2 Operator's Action & Necessity of Knotter

They are tying the yarn with their fingers and nails, so we can find so many irregular and inferior knotting portions - the knotted ends are sometimes too short and often too long, they should be 4 - 5 mm constantly, the knotted points are not done in the right way, some of them are double and triple. They need to use the knotter, for example, "Boyce's" or "Todo's" Weaver's Knotter, or more simple and cheaper one.
This investment on buying these knotters and on training the operators how to use them can definitely produce much more profit than the spent money to the mill by developing the productivity in the weaving.
The yarn tension should be given by the hand of operator at the time of each start of the cone rotation to avoid the slackening inside the cheese, which causes always troubles in the next warping and pirn winding processes.

7. PIRN WINDING

1. Murata#100 Automatic Pirn Winder 4 spl. x 5 machines = 20 spl.
2. Hacoba Automatic Pirn Winder 4 spl. x 7 machines = 28 spl.

The bobbin chuck is too big for the bobbin, the bobbin vibrates terribly, smaller chuck should be made even from wood by hand.

8. WARPING

One Kawai Sectional Warper with 504 ch. creel.
As above montioned already, for grey cloth, the paper cone is directly used in this warping, so every cheese on the peg is downward not t to point out to the direction of porcelain guide. And also some of this paper cone are crushed during transportation, these should be rewound into wooden cone bobbin, or at least, empty wooden bobbin should be put on the peg and then the paper cone should be on it to avoid misdirection.

9. S I Z I N G

9-1 Machine

One Kanamaru ordinary type sizer, but squeezing roller is only one pair. Now they cover this upper squeezing roller only with cotton shirting cloth, but, of course, sizing flannel should be covered at first on this roller to give the good squeezing effect.

9-2 Size Recipe, Mixing and Sizing Process

Material	Quantity	Ratio
Water	200 L.	-
Tapioca (Adhesive Agent)	8 Kg.	(for water) 4%
Size C (BASF-Made, Adhesive Agent)	4 Kg.	(for water) 2%
Total	212 Kg.	-

This size recipe consists of adhesive agents only, they need to mix softening one - for instance, Maconol B-19 & T (total : 0.8 Kg.) or Animal Fat (1 Kg.).
I could not observe their mixing process, but they told me they throw and mix the size materials directly inside the cavity box of sizing machine, because the mixing equipment is not installed there.
They boil the mixture about 50 minutes at 80°C.
The cavity box should be used for pre-heating and its contents (size liquid) needs to be continuously circulated during sizing to and from the size box by gear pump.
To melt cotton wax over cotton fiber for promoting the penetration of size liquid into the yarn body, and to stabililze the viscosity of Tapioca starch, they need always to boil the liquid at nearly 94°C during sizing.

10. W E A V I N G

10-1 Mechanical Efficiency by Snap-Reading

57/90 x 100 = 63.3%.

10-2 Mechanical Condition

(1) Loosening & Absence of Bolt, Nut & Bearing

This can be found very frequently on the looms, systematic maintenance should be done to avoid the quick wear and tear of looms and to improve the weaving efficiency.

(2) Picking Motion

They had not understood the importance of the motion of check-strap, this is the essence of loom motion.
As I demonstrated on the spot, they should adjust it in order to get a good shuttle-flying.

They are now using check-straps made from old rubber tire, the friction between this and plate-spring in the holder is very different from ordinary leather-made one, so the motion is very unreasonable for absorbing the shuttle running energy.
Of course, the force & timing of picking motion is the most important, two mechanics should be appointed and trained especially for this picking motion maintenance & adjustment only.

10-3 Operator's Action

They have only two looms per one operator, they are not so busy. They should be almost always backside of loom to correct and amend the irregular yarn on the beam in order to improve the efficiency.
But now many of them are only standing up in idleness doing nothing, they should be trained in the above mentioned way.

11. CONCLUSION

This mill cannot be said to be satisfactorily managed and controlled yet, but the mill manager is very eager in getting improved efficiency and he is studying very diligently and keen to absorb practical knowledge from others, so I can expect this mill will be much improved in future.

TECHNICAL REPORT ON
"SIMA" WEAVING MILL
MEDAN, NORTH SUMATRA

April 17, 1972

Tamotsu HOSHIYAMA
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TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

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1. INTRODUCTION

I visited this mill on April 17, 1972 along with Mr. Djoemena, Director of Textile Department, Ministry of Industry.
The following is the summary of my survey, discussion and recommendation for this mill.

2. BUILDING

Concrete building with low roof and cement floor - ordinary one.

3. NUMBER OF LOOM

1). Sakamoto 1 x 4 with Dobby Motion, 44" R/s.
2). Sakamoto Cop change System Automatic, 64" R/s.
3). Suzuki 1 x 4 64" R/s

Total 110 Nos.

4. PRODUCTION

1). 36" width 20^s x 16^s grey honey comb - appearance cloth.
2). 42" width 20^s x 16^s grey shirting.
3). 50" width $42^s/2$ x 50^s checked sarong.

About half of all 110 looms are stopped due to the recent high price of yarn, they say.

5. RAW-YARN

16^s and 20^s are brought from Pardede Spinning Mill, Medan and $42^s/2$ and combed 50^s are made in U.S.A.

6. CONE WINDING

6-1 Machine

Murata Roto Coners.
They use this only for dyed hanks.

6-2 Unraveling of Hank before Setting into Winder Creel

After hank dyeing, these hanks are usually entangled, so the operator of winder needs to unravel them very softly and carefully, otherwise the quality and productivity of cheese will be very inferior and low which causes the weaving efficiency dropping very much like this mill at present.

7. PIRN WINDING

Murata#100 Automatic Pirn Winders.
The winding volume per one pirn should be increased more in order to raise the weaving efficiency.

8. WARPING

8-1 Machine

1). KMS Sectional Warper 3 Nos.
2). Kawamoto Warper with Stop Motion Feeler on Yarn guide Bar of Creel Front (Schlafhorst Typo) and Group Turn Over Type Simultaneous Cheese Change System Creel.

8-2 Cheese Condition on Creel

Paper cone cheeses are directly brought into this warpers creel In case of grey cloth, many crushed and damaged cones can be found there, and the center direction of cone does not coincide with the porcelain yarn guide on the bar.

8-3 Cheese Change System

As mentioned above, they have the simultaneous cheese change system in the Kawamoto warper, but they don't utilize it at all, every exhausted cheese is changed one by one by stopping the warper, this causes the inferiority of beam as well as the low warping efficiency. They need to change all of cheeses at once after some number of beam warped (Small cheeses remained should, of course, bo rewound in the winding process afterwards), then they can get good beam and finally can raise weaving efficiency very well.

8-4 Necessity of Rewinding cheese brought from Spinning Mill

They should check the quality of yarn itsefl and condition of cheese winding in the spinning mill.
When the spinning mill is not so well controlled, they need to rewind all of the paper cones brought from that spinning mill in order to clean the defective yarn and repair the crushed and damaged cheese during transportation to this mill.
Then they can expect the great imrpovement of weaving efficiency.

9. S I Z I N G

One Kawamoto Ordinary Type Hot Air Sizer with only one pair of squeezing roller.
This was stopped and I could not observe the operating condition.

10. W E A V I N G

10-1 Loom Speed

1). **Sakamoto 44" R/s** 130 - 140 r/m

This is too low, but they had better increase in this speed up to 160 r/m after the loom maintenance and beam condition are improved.

2). **Sakamoto 64" R/s** 140 - 150 r/m

This is moderate.

3). **Suzuki 64" R/s** 120 - 130 r/m

This is also too low, but they need to wait for raising the speed up to 150 r/m until both the loom maintenance and the beam condition are improved.

10-2 Mechanical Condition

There are many mechanical troubles in this mill, but especially picking motion and loosening of bolt, nut and bearing should immediately be checked and maintained.

10-3 Relationship between Both Spaces of Beam-Flange and Drawing on Reed

For plain weave and like, the beam-flange space should be about three inches (8 cm) more than that of drawing on the reed in order to avoid the selvedge yarn breakage. This "three inches" has nothing to do with the absolute drawing space.
In this mill the drawing space is 46" but the beam-flange space is 47 1/2" only for 42" width shirting, and D.S. is 53" and B.F.S. is also the same 53" only, the beam flanges should be widened in the above mentioned way.

10-4 Operator's Action

The number of looms per operator in this mill is very few, they are not so busy and they can spend much of their time for repairing and amending the terribly inferior beams' cross yarn, etc.
They should almost always be in the backside of the looms for the above mentioned action, but they are now standing up in idleness doing nothing, they should be trained much more to improve weaving efficiency in this way.

11. DISCUSSION ON NECESSITY OF SPECIAL WINDER FOR CHEESE DYEING

The mill manager asked me about the necessity of special type winder for cheese-dyeing, which he is going to carry out in his mill in the near future.
I explained them that the ordinary winder is sufficient for this purpose, but the winding tension should be decreased by adjusting the tension device for getting soft cone in order to promote the penetration of dyestuff into cheese body and, of course, metalic perforated cone bobbin needs to be used instead of ordinary wooden bobbin.

12. CONCLUSION

This mill has also many troubles to be solved for raising weaving efficiency, my above mentioned recommendations are, of course, not all of them. But every technical problem has its own timing, in their stage at present, they need to follow my these suggestions at first, then they can definitely improves various efficiencies.

TECHNICAL REPORT ON
"TIMATEX" WEAVING MILL
MEDAN, NORTH SUMATRA

April 17, 1972

Tamotsu HOSHIYAMA
Weaving Expert

TEXTILE INDUSTRY REHABILITATION
AND DEVELOPMNET PROGRAMME
IN INDONESIA, UNIDO

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1. **INTRODUCTION**

I visited this mill on April 17, 1972 along with Mr. Djoemena, Director of Textile Department, Ministry of Industry.
The following is the summary of my survey, discussion and recommendation for this mill.

2. **BUILDING**

Wooden small building with cement floor, without office. In one building, all of preparatory and weaving machines are installed.

3. **NUMBER OF LOOM**

Sakamoto Cop Change System Automatic Loom, 64" R/s 40 Nos.
Bandung & Djakarta-Made Loom, 66" R/s. Not installed completely.

4. **PRODUCTION**

Now only 20 looms are operated, and they produce 55" width thin grey cloth.

5. **RAW YARN**

They are brought from Pardede Spinning Mill in the state of hank.

6. **CONE WINDING**

Bandung-Made simple Roto Coner without Slit Gauge & Stop Motion.

30 d x 1 machine	= 30 d
20 d x 1 machine	= 20 d
Total	50 d

The vibration of drum is terrible, because drum-shaft itself is bent and its bearing is worn and not fixed.

7. **PIRN WINDING**

Circular Disc Pirn Winder

32 spl. x 1 machine = 32 spl.

8. **WARPING**

Djakarta-Made Sectional Warper with Screen-Type 204 ch. Creel.
Very primitive one.

9. S I Z I N G

Hank-Sizing by hand with Tapioca (Adhesive Agent) and Ramasheet (Softening Agent) and drying in the outside sunlight.

10. W E A V I N G

10-1 Efficiency

About 70%, the number of loom per one operator is one or two only, loom speed is moderately 140 r/m.

10-2 Mechanical Condition

(1) Warp Stop Motion

They don't use this motion at all.

(2) Loosening of Bolt, Nut & Bearing

There can be seen so many loosening in bolt & nut, and especially almost all crank-shaft bearing are loosened and vibrated during operation.

(3) Picking Motion

This cannot be said to be maintained and adjusted.

(4) General Comments

In this mill, the condition of beam is comparatively good, but the mechanical condition of loom is very inferior - they need to appoint skillful mechanics and establish maintenance system, otherwise in the near future all of their looms will be completely worn and they will be unable to operate them at all.

10-3 Operator's Action & Necessity of Training

They have only one or two looms per one operator, they are not so busy. They should be almost always backside to correct the irregular yarn on the beam in order to improve the efficiency. But many of them are now only standing up in idleness doing nothing, this is very uneconomical and they need to be trained in the above mentioned way.

10-4 Relationship between Beam-Flange Space and Drawing Space on Reed

For plain weave, the beam-flange space should be about three inches (8 cm) more than that of drawing on reed to avoid the selvedge yarn breakage. This "three inches" has nothing to do with the absolute drawing space.
In this mill, however, the drawing space is 57", but the beam-flange space is 52" only - reversely 5" narrower ! This beam-flange should be widened up to 60" (8" more than now).

11. CONCLUSION

The small factory like this should receive more technical guidance from others, this may be one of the Government's duties at present. They aspire after the practical knowledge of weaving on the spot, but so far nobody has given them this kind of guidance and training.

REPORT ON VISITS WITH Mr. SAFIOEN & Dr. OWEISS
TO BALI, TIMOR, CELEBES AND AMBON

The party consisting of Mr. Safloen, Dr. Oweiss, Mr. Iman Soetjipto Oemar, A. Gani Adam and myself left Djakarta for Bali on April 12, 1972.

1. The first factory visited was Tohpati, a spinning factory P.N. Industri Sandang belonging to the Central Government.
   There are 15,000 spindles spinning 20^s and 40^s cotton counts.
   a. Dr. Oweiss recommended that the efficiency should be increased by speeding up the RPM of the spindles to 12,000 revolutions on the 20^s count and 13,000 for the finer counts.
   b. The manager was instructed to carry out tests on one frame only and to note if there was any increased vibration or heating up of the electric motor and to proceed slowly to increase the general speed of all the frames.
   c. Dr. Oweiss recommended that the 24 twisting frames 400 spindles each be converted to spinning frames. These measures according to Dr. Oweiss estimate would increase production by about 70%.
   d. The manager was asked to study the balance of production between the preparation and the spinning. It may be found necessary to add one scutcher to the blowing room making one line of three scutchers and to add a set of drawing for both the first and second passage may be with a roving machine if the twisting frames after convertion will not be super high draft.
   The manager complained that the quality of spinning was inferior due to the immaturity of the cotton provided.

BALITEX

This factory is situated in Denpasar town and is local government owned. There are warp sizing, pirn winding weaving and finishing departments and the manager is a Mr. Ngurah Agung Bk.Teks.
There are 52 looms of which we saw 37 running and 15 stopped.
The finishing department consists of the following machinery :

Kier - not used
4 Jiggers
1 Two section clip stenter Domier Temperatures up to 140°C
Calender.

The looms are old and obsolete.
There is a hand printing department. The azoic dyed cloth was bad to rubbing and I promised to send the Manager, some notes on azoic dyeing.
They work six days instead of seven on two shifts of total 14 hours a day instead of 24 hours a day/seven days a week.
They complained of being short of working capital.
The main problem stated was that the cost of production was too high and this may be because the unit is below optimum size of 300 - 400 looms.
Dr. Oweiss discussed the various means of raising capital.

Dr. Oweiss recommended that the 52 looms must be fully utilized and that the plant works on a four team system three shifts 24 hours a day, 7 days a week. This will double the production and reduce the fixed cost more than 40% enabling the factory to make a reasonable profit.
We visited PERTI - a little weaving factory with 32 looms. They size in hank and dye in hanks. There is home made steam kettle. Dr. Oweiss urged better machine utilisation as explained in Balitex recommendation.
The next visit was to a handicraft industry TOGOG Gianjar - Bali.
There are two factories with a total of 600 hand looms. They are privately owned and weave rayon sarongs up to 700 pieces per day.
They hank dye up to 400 kilos per day and much of it is weft tie dyed.
They use vat and azoic colours with the most primitive but effective equipment. They employ about 900 people mostly girls of all ages.
On 14 April we flew to Kupang and visited a handicraft factory with hand looms tie-dyeing the warp yarns.

On the 15 April at 8 a.m we were privileged to meet the Governor of Timor.
Dr. Oweiss had a long discussion with him about the imports and exports of the province and he recommended the thorough examination of the feasibility of growing raw cotton. It seemed that the climatic conditions and the length of wet season were very suitable. Eight months dry season with four months wet.
The Governor stated that there were 20,000 Hectare of land available free and 30,000 Hectare occupied which could be made available. The land is flat and can be irrigated from a river.
Dr. Oweiss suggested that the French cotton mission at present in Java should be asked to study the project which in his opinion was possible.
He suggested that the project consist of cotton growing with a :

1. Ginning mill to allow the cotton to be economically bailed for export.
2. An oil mill to extract the oil from cotton seed for food and produce cattle feed for the island cattle, and
3. A soap mill to use the oil in soap making.

According to the Governor information the population of the province was 2.4 millions with 3% per annum was increasing rapidly. The textiles were all imported from Java.
Dr. Oweiss suggested that these figures would justify a small textile industry of say 10,000 spindles with 400 looms.
This would be sufficient to cover for 60 - 70% of Timor's requirements.
It would also give benefits of opportunity for employment and cheaper transport costs.

16 April 1972.
We first visited the oldest weaving factory in Surabaja - Baswedan, private owned.
There are 72 looms plus a sizing machine but only 5 the looms were working.
The machinery is obsolete and there were few people working.
According to the figures of Managers the firm is working at a loss.
The problem was one of survival.

Dr. Oweiss recommended,

1. That the cloth is made from 20^s and 20^s not as being done 30 x 20.

2. That they work two shifts - this will bring down the overheads and the cloth can be marketed at a lower price to meet competition.
3. That they offer to size on commission and so utilize the machine.

Dr. Oweiss was of the opinion that if these measures were taken the plant would become profit making.

Visited P.N. Industri Sandang, Pabrik Pemintalan Grati.
Manager Abdul Muslim B.Sc., Machinery Platts, England.
There are 30,132 spindles and 973 workers in four teams working three shifts 24 hours a day.

They spin	Tetoron/Rayon	20^s counts	14 machines
	Cotton	30^s counts	40 machines
	Cotton	40^s counts	26 machines

and the production	January	2533 kgs.
	February	2286 kgs.
	March	2296 kgs.

Dr. Oweiss complimented the factory on the production in January and recommended that the unused twisting frames should be converted to spinning frames.
To do this they needed to convert the draft system and change the rings and travellers which can be obtained easily. It was a simple matter to reconvert to twisting but Dr. Oweiss thought that twisting would decline as sizing of yarns increased. The two fold 40^s were being replaced by size 20^s. This was also the opinion of Mr. Safioen.
Dr. Oweiss asked the manager to check on his preparing and opening capacity and to experiment with increase of ring speed from 10,000 - 12,000 rpm, but to buy new heat resisting travellers.

Visited P.N. Industri Sandang, Patal Lawang.
Manager Said Abdullah Text Engineer.
This is a small factory with 15,000 spindles machinery by Japanese Reparations spinning 20^s and 30^s count. They spin yarns and deliver on hank, bobbin or cheese for hand loom weaving.
There is one opening and blowing line and 56 cards. The spinning is high draft 120.
Dr. Oweiss recommended that they change the unused twisting frames to spinning frames which would give a 66% increase in production.
Mr. Said was to experiment carefully in increasing ring speed and check on preparation and opening.

17 April 1972.
Visited Radjut Djatim Surabaja.
This is a cotton weft knitting plant privately owned by Mr. Sira.
They make 18,000 dozen cotton vests & 15,000 dozen T shirts a month from imported 40 single combed yarns from China and Singapore.
There are about 20 knitting machine working three shifts of eight hours- 6 days a week.
They are about to move to a new factory site.
There is a primitive caustic scouring and bleaching department.
The turbular cloth being given I hour boil in 20° Be NaOH and washed in Teepol, and bleached with Calcium Hypochlorite.

They are anxious to do bleaching trial with Hydrogen Peroxide and Mr. Bennett gave a trial recipe and promised to send another recipe. He also arranged to call on them during his next visit.
Dr. Oweiss recommended and described four team - 3 shift working and arranged to a trial to be made with Indonesian spun yarn, to meet immediately the increasing demand on these products and to cut the cost of import duties.
Dr. Oweiss commented that the only factory in Indonesia producing knitting yarns of suitable quality is the Primissima factory in Medari.
It is essential that yarn for knitting should be soft and of low twist to give comfort in wear with high moisture absorption.
Despite the softness "low twist" the yarn must be even and of sufficient strength. In order to fulfil these conditions the 40^s yarn must be made from the longer finer fibres (Egyptian type of Cotton) with staple length of 11/4" or longer. Indonesian yarn are made from American Cottons staple length mostly 1 1/16" with a small quantity of 1 1/8" staple.
These cottons cannot be made in 40^s count to the standard of softness required for knitting.
Dr. Oweiss is most anxious to replace these imported yarns by Indonesian productions and is working to this end within Bandjaran Spinning mill Bandung.

Visited Ratatex.
This magnificent plant was only working at less than 20% capacity and has marketing and financial problems. They also complained that widths of 110 cms were being asked for and they can only process up to 90 cms.

Dr. Oweiss inspected the plant and made the following recommandations,
1. To air condition the photo engraving department in order to improve the quality.
2. To study the chromium plating of the printing rollers for longer wear and sharper prints.
3. To consider the purchase of a pantograph and milling machine for geometric and line prints.
4. He also advised on obtaining finance and suggested commission printing and drive for exports, and additional sales to use the idle facilities.
5. He promised to consider the matter further in Djakarta.
   It was also arranged for Mr. Bennett to visit and assess the potential production.

Visited Kamadjajateks, Sukoredjo, Malang.
This is a local government factory with 291 looms and a finishing departments.
The looms were old circular and drop box looms no warp stop motions and weave yarn dyed sarongs.
There is a yarn dyeing department and a new piece dyeing and printing department equipped by the Dutch grant similar to Texin Tegal.
The department is not yet in production but has been planned with foresight and they increased the grant expenditure in order to provide a balanced unit.
The machine consist of a singer, a Max Goller pad roll, semi continuous scouring and bleaching machine with auxiliary large batching equipment.

A Stork Rotary screen printing and drying machine. A Rope-o-matic washing range - 4 sections heat setting Famatex Stenter, a calender.
We were told that there is an open width machine on order.
Dr. Oweiss questioned the balance of machines and recommended that a production study be made.
There was some delay due to aircraft cancellation and the party left for Makassar at 2.30 p.m.

19 April 1972.
Visited a privately owned Knitting factory Pabrik Badju Kaos Istimewa & Co.
There are eleven weft Knitting machine and four hand warping knitting machines.
Six new Japanese machines are being installed.
They knit 40^s singles carded cotton for manufacture into cotton vests T shirts and singlets.
The hand warp knitting machines are used to knit nylon garments.
The scouring and bleaching equipment is simple but seems to be adequate.
There are two primitive boilers where the fabric is scoured. Bleaching is by Calcium Hypochlorite.
There is a making up, sewing and ironing department. The production is 8000 dozen a month plus 15 dozen Nylon garments.
There are 86 employees on 1 shift. The yarn is imported from Singapore.

Visited P.N. Industri Sandang, Patun Makateks, 1965 Makassar.
Manager M. Rapi.
This is a Government owned factory with sixty dobby looms a sizing machine and a small finishing department.
The looms are Japanese weaving drill cloth subsequently dyed with water soluble sulphur dyes.
The finishing department consists of two 500 kg Kiers not used and two wooden bleaching winches, a singeing machine.
There are two automatic jigs Japanese a foulard and 8 cylinder driers before a two chamber pin clip stenter.
There is a very old calender and a crease and lapping machine.
The processing consists of scouring and bleaching on the jigs with caustic soda and soda ash and dyeing. The cloth is then sized wet on wet.
Mr. Bennett recommended that increased attention be given to maintenance and inspection. Production about 12,000 metres a week.
Dr. Oweiss opinion was that the weaving and finishing quality were poor and also was the sizing. The gauge in the warping is small and it would be better to change the creel to avoid rewinding.
He suggested that Mr. Hoshiyama visit the plant and may be a further visit by Mr. Bennett would be useful.

Visited a handloom silk weaving house making silk sarongs at Rp. 3000,- per sarong.
In the afternoon there was a meeting of the department of Industry.
This was addressed by Mr. Safioen.

20 April 1972.
Visit to MATOARI Makassar, primitive building housing 10 handlooms making bandages and surgical dressings.
They use 30^s bleached yarn.

MALINO

Visited a house producing real silk from silk worms at a price of Rp. 4,000.- per kilo.

In Makassar Dr. Oweiss met the Manager of the flour factory which uses 12,000,000 sq. metres of cotton cloth per annum for making flour bags to bag the flour.
This large quantity of cloth could be produced in the Province by 6,000 new spindles and about 200 automatic wide looms. There is also to be considered the local consumption of textile apparel cloth.
Dr. Oweiss estimated that with a further 9,000 spindles and 300 looms to make the total 15,000 spindles and 500 automatic looms, the local market could be supplied with reasonable quantities of cloth and the existing weaving sheds - 175 looms, with yarns, besides meeting the full requirements of the flour factory. The flour factory showed its readiness to contact for a full requirement year per year grey of $\frac{20^s \times 20^s}{60 \times 5\ c}$ with a width of 90 cms at present at 83 Rps the yard.
After discussing with the managing director of this company in Djakarta their participation in capital as a foreign investor he promised to study that with the headoffice in Singapore.
Dr. Oweiss recommended that a spinning and weaving plant be established in order to meet the demand; to avoid freight expenses; and to create jobs for the people of the province.
Later Dr. Oweiss met a local civil engineer and architect and questioned him about buildings, water and power supplies local labour conditions. According to the civil engineer all buildings and services can be supplied cheaply and there is an adequate labour force living adjucent to the site. About power supply from P.L.N. he replied that it is adequate and at 5 Rps/K.W.H. or less according to bargaining.

21 April 1972.
Flew to Ambon and visited a coconut oil factory NUSA INA DJAJA and received by Governor.

22 April 1972.
Flew back to Djakarta.

CONCLUSION

Beside visiting the many factories and enterprises detailed the party made an investigation into the retail textile trade by calling at many shops in the various provinces.
It seemed to them that 30% of the apparel cloth were synthetic blended with cotton or rayon cloths and 70% all cotton.
This represents about 80% cotton and 20% synthetic fibres an estimation that compares exactly with that of Werner Associates. It may be than by 1980 the proportions will be 70% cotton 30% synthetic.
The party attended to talks given by Mr. Safioen to the Inspectories and Industry of Celebes and Ambon.
Mr. Safioen mentioned in the course of these talks the availability of the UNIDO experts for advice and consultation on technological, marketing and other managerial problems.

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
(SPECIAL FUND PROJECT/INS - 71/531)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report No. 5

Seminar 2
Seminar on Textile Education

(June 26 - 30, 1972)

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization"

Bandung, July 31, 1972

p.p.
EL-SAYED M. OWEISS
Project Manager.

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EL-SAYED M. OWEISS
Project Manager

Bandung, July 31, 1972

INTRODUCTION TO SEMINAR ON TEXTILE EDUCATION
HELD AT I.T.T. JUNE 26 - 30, 1972.

1. This seminar was sponsored by the Director General of Textile Industries Mr.Safioen, and organised by the I.T.T. Director, General Soerjosoejarso.

2. The subject was Textile Education with the special object of upgrading the knowledge of the teaching staffs of both I.T.T. and I.T.B. (Institut Teknologi Bandung).

3. Dr.Oweiss was approached by the I.T.T. to assist by lectures from the experts and two papers were given one by Mr.T.Hoshi-yama on Weaving Today and Tomorrow and the other by Mr.John E.H.Bennett on Finishing Today and Tomorrow. Mr.A.E.Curran prepared a paper on Spinning Today and Tomorrow but unfortunately was unable to present the paper because of illness - copies were given however to those present.

4. There were approximately sixty lecturers from the two institutes present. No Indonesian language translations were provided as it was stated that their knowledge of English was satisfactory.

5. The Director General of Textile Industries gave the opening lecture and detailed the structure of the industry its present production and planned expansion.
He expressed appreciation of the UNIDO team helping to rehabilitate the industry.

6. The two lectures were followed with keen attention and there were lively discussions afterwards supplementing the interest aroused.

7. The seminar was closed by Mr.Santosa who complemented the various lecturers on their papers and spoke with gratitude of the contributions made by Dr.Oweiss' team.

8. The seminar was organised with the customary efficiency of I.T.T. under direction of Mr.Wibowo.

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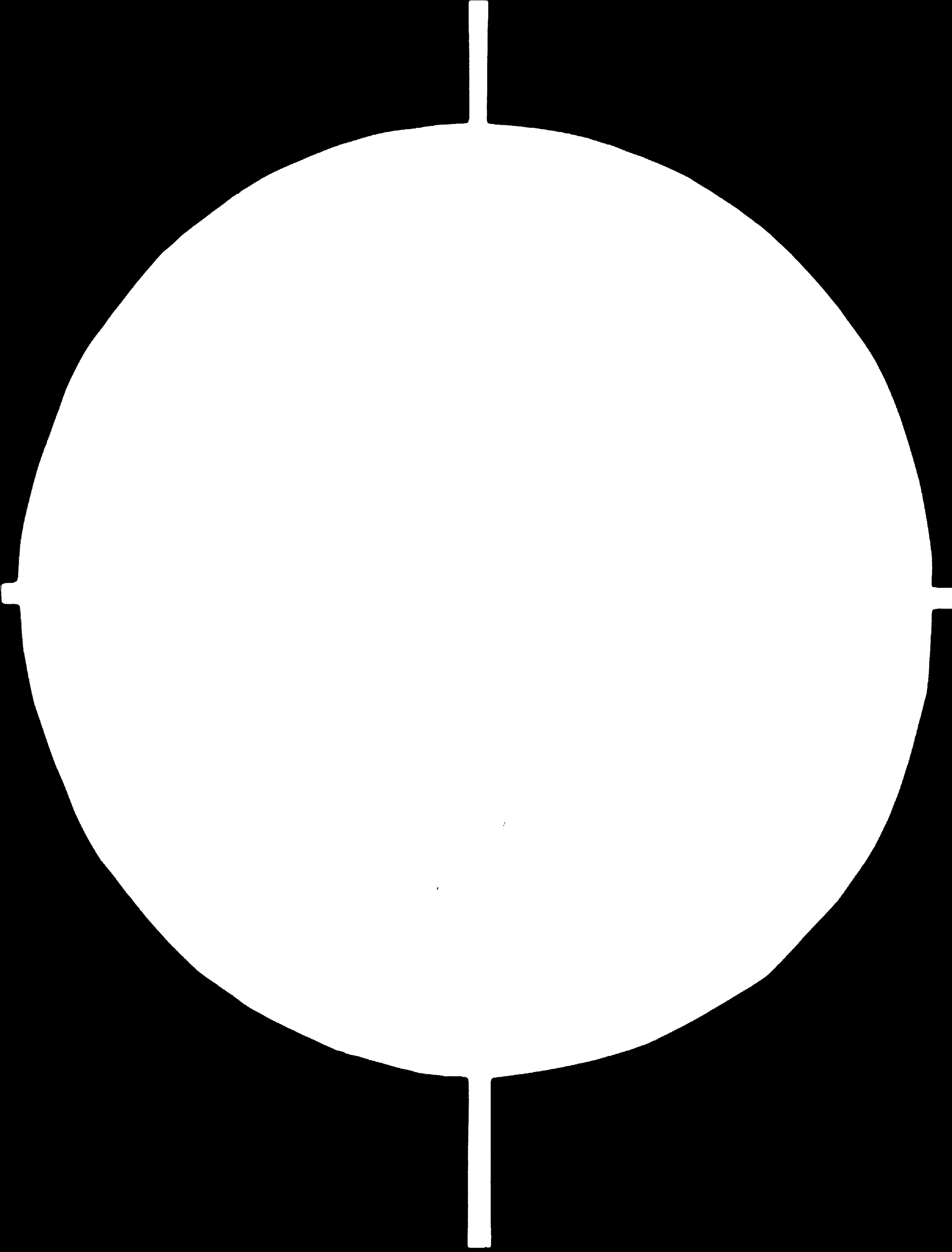

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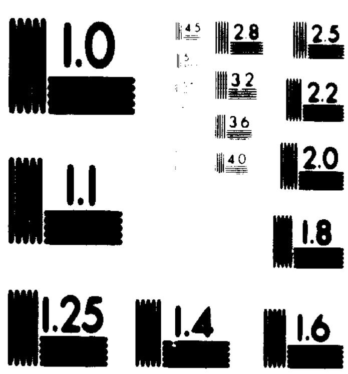

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SPINNING SECTOR
TODAY AND TOMORROW

BY
A.E. CURRAN

LECTURE FOR 29th JUNE, 1972 - INSTITUTE OF TEXTILE TECHNOLOGY

Although I was asked, when giving this paper, to deal with the present and future development of the spinning section of the textile industry, I should like first to dwell for a little while on the past and look at the development which has taken place up to now.

In 1938 there was, to my knowledge, only the one mill in Tegal, but the potential for spinning was very great, as even then quite a large weaving section existed, making cloth for the Batik dyers. This weaving section consisted, as we know, of individual hand looms, small mills of multiple hand looms (maybe 5, 20 or even up to 50), and also about that time small units of power-driven looms were being set up.

This spinning mill potential was observed by two or three groups of Dutch companies and so the mills of Djantra, Nebritex (which is now Inbritex) and possibly others were planned. However, they were hardly under production before the Japanese came into the war and found their way into Java. Consequently, it was really the Japanese who first actually ran the mills which came into being during the second stage of the spinning mill development.

After the war the Republic was set up and took over the mills from the Japanese. Now the point which I wish to stress arises, and that point is that the staff taking over the mills at that time was untrained and with very little experience, and we find the mills were running with very large numbers of operatives; as an example, four spinners to one side of a Ring frame, but running also at a very low efficiency. The cotton available was also of poor quality, and in short supply.

Eventually these mills were handed back to their original owners and by using trained expatriate staff those mills improved their efficiencies and also took upon themselves the training of Nationals of Indonesia ; also at that time I.T.T. was in full swing and able to pass on to the industry a number of technically and theoretically trained staff.

It was also about that time that a group of Central Government businessmen planned and opened the first 30,000 spindle mill at Tjilatjap, fully staffed and run by Indonesian Nationals. This was so successful, and the need for yarn so great, that further plants were planned - with the result that today Indonesia can claim fifteen large plants, all, with very few exceptions, staffed locally.

This, of course, shows the amount of work in teaching and training which has gone on here at I.T.T. for not only are these mills staffed by those graduates, but there is also the staffing of the various Government departments which have their affiliations with the textile industry. I must not say anything about Weaving and Finishing, otherwise my colleagues will accuse me of stealing their thunder, but it is sufficient to remind you that these sections have also expanded and their expansion again has been made possible by the work of teaching done at I.T.T.

PRESENT

Enough of the past - we must now look at the present. In doing so, we find that some of the mills are very efficient, whilst others are not so efficient.

On looking into the reasons for inefficiency we find many things to review :

1. Staff not technically strong and lacking in experience.
2. A lack in the number of senior experienced staff in some mills.
3. Shortage of spare parts, productive and control plant.
4. Technical faults -
   a. Faulty specifications and planning.
   b. Manufactured article faults.
   c. Lack of maintenance.
   d. Due to spares shortage.
5. Cotton supplies - wrong grades and or staple lengths.
6. Lack of knowledge of cotton mixing.
7. Insufficient work done on studying the available cotton, both in the laboratory and in the mill.
8. Mill balance not correct; too low Speed on Flyer frame hank and too high drafts, especially on Ring frames.

9. Faulty air conditioning, or insufficient control.
10. Lack of training of operatives and mandoers.
11. Lack in mill training of supervisors (Shift managers).
12. Lack of drive and initiative on the part of some staff members - here again this may be due to a lack of training and a fear of making mistakes.
13. Bad market surveys or not keeping up with changes in trend. Lack of knowledge as to what the market wants and attempting to force on to the market what can be produced and what it is thought they ought to have.

In analysing our headings :

1. Staff not technically strong - We may find this chiefly in the more senior positions where, due to the rapid expansion of the spinning section, people had to be found to take up senior positions without having the necessary training and mill experience. "Mill experience" - an easy thing to say, but when one starts to think about it one finds it means time. Time spent in a position of training without senior responsibilities, so that learning can be acquired without having at the same time to take major decisions; where one can watch and observe the decisions of others going into effect, (sometimes mistakenly, but good can come out of mistakes, providing the same mistakes are not made repeatedly).
   The younger man having come through I.T.T. will require at least 10 years before coming to top management, and providing he has spent this 10 years gainfully, he will be in a much better position than those who went before him and had to manage new mills without first acquiring experience.

2. When going round the mills, I find quite a shortage of top staff, often the whole weight of management being on one man. Consequently when he is away from the mill it is difficult to get a decision or even a small service rendered. It is difficult to obtain any information under such circumstances, as junior management either cannot,

or will not, assist.
This situation is also found after office hours, when those left in charge of the shifts have not the responsibility or the power to give a decision.

3. Shortage of spare parts - In this connection I have never been able to find out whether this is due to the mill staff having acted too slowly or to a Head Office holding up the forwarding of orders to the manufacturer, or again whether it is due to a lack of finance to cover the required purchases.
However, whatever the reason "lack of spares equals loss of production and efficiency" and the loss of far more money than the value of the spare parts.

4. Technical Faults.
   a. Faulty specifications and planning. This can cause untold trouble to a mill; loss of production because the plant is not balanced; yarn irregularities for the same reason and also where too high drafts are demanded from drafting systems. I frequently find this, but very often it is also the fault of the staff who do not run the plant efficiently and go coarser and coarser on Speed frame hanks, causing the necessity for too high drafts from the ring frame systems. For instance, recently I came across a 58 draft on a Casa Blanca system which has a top draft of about 40. Replanning this mill, I found that instead of the 0.55 Hk. being used, the mill when efficiently balanced, could run with 1.1 Hank roving, and only required a draft of 29, exactly half of what the mill was using.
   b. Manufactured faults can include faulty design of machines, bad workmanship in erection of machinery. It can include insufficient or badly designed air conditioning plants; badly laid-out plants. There are so many things which the machinist or mill planners can do which will always remain with a plant unless they are put right, which may involve heavy commitments financially.

c. Lack of Maintenance is a question we should hardly need to consider, yet so many managements fall down on this. They may have a first class system on paper but the staff does not put the system into effect. Or they may say, under pressure for production, "We will do it tomorrow" but tomorrow never comes, or is delayed for two or three weeks.
A good maintenance system should always be planned on paper and the use of wall charts and operators' signatures, with good staff checks, is almost the only way in which to have efficient maintenance.

d. Lack of spares - I have already spoken of this, but it is a fact that much loss of production is due to this cause.
Attention by the management to a good warning system on spares is worth a great deal; faulty parts continuing to run wear other parts until the whole machine comes to a standstill, proving expensive finally, whereas earlier it was only a simple matter, with slight expensive involved.

5. Cotton Supplies - Often I hear staff members say "We have to take that cotton" and I wonder whether if one could go back into the history, whether the remark is true. There seems to be a great lack of knowledge in the mills on this subject, and also on the subject of;

6. Mixing and Blending.
This is a very critical part of the process, a mixing should represent a good average part of the bales stored in the godown, so that the strength produced at the Lea strength tester remains close to a set standard.
A mixing should be from a minimum of 24 bales but it would be better if it could be one of 40 bales.
It should also represent about 8 different MARKS of cotton to get a wide variation of types. Mixing too few types will cause lots of variations in the running of the mill.

One further point the waste should be no more than 5%, but it is important that the waste is fed consistantly, not one time 3% and the next 15%. Standard consistant conditions is what is required all the time of running.

If a mill has two or three lengths of staple they should endevoure to run them into separate mixings. At all times one length only in one mixing. Introducing two or more lengths to a mixing is introducing irregularity, which is made worse by the introduction of short staple waste.

7. Studying of available cotton.

Many mills have good laboratories and are in a position to make a deep study of their cottons. Even so, the most simple and effective method I know is to run a test sample of all marks and types of bales as they are delivered to the mill. A 100 kilos run through the blowing room plant, and on to make 4 bobbins at the ring frame, will give sufficient information to formulate a quite effective mixing, using the Counts x Lea strength standards of all the cotton marks in the bales stores.

8. Mill Balance and High Drafts have already been discussed. Most textile machinery manufacturers are very careful to offer a balanced mill plant and when given the counts, etc. which a mill wishes to produce, will prove their plant by providing a Spin Plan. It is only when a mill changes its ideas and starts to produce something entirely different that the plant becomes unbalanced. Even so, an efficiently run mill where the staff is getting every potential from the plant, can usually be re-calculated to give a new balance, if the changes are not too big. It is only in inefficient mills, running say preparation machinery at very low efficiencies, where balance becomes a major problem.

In a highly efficient mill, one balanced on a knife-edge, the manager can play with his bobbin stocks and slight changes in hank, just as a pianist can play on a piano, and in such circumstances the mill never falls short in production.

9. <u>Air Conditioning plants</u> seem to give much trouble. It is hard to believe that reputable companies have installed faulty plants in Indonesia, or that their controls are fault. Immediately the thought jumps to mind "maintenance, or lack of it". Also on the next subject:

10. <u>Lack or Training</u>. This is very important - to do a job efficiently, no matter how simple that job may be, requires training. In most mills one operative shows another how to do the job, thus passing on not only good habits, but also bad ones, and it is usually much easier to pick up a bad habit than a good one. Training is essential and for this purpose, a Training Officer is required, together with a staff who themselves have been correctly trained. Training must also be done "off the job", in a section put apart and equipped for this purpose. <u>This method is so important</u>, but how many mills in Indonesia even consider it?
A mandoer and mechanic learn by watching others, and making mistakes, which can be costly and are often repeated, because bad habits stick and only proper training will break those habits. Early training prevents their being formed.

11. <u>Lack of Mill Training for Staff</u>. This is almost more important than for operatives. A young man coming to the mill from I.T.T. is full of his importance and knowledge, yes, but what about experience? This he will not get by standing next to a supervisor or Shift Manager. Bad habits he will easily pick up, but experience, lasting enthusiasm and initiative he will only acquire by following a wise programme of training, which brings me to my item number 12

12. <u>Lack of Drive and Initiative</u> on the part of some staff members. I am happy to say that I seldom meet this in Indonesia - in fact, often the enthusiasm is overwhelming. However, there <u>is</u> a lack in some places. Textiles are very demanding - they demand that the staff have knowledge and experience, and for this training is the key. Having been properly trained a staff member can face up to any

problem and enjoy it; if he makes a mistake it is a way of gathering further experience, but he does not go in fear of doing wrong, because he has the confidence of his training and knowledge. With such staff members a mill efficiency can only rise, and remain at the top.

13. Our last point is a very serious one and is really a lack of market intelligence. Today there is a great deal of choice for the customer, if not in Indonesia, certainly in Europe, America and Japan. The young people know what they want and even the older people see the advantages of modern fabrics, so it is no use trying to say "You cannot have it; you must take what we make". This will not do - we have to try to meet their demands and we have to change, otherwise the customers will find other means of satisfying their demands, and we all know that this is possible.

One of the worst ways of becoming stagnant and inefficient is by having a warehouse full of yarn and/or cloth which nobody wants. Many mills have completely closed down for this one reason alone.

Now after all that, we should move on to the Future, and see what it holds for us. My job as a member of the United Nations Development Programme for the Rehabilitation of the Textile Industry of Indonesia is, first to get the existing mills up to a good standard of efficiency. What does this mean? To me, it means having the ring spinning fully at an efficiency of 92%; producing a good regular yarn, say with an Uster C.V. of 12%; and using a reasonable standard of staffing, taking into consideration the requirements of Indonesia to provide work opportunities for its people. However, this does not mean employing more people than are required to run the mill.

And now, what are the requirements for an efficient mill?

To me they list as follows: -

1. Competent trained management.
2. Trained and capable operatives and mandoers.
3. Machinery that is maintained to a high standard; preventive maintenance so that there is no such thing as a "breakdown" in any plant. Any machine stopped for repair is stopped because

such repair was found to be necessary during the routine maintenance period.

I am not reaching for the moon with this; it is a situation which is possible, for no textile machinery manufacturer makes bad machinery - it is only bad through neglect or inexperience of those working it.

4. Quality control department which is effective and which controls quality on the shop floor; which keeps a watching brief on the amount of waste being made, keeping it to the lowest level consistent with quality of yarn.

   A further duty would be to watch the quality of cotton going into the mixing, so that the Grade and Staple are neither too high nor too low, again being consistent with the yarn quality.

This now brings us to two more sections, one of which is still very practical and that is

5. A well-organised spare parts store, organised to ensure that spares are available as required, but so that capital or financial outlay on spares be kept at a minimum. The control of this is usually in the hands of the Finance Director, which makes the question of spares more difficult, and it is a critical point that the practical mill management must decide on the essential spares, whilst giving a minimum order level.

   Such a spares section must work to a point where new orders for spares must be placed; this point is decided upon by taking into consideration the frequency of breakage or wearing out, and the time required to place and receive spares from the manufacturer or supplier. We all know that from Europe or Japan this can be one to two years.

6. The sixth is a good Costing Department.

   Although I have placed it last, this is probably one of the most important departments. One major reason for an industry is that is should be profitable; if it is not profitable, funds or finance have to be obtained from some other source. If all sources are unprofitable, then the organisation cannot continue. Therefore it is essential that our industry be run at a profit and can contribute to the well-being of the country, in addition to providing work for the people and clothing for the community.

The subject of my paper so far has been of what should be done about training management and the practical operations in the mills; this I have stressed, and would like to continue stressing throughout the whole of this lecture. I make no apology for doing this, because when I visit mills I become more and more convinced that these things are neglected. Too many staff members are not taking enough interest. Laboratory work is not sufficiently conclusive, and much that is done is not receiving the attention it deserves. Again, quality control is not being carried out and results of tests go into files without action being taken. There seems to be a strong possibility that you, the staff of I.T.T., could load your work and lectures to stress upon the students passing through the Institute, the necessity of the main requirements of a Spinning Mill, given here again:-

Training;

Maintenance;

Quality control;

Costings, which includes spares; standardisation of amount of labour.

In all of which, each and every member of a mill staff can play an effective part by being <u>interested</u>, and realising that these subjects are the basis of a spinning mill organisation.

TEXTILE INDUSTRY - SPINNING PLANT DEVELOPMENT - PAST, PRESENT AND FUTURE.

For many years, development was very slow, especially the period following the break-through from the first mechanisation to a point, say, in the early part of this century, when Ring spinning frames started to take over as the most economical method of spinning yarns.

It was only after World War 2, that development of spinning machines gained the impetus which we now take for granted.

That is:-

Opening plant which is practically self-feeding;

Opening and feeding of bales by the Digestive methods;

Automatic Blending and feeding of the blended material;

Direct Feeding to Cards;

Grouping of High Production Cards to directly feed Draw Frames;

Automatic control for Level or Evenness of Slivers, both at the Card and Draw Frames;

High Production at the Card and Draw Frames;

Sliver to Yarn Spinning;

High speeds at the Ring Frames -

and now, Open-end Spinning.

The developments so far mentioned are more or less those of a standard yarn spinning process, that is one in which we finish the processing and have a product of a yarn made up of staple fibres being bound together by twist. Today there are a number of other methods of making yarns - for example, a process whereby the fibres are held together by size; another where a yarn is made and the fibres are held together by rubbing and imparting a false twist in both directions, normal twist and reverse twist; another where a tape of synthetic material is made and split into fibres later in the process to be twisted.

All these are efforts to produce a yarn at a lower cost than that involved in what we may term conventional means, i.e. a yarn spinning process involving processing from bale to a twisted yarn.

To us, the most important development to consider at present is the Automated Short Fibre Spinning process.

Nearly all the main textile machinery manufacturers from the different countries of the world have some form of automated plant to offer - generally they consist of a Bale Digester or Opener.

Here, bales with their tares and wrappings removed are placed on some form of a lattice. Then, with either a reciprocating action or difinite move forward, the baled material is gradually stripped from the bale until all is removed, further bales automatically taking the place of those processed.

There may be two or three of these machines working in parallel to each other, but all feeding to a common Automatic Blender.

This Blender will probably be anything from 8 to 16 meters in length and 3 to 4 meters in height, holding one or two tons of material. The material being fed from the Bale Opener arrives on to a lattice at the top of the Blender. This is capable of reversing direction and also reciprocating, so that the material is first fed to the right and then to the left; also, in reciprocating, the lattice travels half the distance inside the Blender and in this way the material being fed is evenly distributed on the floor of the Blender and is eventually built up into a sandwich, and a number of layers thick. Then, as the floor of the Blender is in the form of a lattice, this lattice moves forward to deliver the sandwich of blended material to the next machine, at a constant rate of feed.

The transfer will probably be by pneumatic means, through pipes and airflow.

It should be realised that the first Opener of Bale Digester used in the line, has very powerful opening capacity and the material, generally cotton, is taken off the bale in small flakes, the dirt, seed, leaf, etc. being allowed to fall away.

So, following the Blender, the beaters are not required to break up the cotton to the same extent as conventional plant in the older Blowing Rooms. Consequently, the remaining plant will probably require two beaters only, one of which should be a porcupine type and the other a Kirschner situated in the Scutcher. So, from the Blender, the material would feed direct to a porcupine-type beater through a two-way distributor to feed two lines consisting of a Hopper Feeder and Scutcher with Kirschner Beater in each line. The Scutcher would not be fitted with a lap end, the material being fed direct to the back of a group of 6 or 8 Cards.

These Cards are fitted with a chute which is interconnected by trunking to the Scutcher in such a way that each Card receives the amount required, and the excess is returned to the Hopper Feeder behind the Scutcher.

Such a system using, say 8 High Production Cards to a circuit, would probably handle four such circuits, and each circuit would probably produce between 220 to 290 Kgs. per hour.

There are, of course, a few problems involved with such a system -

a. control of material, both feed and excess,

b. breakdown of feed,

c. carrying of fibre from Blowing Room to Cards.

All these matters can be, and are, controlled by detection devices, electronic or other electrical means.

Other problems which have to be met at the Cards are - Light feed, Card breakdown, and regularity or evenness of sliver. These allowed for by automatically speeding up the feed from the other Cards, for, of course, the circuit is fed an excess of material from the Scutcher all the time. Evenness of sliver is controlled by some automatic method of levelling the sliver, measured usually by passing the sliver through a pair of tongue-and-grooved rollers. Co-efficient of Variation about 1.5 to 3.5 %.

Feeding from the Cards can be into sliver cans or directly down a table to the back of a single-delivery high production draw frame.

Feeding into cans at 27 to 37 kilos per hour requires the cans to be of a large diameter and these are generally in the region of a meter diameter by a meter high.

Direct feeding from 8 Cards to a Draw Frame again requires some form of auto-levelling for the sliver, and to do such auto-levelling, which requires a temporary under- or excess production from the Cards, it is necessary for a small reserve of sliver between the card delivery and draw frame feed; it is also necessary for the Cards to be controlled for stopping and starting of production from the Draw Frame.

Draw Frames capable of direct feed from such Cards must have a roller delivery in the region of 600 meters per minute, and as auto-levelling is employed, one would expect a C. of V. within 2.0 %.

A second passage Draw Frame would feed Speed Frame, and this in turn would feed the Ring Frames.

The whole object of the processing here has been to obtain a perfectly level yarn at a low production cost. Such a mill would probably employ half the operatives of a present-day plant of similar size. The technical capabilities of the staff would have to be of an appreciably high standard to meet the requirements of automation. There are, of course, many refinements required in a plant such as described above, one of the most critical being the removal of waste from the Cards. This would be entirely mechanical flat strip and under card waste being removed as it is made; Sliver cans at the Draw Frame automatically changed from full to empty and possibly an automatic system of doffing and re-starting the ring frames on empty bobbins. A further refinement in process of experimentation is the automatic piecing up of broken ends at the Ring frame.

I am sure someone is ready to jump up at this stage and say "What about Open-end Spinning instead of Ring Spinning?". This, of course, is now a strong possibility; there are already many spindles in use and, in fact, some mills totally equipped with this system.

The type of system which finds the most favour is one where a sliver is fed into a cylinder which is revolving at a speed of 45,000 rpm. The sliver in this cylinder is split into individual fibres by centrifugal force and with the aid of air pressure the fibres are removed from the cylinder to form a twisted yarn. The method of piecing is quite simply by introducing an outside yarn throuh the delivery nozzle to connect with the fibres in the cylinder. On leaving the cylinder, the yarn is then wound directly on to a cheese.

Although I have never personally had experience of this system, there appear to be a number of difficulties which are holding it back from being universally accepted. These, however, are sure to be overcome in the not-too-distant future.

Some machines are double sided, fed from small sliver cans 12 inches by 30 inches high. Others are single sided, using conventional-type sliver cans.

The count range is said to be from 6s Ne to 40s Ne, whilst the cheese package weight is up to 2 Kgs. No re-winding of the yarn is necessary.

It is claimed that these yarns have improved regularity and extensibility, whilst also being cleaner, being free from trash and nep on the surface of the yarn.

Probably it will be some time before such spinning machines are in use in Indonesia. I think we should now look at the Man-made fibres, and the special techniques which can be used in their processing due to their difference from natural fibres - such as cleanliness, dimensions and sizes formed as required by the producer, also in many physical and chemical properties.

MODIFIED COTTON SPINNING SYSTEM

The conventional plant as applied to man-made fibres, uses fibres no longer than 40 mm. and a fineness no greater than 3 den. and would consist of a short Opening plant, using only two beaters, or even only a Kirschner beater at the Scutcher, as there is no cleaning to be done. It may consist of Blenders, bale openers, Hopper Feeder, Porcupine beater, Hopper Feeder, Scutcher. The process then being completed with Cards, all metallic clothing, two passages of draw frame, flyer frame, to ring spinning frame.

To obtain a handle in fabrics which simulate a wool-like character fibres of 50 to 75 mm. of 2.75 to 3.0 denier could be used, and since such long fine staples tend to form nep on this process, the desired handle is obtained. This, however, is only a cheap method of obtaining something which should be processed on the Worsted system. An alternative processing method would be the use of Opening and Carding as above, followed by intersecting Gill boxes and sliver-fed ring frames.

A similar system is used for the production of carpet yarns, but in this case the fibre denier would be in the region of 13, and the counts 0.2s to the main difference being the use of roller and clearer cards, with the alternative of Draw Frames or Gill boxes.

FINE TOW-TO-YARN CONVERSION

In the spinning of staple fibre this is the shortest process of yarn production. In it, a group of continuous filaments are ruptured by over tensioning; this is then fed into a spinning machine with a ring frame arrangement.

Such yarns have a high tensile strength and a lower elongation at breaking point, and are mainly for industrial use, conveyor belts, nets, etc.

TEXTURING

This depends upon the thermoplasticity and strength of the synthetic fibres. The use of such yarns is constantly being increased, especially in wearing apparel such as socks, underclothing, etc. There are many methods of processing the continuous filament into a high-bulk yarn, such as:-

a. Texturing by a true or false twist,
b. Crimping by stuffer-box method,
c. Undulated, by being drawn over a blade edge,
d. Bulked by air blowing.

These are only a few of the methods employed.

CORE-SPUN YARNS

The use of this is to produce yarns of various compositions; for example, combining continuous filament and staple fibre, which would be very strong due to the core of filament yarn but very soft to the feel when used with a cotton sheath. A further example is a high elastic yarn with a core of polyurethane filaments.

One more we should look at is the range of ORIENTED FOIL YARNS (previously mentioned). In this system, a polyolefin material is first made into a continuous foil. It is then cut lengthwise into narrow strips, later drawn across a heated zone to cross fuse. Such sheets can be made up into bags and sacks, being both strong and durable. These, of course, are only a few of the systems employed, and it is as well to remember that the Worsted spinning industry probably uses as much synthetic fibre in their production as is used in the cotton spinning systems.

SYNTHETIC OR MAN-MADE FIBRES, AND THEIR USES.

How can we, in Indonesia, decide on the type of fibre we should spin?

There are, of course, a number of points to take into consideration

1. availability,
2. cost,
3. end use, and advantages over other fibres.

Shall we briefly look at the properties of cotton, wool and the baste fibres, to enable us to make a comparison with synthetic fibres?

C O T T O N

It is popular, inexpensive, has very good physiological and tensile properties. It is resilient and its recovery from stains is good.

It has a high resistance to the effects of water, which permits frequent washing with little or no deterioration.

It wears well and is comfortable to wear, therefore it is frequently used for lightweight clothing, light and frequently-washed textiles for the home, such as bedding and table linen, etc.

It can be said with confidence that it will continue to be used as clothing for hot and humid climates, but will be blended with man-made fibres, mainly viscose, polyester and polyvinyl alcohol fibres.

It also has many advantages with the wash-wear and anti-crease properties imparted by the use of resin finishes.

W O O L

Because of its excellent physiologic and aesthetic qualities wool is readily applicable to a wide range of textile products and it is one of the most popular textile fibres. However, it has poor strength and the resistance to stretching, bending and rubbing is considerably inferior to most of the synthetics.

It has specific properties of resilience to wear and it's ability to felt. (The latter, however, is not always an advantage). It has a low thermal conductivity and has a very good spinability.

All these properties make wool a desirable fibre, especially in wearing apparel, blankets, etc. It is increasingly used in blends with viscose to make a lighter, cheaper cloth, and with Polyester fibres for clothing fabrics, such as suitings and dress materials.

In the knitwear field it is losing ground to the polyacrylic and acetate fibres, which are easily bulked and textured. It is also being pushed out of the furnishing and upholstery fabric market; probably the reasons for this are it's easy felting and vulnerability to moths, and the easy replacement in this field by more suitable synthetic fibres.

BAST FIBRES - FLAX, JUTE, RAMI.

These fibres are noted for their strength and resistance to moisture. Their main uses have been in sacking, tent cloths, marine use for ropes, fish nets, sails, etc. and to a lesser extent, for garments, bedsheets, table linen, etc.

Like cotton, they have a poor recovery from deformation, and this calls for special finishing processes to improve the aesthetic appeal and wearing properties of the final product.

Because of the specific spinning techniques involved in the properties, their blending with man-made fibres is very limited.

In Industrial usage these fibres are losing ground to the synthetic fibres such as polypropylene, polyvinyl chloride and polyamides, which are found to be more suitable and cheaper for such end uses as bags, ropes for marine and fishing purposes.

CHARACTERISTICS OF MAN-MADE FIBRES

These man-made fibres are of many types and from many and varied manufacturers. Some are made for specific purposes and it is, therefore, only my intention to deal with the main and best-known groups.

Viscose Fibres

These constitute a separate group of man-made fibres, being regenerated cellulistic, and they form a link between the natural and the synthetic fibres.

They are very hygroscopic and have an excellent affinity for dye-stuffs; because of this and their low manufacturing costs, they are widely used in the production of most textile goods.

The principal drawbacks are their very low resistance to moisture, low wet strength, brittleness, little resilience, bad thermal insulation and high shrinkage in an aqueous media. All these drawbacks place a limit on their uses in textile production.

Modifications have taken place; one being the increase in tensile strength of some types (these find a use in the production of industrial goods), another in the production of high crimp wool-like fibres of great bulkiness, with good thermo-insulation and high resilience with end uses primarily as outerwear, blankets, carpets and furnishings.

A third modification, a high wet modulus having a high tensile strength both wet and dry, and with a much lower swelling than ordinary rayon. The so-called "polynosic" fibres come into this group and have a high resistance to sodium hydroxide.

Acetate Fibres

The properties of acetate have tensile strength which are low and limit their usefulness. Recently the acylised high tenacity viscose fibres such as Tohalon, from Japan, have brought out some improvement.

Acetate fibres have good warmth-retaining properties; they are also thermoplastic to the extent that the final product retains its shape.

They are used mainly for dress goods, knitted and woven blouses, neckties and some goes into the production of lightweight suitings.

Polyamide Fibres.

These were the first synthetic fibres to be produced. They have an excellent tenacity and are widely used.

Their greatest asset is their resistance to abrasion, which is twice that of polyester, ten times that of cotton, and fifteen times that of wool. Even a small amount in a blend considerably increases the durability of a product. The proportion of polyamide staple fibre is limited to a small percentage.

The products are usually materials which are subject to intense rubbing, such as socks, stockings, shirts, undergarments, carpets, rugs and upholstery.

The drawbacks are low hygroscopicity, low resistance to light, easy pilling and poor handle.

Polyamides are of great importance to the tyre industry and largely replace viscose and cotton.

Polyester Fibres.

These fibres probably account for 20 to 25% of all the synthetic fibres in use throughout the world.

Their advantages are - a very high resistance to light, a good resistance to creasing, whether wet or dry, excellent tenacity and a thermoplasticity which enables them to be permanently set in any desired form. The properties can be considered to be stable once set.

The fibres are used chiefly in blends, and have an outlet in wool fabrics for suitings, cotton and silk fabrics in shirts, lightweight coats and dresses and even in Flax-type fabrics for curtains, neckties and industrial end uses.

Until recent years they have not been used in knitwear of the loose construction, with the resultant pilling effect. However, Dacron 64, Terylene W4 and Trevira WA, which incorporate certain foreign compounds, are supposed to diminish slightly the regularity of their structure and to lower the degree of polymerisation, fibre strength is lowered and the tendency to pill reduced.

Polyacrylic Fibres.

These fibres constitute the third group of synthetics of major economic importance. Their principal advantages include excellent resistance to light, a warm "woolly" handle and high bulkiness. They are, however, rather brittle and not very resilient. They are widely used in the knitting trade, the structure of such fibres and end use of which requires high bulkiness, softness and thermoinsulating properties.

As the resistance to abrasion is less than with other synthetics, these fibres do not exhibit excessive pilling.

A further outlet for Polyacrylics and a very large portion of the material goes to these fabrics is in imitation furs, furnishing fabrics, blankets and some woven dress fabrics.

There are many polyacrylic co-polymers produced with differing properties; each variety having specific advantages - for instance, the American fibre "Orlon" has several types, each for its own special purpose.

Low-cost manufacture combines to make the prospects for further development very promising.

Polypropylene Fibres.

These have features which will permit them to play a serious role in the textile field in coming years. Physical properties are very good; they are not affected by chemicals, have a small specific gravity and their manufacturing cost is low. One of their biggest drawbacks is a very poor resistance to light, low temperature melting point and high hydrophobic properties, which prevent the usual dyeing techniques, greatly limiting their use in textiles.

The fibres in this range produced at present are of a type more suitable for industrial purposes; filters, cordages, even up to heavy hawsers, fishing lines and nets, bags, etc. However, most of the domestic uses are in carpets and upholstery. When, and if, the faults are eliminated, and the fibres are extended to apparel goods, their low cost of manufacture will make them a universal textile material in many countries.

Polyvinyl Chloride Fibres.

Although this type of fibres belongs to the longest-known synthetics, they have a limited development and use, as many of their properties are unsatisfactory. For example - their tenacity is poor, they are easily deformed, sensitive to high temperatures, and difficult to dye. However, P.V.C. have their own specific features, which include non-inflammability, resistance to the effects of moisture and chemicals, as well as light, also great insulating properties, which put their fibre uses chiefly in the production of flame-resistant fabrics, overalls, other industrial articles, blankets, and other types of bedding.

Polyvinyl Alcohol Fibres.

Their very difficult processing techniques involving high humidities and temperatures, and such drawbacks as brittleness, small resilience and difficulty in making-up, make them unsuitable for ordinary use.

The fibres are used chiefly for cordage, fishing nets and industrial-type fabrics. In blends with cotton or rayon the fibres can be used in apparel goods, particularly underclothes. It would not appear likely that this type of fibre will find any use in Indonesia, as it is not popular in other parts of the world.

Spandex Fibre.

This is a synthetic elastomer and replaces rubber for textile usage. It's most important feature is it's ability to stretch and recover from being deformed after the stretch ceases. It has a tensile strength two or three times greater than rubber, consequently much finer filaments can be used to produce light comfortable products. Spandex is easily dyed and no sheath fibres are required. It is resistant to light, sea water and oil staining. A disadvantage is it is vulnerable to high temperatures and bleaching agents.

Prices are high, but it finds a ready market in swimwear, sports wear, garments, etc. requiring stretch and return properties. Even a low proportion of Spandex in an article contributes to its high stretch properties.

<u>Other Man-Made Fibres.</u>

Only a small proportion of the available synthetic fibres have been discussed, and these are of the major classes. Mention should be made of such materials as casein fibres, glass, alginates, various metals, Polyethylene, Polyvinylidene Chloride, polytetrafluorethylene, etc. and etc. New groups are always being developed and it is nearly impossible for the technologist to keep pace with them. However, it is not expected that fibres other than those discussed at length will be found for processing in Indonesia within the near future.

SYSTEMATICS OF METHODS FOR SPINNING MAN-MADE FIBRES

The techniques of yarn production depend on the properties of the fibres from which they are spun. Among these, length, fineness, crimp, adhesiveness, freedom from impurities and hygroscopicity are generally considered as of basic importance, since they directly affect the layout of machines, the number of technical operations and the design of the working elements.

Three basic kinds of textile fibres were in use when mechanised spinning processes began to be developed during the nineteenth century and at the beginning of the twentieth century, namely, wool, cotton and bast fibres. Consequently, three basic spinning systems were created and developed in the course of a steady progress and specialisation of yarn production. There were thus woollen, cotton and bast fibre spinning techniques, the first becoming divided into the worsted and woollen systems.

Quite a different situation arose when man-made fibres appeared. At first they were processed on the then-existing equipment, according to techniques applied at that time for natural fibres. Man-made fibres were initially produced in wool or cotton-like varieties and spun with a corresponding system, either alone or in blends, the matching of the properties of the different fibres being strictly observed. The steady and rapid growth of supplies of man-made fibres brought about the development of new spinning techniques designed exclusively for the processing of specific man-made fibres into yarns for specific end-uses.

All techniques for the production of yarn may be divided into the four following basic groups, according to the raw materials used;
a. natural fibres; b. blends of natural and man-made fibres; c. blends of two or more man-made fibres, and d. a single kind of man-made fibre.

All of these groups may be sub-divided according to the properties of the fibres and the characteristics and end-uses of the yarns. The Table on page 28 lists various techniques for processing natural and man-made fibres, with indication of the staple length of the latter.

It can be seen in this Table that, of the 22 listed techniques, nine refer to natural fibres, namely: worsted, woollen, fine-count, medium-count and waste-cotton, hackled flax, tow, jute and hard fibres. The conventional worsted system is most generally used with man-made fibres. The system had to be modified, first of all because in it dyeing is mostly carried out before carding and not in sliver. Carding conditions also differ for wool and man-made fibres.

The good results achieved with dyed fibres in woollen-type spinning, led the producers of man-made fibres to begin the production of spun-dyed fibres. However, this did not occur in cotton-type spinning, in which dyed fibres are seldom used. In the cotton spinning system, man-made fibres are processed alone as well as in blends with cotton, the spinning techniques being only slightly modified. Blends of man-made fibres with flax (hemp) have been used only on a limited scale.

Recently, however, prospects for an increased use of such blends can be noted, because certain chemical processes have been developed that can alter the structure of flax in such a way that its fibres will more readily blend and be spinnable with man-made fibres. Yarns produced in this way will have the characteristics of flax textile. Also, these blends may be spun with both the dry and wet methods.

In the jute system of spinning, man-made fibres are spun alone for the production of carpets or blended with jute to produce sacking and the like.

SPECIAL TECHNIQUES FOR MAN-MADE FIBRES

Since man-made fibres differ from their natural counterparts as regards such characteristics as cleanness, dimensions formed at the will of the producer, and in many physical and chemical properties, special processing techniques have been developed all over the world to convert them into yarns. These techniques vary widely because they must be adapted to the form of the initial raw material (staple fibres, tow, fine tow, continuous filament or granulates for foil production).

CONVERTER SPINNING

Tow-to-top converters permit shortening of the spinning process, making it less costly. Compared to the conventional combing technique, which comprises seven different operations, the converter technique requires only three, namely, converting and two gillings. The resulting top can be processed further, depending on the end use of the yarn, in the following ways: a. dyed, blended with wool tops and combed as a blend; b. spun raw (undyed) to counts up to 40 tex; or c. combed and spun raw (undyed) to finer counts.

Converters are of three different kinds, depending on the principle on which they operate, namely, a. fibre-cutting; b. plain rupturing and c. controlled breaking.

The selection of the type of converter depends on the character of the yarns that can be spun from some varieties of fibres; for example, high-bulk or standard yarns from acrylic fibres.

A combing plant equipped with converters requires 55% less floor space and requires 60% less power and 50% less labour than one that lacks them.

THE MODIFIED COTTON SPINNING SYSTEM

As applied to man-made fibres, the conventional cotton spinning system uses fibres no longer than 40 mm and of a fineness no greater than 3 den; thicker fibres would spin only to coarse counts; for example, not below 33 tex. For finer spinning, the length of fibres is increased to 50, 60 or even 75 mm, and the fibres are made coarser than cotton (2.75 to 3 den).

THE NON-COMBING OR SEMI-COMBING SYSTEM

This system is intended only for man-made fibres spun into yarns for hand knitting or industrial use, with counts between 50 and 125 tex. Typical equipment for this system is supplied by such manufacturers as J. Mackie (Northern Ireland) and Carniti (Italy). A typical layout comprises the following machines :

- One mixing and opening picker;
- One high-production card with an output of about 100 kg per hour;
- Three intersecting gill boxes, the second of which has an autoleveller; and
- One ring frame adjusted to sliver feeding, spinning on to packages weighing 1.6 kg. each. Frames of this kind usually deliver at one side and are fed from cans at the other.

CARPET SYSTEM

This system is rather similar to the non-combing system and produces yarns of 2,000 to 3,000 tex for carpet manufacture. The layout of the machines is as follows :

Mixing pickers;

One single swift card;

Two intersecting gill boxes, and

Single-side can-feeding ring frames, as before.

The specific weight of the sliver fed into the spinning frame is approximately 7 g/m.

Careful blending of the fibres is of great importance, particularly because several colour components are commonly used in these blends, and also because of the wide variation in fibre fineness, which can range between 20 and 100 tex.

FINE TOW-TO-YARN CONVERSION

As far as spinning of staple fibres is concerned, this is the shortest process of yarn production. The fibres are obtained by rupturing continuous filaments to form a fine tow, which is fed into the spinning machines, breaking the filament into fibres of a specified staple length and then spinning them with use of the ring frame arrangement.

These techniques have not yet found wide use because of the high cost of producing fine tow. Also, yarns made from fine tow have properties different from those of conventional yarns; for example, they have higher tensile strength and lower elongation at the breaking point. Consequently, their final destination is for industrial use, such as for conveyor belts, nets and sacking.

The most suitable materials for this purpose are polyvinyl alcohol fibres, the conventional spinning of which is very much hampered by the accumulation of static electricity charges on the fibres.

Although none of these techniques is yet in widespread use, several prominent machine builders have designed devices for this conversion system. At least nine such designs are known to exist. They may be divided into two groups; those that operate on the principle of a plain rupturing and those in which rupturing is controlled.

TEXTURING

The thermoplasticity and great strength of synthetic fibres permits the use of new methods of processing continuous filaments into high-bulk yarns. Developments in this area have proceeded rapidly everywhere. In 1966 the production of such yarns amounted to 250,000 tons, and it has probably doubled by this time.

There are several methods of texturing, and the resulting yarns are classed accordingly as follows :

a. Textured by true or false twist (Helanca, Elastil, Fluflon, Superloft, Elastic are just a few of about 25 trade marks now in use);
b. Crimped by the stuffer-box method (Anilon, Ban-Lon, Newlon, Spunized, Gofron);
c. Undulated by being drawn over a blade-edge (Agilon, Evalon);
d. Bi-stabilised by re-setting (Astralon, Crimplene, Saaba, Melan, Meron);
e. Bulked by air-blowing (Taslan, Skyloft, Mirlan, Suflete).

CORE-SPUN YARNS

The widely differing properties and specific merits of particular types of man-made fibres create various opportunities to produce yarns of various compositions.

For example, continuous-filament and staple fibres may be combined. Thus yarns for specific end uses can be produced. Some examples are a yarn that is very strong because of its synthetic filament core, but that feels soft because cotton fibres form its sheath, non-inflammable yarn with glass filament core and synthetic fibres for the sheath, combination yarns and super-elastic yarns with cores of polyurethane filaments.

METHODS OF YARN PRODUCTION

METHOD	MATERIAL AND LENGTH OF STAPLE
1. Conventional worsted system	Long and medium-length wool, man-made staple fibres (70 - 140 mm)
2. Worsted system, with use converters	Man-made tow, 3,300 - 5,600 tex
3. Abbreviated converter system	Man-made tow 4,500 - 5,600 tex
4. Woolen system	Short wool and reclaimed fibres, man-made fibres (50-80 mm), wastes
5. Medium-count cotton system	Cotton and cotton-like man-made fibres (28-40 mm)
6. Fine-count cotton system	Long staple cotton, cotton like man-made fibres (36-40 mm)
7. Waste cotton system	Cotton waste, man-made fibres up to 40 mm length, spinning waste.
8. Modified cotton system	Man-made fibres (50-75 mm)
9. Non-combing system	Man-made fibres (80-120 mm)
10. Hackled flax system	Hackled flax and man-made fibres (90-120 mm)
11. Flax tow system	Flax tow and hacklings, man-made fibres (90-100 mm)
12. Jute system	Jute, man-made fibres (140-200 mm)
13. Carpetings	Man-made fibres (100-200 mm)
14. Hard fibres	Sisal, hemp, man-made fibres (about 100 mm)
15. Fine tow conversion	Continuous filament tow of 110-670 tex total fineness
16. False-twist texturing	Continuous filament yarn, 2.2-17.0 tex
17. Stuffer-box texturing	Continuous filament yarn, 11-330 tex
18. Air-blown texturing	Continuous filament yarn, 5.5-22 tex
19. Undulation	Continuous filament yarn, 2.2-11 tex
20. Bi-stabilisation texturing	Continuous filament yarn, 8.5-17 tex
21. Core-spinning	Continuous filament for core and any staple fibres for sheath
22. Orientation and cutting of foils	Granulated polyolefin materials

CHARACTERISTICS OF SOME VARIETIES OF TEXTILE FIBRES

PROPERTIES	FIBRES							
	COTTON	WOOL	VISCOSE (ordinary)	POLYAMIDE	POLYESTER	ACRYLIC	POLYVINYL CHLORIDE	POLY - PROPYLENE
HYGROSCOPICITY	●	●	◐	◔	○	○	○	○
STRENGTH	◐	◔	◔	●	●	◐	◐	●
RESISTANCE TO ABRASION	◐	◔	◔	●	◐	◔	◐	●
RESISTANCE TO WRINKLING	○	●	○	●	●	◐	◐	●
RESISTANCE TO SHRINKAGE	◔	○	○	●	●	●	◐	●
RESISTANCE TO EFFECTS OF HEAT	●	●	●	◔	◐	◐	○	○
RESISTANCE TO FORMATION OF ELECTRICAL CHARGES	●	●	●	◔	◔	◔	○	○
HANDLE	◐	●	◐	◔	◔	◐	○	○

● Very good ◐ Good

◔ Satisfactory ○ Unsatisfactory

FUTURE OF THE INDONESIAN TEXTILE INDUSTRY

Without a shadow of doubt, the future is good; the demand for cloth and textiles ever-increasing and more people in employment creates higher demands. Increasing population expands the demand still further, but as the standard of living rises so do the demands for quality. Sub-standard cloths, of irregular and weak yarns, and poor printing and dyeing will not do. Grey cloths of what was known as grey baft have already ceased to be in demand - the people want something better.

I have already discussed the essential of up-grading the mills by training schemes, etc., but we have to go further than this, to another point which I mentioned previously, and that is manufacturing and supplying what the market demands. Having this, and quality, there will be no need for people to look elsewhere for their requirements.

No doubt cotton will always have an honoured place - in fact, most of the people in tropical countries would say they preferred cotton and on comparing the various fibres on our table of Fibre Characteristics, it is easy to see why, for the only fault comes under the heading "Resistance to wrinkling". Even this can be overcome by resin treatment but unfortunately only with losses in some other areas.

What, then, will be the demand - or in which direction should the industry move? Fortunately, your mills come into two or three large groups and, apart from the private concerns, a programme of expansion into other yarns and fabrics can be controlled. For example, one mill can be given Combers, and instructed to move in the direction of producing Polyester Cottons, mixing at the Draw Frame and producing medium to fine counts. In fact, I am advocating a Central Control of Products from each mill, rather than each mill choosing it's own policy. It is sufficient for a mill management to concern itself with quality, training, etc., rather than with sales policies, and with doubts as to whether they are going in the right direction with what they are producing. The Central Control will also know which mills are best suited for particular types of products.

You will note that I am accepting the need for the production of blends with synthetics. I do this with the opinion that eventually, or maybe even in the near future, you will have to diversify, and be thinking in the terms of industrial fabrics, ropes, twines, more furnishing fabrics, carpets, curtains, towels, etc. Even with a probability of moving into the field of wool, with a market requirement of lightweight Polyester wool suitings.

To go back to the question asked on Page 17 - "How can we decide on the type of fibre we should spin?". We have considered the main types of fibres available, both natural and synthetic and having already our industries of natural fibre, it is a case of marrying these to synthetic fibres to give the desired effects.

In the case of our cotton spinning plants, there are basically two fibres worthy of consideration 1. Viscose rayon fibre and 2. Polyester fibre.

Viscose Rayon Fibre.

Turning back to our notes on this, we see that :-

1. They have low manufacturing costs; are
2. Very hygroscopic, and so have a high affinity for dyes.

Their drawbacks we can afford to ignore, because we are only thinking in terms of blends, and would not consider 100% viscose as a good fabric for Indonesia.

Polyester Fibre.

Turning back to our notes again, we find the advantages are:-

1. a high resistance to light.
2. good resistance to creasing.
3. excellent tenacity; good wearing life.
4. thermoplasticity for permanent setting of garments.

The main, and probably only, drawback is the fibre cost, but the advantages to this fibre in blends, and the uses to which these blended cloths are put, greatly offset these extra (over cotton) costs.

At this stage someone may want to add to the list the Polyacrylic fibres. These, in my opinion, are not of much advantage in mixing with cotton for, as our notes inform us, they are "woolly" in handle and bulky, rather more useful as a blend with wool, although they do have some appeal for use in cotton blended yarns for the knitting trade.

What of the Bast Fibre Spinning Plants?

Of those spinning jute, there appears to be no alternative to this. The fibre offering strong competition to jute is that of polypropylene. This, however, does not require a spinning plant but only a twisting machine, as the fibres are fabrilated, i.e. made into sheets, cut down to strips and due to the fabrilations split into fibres as the strips are twisted into yarn. Such yarns are then made up into twine, rope, carpets, etc.

For the manufacture of bags the polypropylene is left in sheet form, with strengthening threads fused to the sheets if necessary for added strength.

Therefore, any extension considered necessary in this line would be in the production of polypropylene or manufacture of products using that as the raw material. A rope and twine works could be considered as essential to the shipping and fishing industries, for here again I would consider that Indonesia will expand further in marine activities in the not-too-distant future.

The Rami Plant in Sumatra does not have much activity producing rami, due to a shortage of the raw material, but probably this could be made up by blending existing supplies with a synthetic fibre, or even two fibres in the one blend. Of those considered, both a coarse denier viscose and Polyester fibre would be suitable.

To digress for a moment, I am always shocked by the fact that in Java there is not one waste spinning plant. The market for yarns and fabrics produced from waste could be quite considerable, and there is certainly a need for existing mills to be able to unload their waste materials. This alone would ensure a better yarn quality from the mills, for at present most are very reluctant to remove any waste from their cottons, and even having removed it, they are very eager to return it. This is false economy, because it is certain that there is much loss in production due to irregular weak yarn, resulting in end-breaks, etc. due to this one reason alone.

APPENDIX

COUNT CONTROL IN THE COTTON ROOM AND BLOWING ROOM

IMPORTANCE OF GOOD CONTROL IN THE BLOWING ROOM

The scutcher is the first point in the spinning mill at which a count characteristic - in this case the weight of a lap of given length - is imparted to the product. It is also the only point at which the whole of the product is tested - by the weighing of the laps. Variations introduced at this process can affect all subsequent processes and may be very difficult to remove. On the other hand, if the Scutcher can be kept steady, there is a good chance of keeping the rest of the mill steady. Good performance and good control in the cotton room and the blow room are, therefore, the foundations of good count control.

In the remainder of this section it will be assumed that the length of the laps is constant, and that adequate control of weight per unit length will therefore be achieved if the weight of the laps can be kept constant. It is not safe to assume this in the mill, however, and an essential preliminary of any work aimed at better control of lap weights is an investigation of the lengths of lap obtained from the various scutchers. Either the scutchers must be adjusted to give the same length for all laps of the same quality, or, if this should prove impossible, a separate lap weight must be fixed for each scutcher, so as to give the same weight per meter.

No matter how good the performance of the blowroom, some degree of variation in lap weights is inevitable. Short-term variations between individual laps passing through the Cards at about the same time are reduced by the doublings at the Draw frames, and are not important from the point of view of count control. On the other hand, long-term variations, such as may be found between two sets of laps separated by several hours, are not reduced. An amount of variation which is insignificant in a single lap becomes important, therefore, when it affects the whole production of several hours.

Short term and long term variations in lap weights have some causes in common, and, moreover, the small but persistent long term variations are much easier to detect and correct, if the short term lap-to-lap variations can be reduced.

Most of the recommendations to be made here, although aimed ultimately at the elimination of long-term variations, will lead to a reduction in short-term variation between and within laps, an end which, with shorter processing and fewer doublings, has become very desirable in itself. Some of them, particularly those concerned with better blending, will also have beneficial effects on other aspects of quality; it is not only in connection with variation in yarn count that the blowroom is increasingly recognised as one of the critical points for quality control.

COMPENSATION FOR VARYING MOISTURE CONTENT

The effect of changes in atmospheric humidity upon the weight of a sample if cotton is well known, and yet is often completely ignored in testing for count control. If the relative humidity varies, then a system of control which keeps the weight of cotton plus moisture constant will generate variations in the count of the cotton.

In the cotton room and the blowroom, the range of variation in relative humidity is usually wide, and rapid changes can occur; for example, in one mill a change of 15% r.h. was found over a period of four days. Even where the mill as a whole has controlled humidity, it is unusual, because of the special problems that are involved, to find the control extended to the blowroom. In the region of 35-70% r.h. a change of 10% r.h. results approximately in a 1% change in the apparent weight of the cotton, so that a change of 15% r.h., uncompensated, would result in a change of over ¼ kg. in the weight of cotton in a 20 kg. lap.

The best basis for compensating for humidity changes would be a direct measurement of the regain or moisture content of the laps as they are produced, and instruments which do this are available. Failing this, the remaining possibility is to compensate on the assumption that the regain of the laps can be deduced from the relative humidity of the atmosphere. The relationship between the lap and the various atmospheres through which it passes as it is processed is a complicated one, which is not yet fully understood, and moreover the atmosphere inside the opening line is not the same as outside. In practice, many mills have found that beneficial results can be obtained by taking the atmosphere in the blowroom, in the neighbourhood of the lap ends, as the basis for compensation.

In view of the differences in conditions from mill to mill, however, it is desirable, before adopting compensation on this basis, to conduct trials to establish whether the relationship between the regain of the laps and the relative humidity of the blowroom is sufficiently close. The regain of the laps may be estimated either from the observed weight of a sample of cotton of known dry weight, or from measurements of relative humidity.

For estimation from samples of cotton, both automatic and non-automatic methods of compensation are available. In the automatic method, the laps are weighed against a piece of cotton cloth arranged on an open framework; since the weight of this varies with the relative humidity, automatic compensation is made for the varying moisture content of the laps. A cloth weight of this kind is greatly preferable to the weights of sliver or loose fibre which are often used for the same purpose, since it responds fairly quickly to changes in relative humidity, whereas sliver can take many hours.

Alternatively, compensation can be based on the relative humidity of the atmosphere, as measured by a sling hygrometer. The approximate rule given earlier for the relationship between relative humidity and regain can then be used to determine the amount of compensation required, and so to obtain a table such as the following, which relates to a cotton lap of nominal weight 20 kgs. at 45% r.h.

Compensation for Moisture Content of Laps.

Observed relative humidity	Compensation as per cent of nominal weight
52½ - 57½	+ 1
47½ - 52½	+ ½
42½ - 47½	0
37½ - 42½	- ½
32½ - 37½	- 1

If a fibre other than cotton is being processed, different amounts of compensation are required, and if automatically compensating scales are to be used, the cloth should be of that fibre. Where several fibres are used, it will probably be more convenient to take measurements of relative humidity, and use a different table for each fibre. The synthetic man-made fibres such as nylon and Terylene take up very little moisture, and no compensation is necessary; for blends with cotton, the compensation should be proportional to the amount of cotton in the blend.

In addition to moisture, the weight of the lap usually includes the weight of the lap rod. It may seem obvious that all lap rods used in a mill should therefore be of the same standard weight, but in a number of cases differences in rod weights have been found which would have a serious effect on the apparent weight of the laps. An occasional weighing of lap rods is therefore well worth while, and may produce some surprising results when it is first undertaken.

STABLE MIXINGS AND GOOD BLENDING

To keep down the variation of weight between and within laps, as well as to maintain good running and good quality throughout the mill, the composition of the mixing should be kept as constant as possible. In practice, long-term continuity is often unattainable, but it is important to do what can be done, by such means as using fresh lots in the order in which they are received, introducing only one new mark at a time, and making systematic Micronaire tests.

Ideally, the number of bales laid down at a time should be large, and in mills abroad numbers of 100 and more are common. The bales can be arranged in, say, four similar parts, of which one is being laid down, while the others are one-quarter, one-half and three-quarters used. Thus, not more than a quarter of the mixing is changed at any one time. There is no space for such large mixings in the majority of Indian mills, but it is generally desirable to use as many bales as the available space will allow. For cottons with similar characteristics, a mixing of 8 bales or so may be tolerable, but for cottons with widely varying characteristics the tolerable minimum may be 30 bales or more.

Before using the bales, it is important to let them stand for as long as possible after opening (24 hours is suggested) to allow the cotton to expand and condition.

Where there are blending hoppers, and the constituents of a mixing are of varying density, the bales should be arranged so that cottons of similar density are fed to the same blender, which should then be adjusted to give the right rate of feed.

Where bales of varying density are fed directly by hand to the same blender, or where there are no blenders, the bales should be laid out with high and low densities intermingled, since this will result in better blending if, as is usual, the cotton is taken from the bales in the order in which the feeder reaches them.

A further requirement for good blending is that the pieces taken from the bales should be small - say 3 to 4 kgs. - and not large pieces of 15 to 20 Kgs., such as one often sees being put on lattices. Where trucks are used to collect the pieces, it may be worth considering putting in partitions which will prevent the loading of large pieces. Another possibility is to place grilles over the feed lattices, through which only small pieces can be passed. A good deal of benefit in blending was sacrificed in return for a gain in economy through the general abandonment of the stack mixing; some of this benefit, at least, can be regained by the use in the opening line of the Sandwich Blender or other similar machine.

A constituent of the mixing for which evenness of blending is particularly important is waste which is fed back either to the same or to another mixing. Irregular feeding of waste is probably the largest single cause of laps which deviate badly from the required weight. Waste must be fed steadily and continuously, and to this end a separate waste hopper is very desirable.

AUTOMATIC REGULATION OF THE SCUTCHER

When it was first introduced, the conventional mechanical feed regulator on the scutcher was a remarkably advanced piece of control mechanism, and it is still quite effective, provided that it is properly maintained and adjusted.

First, all the parts should be cleaned and lubricated regularly, so as to ensure that they can move freely. Second, the magnification of the system should be set correctly for the type of cotton being processed. The pedals of the regulator measure the thickness of the feed to the scutcher, and adjust the speed of the feed accordingly, but the amount of the adjustment depends on where the fulcrum of the long lever is set. Not only is it important that the magnification should be checked, but also that it should be re-set when a change is made to a cotton with substantially different physical characteristics. With a different cotton, the density and resilience may be different and, if so, the change in weight for a given change in thickness, and the adjustment of the feed necessary for keeping the weight constant, will also be different. This was one reason why stress was laid in the preceding section on securing constant density by good blending. The performance of a regulator will generally be improved if it is fed from a tall hopper with a vibrating wall in the delivery chamber, since this will [illegible] even density feed.

It should also be noted that the regulator works by varying the rate of feed, and not by varying the rate at which the lap is formed. The extent to which the rate of feed can be raised when the lap goes lighter is limited, however, by the rate of feed at the hopper before the last beater. It follows, therefore, that either the rate of feed at this hopper must be automatically adjusted, by driving the upright lattice from the driven cone drum of the regulator, or else there must be an over-feed which will allow the regulator sufficient margin for adequate compensation. The regulator makes adjustments in the rate of feed to compensate for variations in the thickness of the feed, but does not check that the compensation has resulted in a lap of the correct weight. The weight is measured by the scutcher attendant, and since the regulator is not completely effective, it is necessary for him to make further adjustments from time to time by means of the turnbuckle in the regulator linkage. The measures already described for keeping the composition of the feed constant and the regulator in good order should reduce the frequency with which this is done, but the need for some provision for additional regulation remains.

TOLERANCE LIMITS AND MANUAL REGULATION

With a view to ensuring that no extreme off-weight laps reach the card-room, instruction are usually given to the scutcher attendants to reject and re-process all laps with weights beyond certain tolerances. In many mills, however, there seems to be little realisation of the true extent of the variation from lap to lap, and instructions are given which, if applied, would result in the rejection of a third or more of the laps. Even if lap production could be increased sufficiently to keep the card-room running, it would be undesirable to reject so many, because the damage done to the cotton by re-processing would be more serious than the increase in variation.

In practice, such instructions are commonly recognised as unrealistic, and therefore not obeyed - but this is not conducive to good morale. Tolerance limits should be based on knowledge of the performance of the opening lines concerned, and should be set so as to reject not more than 5% of the laps.

In deciding when to make an adjustment, there is a conflict between the requirements for reducing the variation of the long-term average lap weights, and those for reducing the variation of the individual laps. Stability of the long-term average is best served by being very free with adjustments, since this will ensure that the average weight never moves far from the required value.

On the other hand, if a single lap differs from the required value by an amount which is within the normal range of inherent variation, and an adjustment is none the less made, the effect will be to increase the variation of the laps. However, this variation is of a short-term character, since the adjustment is reviewed when the next lap is weighed, and will be reduced by doublings at subsequent processes.

At one time, with long processing and many doublings - up to 1,728 - it would have been true to say that the lap-to-lap variation was of little importance.

With short processing, and as few as 64 doublings, the lap-to-lap variation cannot be neglected, but it is still justifiable to aim primarily at reducing long-term variation, even at the cost of some increase in lap-to-lap variation.

The risk of a run of several light or heavy laps going at the same time to cards feeding the same preparation of drawframes can be reduced if the laps are stacked in columns, to form a rectangle, and are taken away to the Cards by rows, i.e. at right-angles to the direction in which they were stacked.

"Adjust the scutcher after every lap which is off-weight by more than 250 gr. The adjustment should be made by an amount that corrects for the extent by which this lap is off-weight. If more than 40% of the laps are off-weight by more than 250 gr. substitute 500 gr. for 250 gr. in the above rule".

In practice, it is impossible to make an accurate small adjustment - say, 50 gr. and therefore the rule should be interpreted to mean "for laps off-weight by more than 250 gr., more than 375 gr. and more than 500 gr., adjust by 250 gr., 375 and 500 respectively".

There is nothing sacrosanct about this rule, and it can be varied to suit the individual mill: for example, in mills with low variation in lap weights, particularly fine mills, it may be desirable to substitute [illegible] gr., 250 gr. and 375 gr. for 250, 375 and 500 gr. . Indeed, an able and experienced scutcher attendant, who takes account not only of the last lap, but also of those which preceded it, and makes use of his knowledge of local conditions, can produce better results than any simple rule.

An important contribution to count control would be made if the blowroom staff were more generally recognised as having a considerable responsibility for the good running of the mill, and were chosen and treated accordingly.

ROUTINE TESTING IN THE BLOWROOM

The need for checking that all scutchers processing the same quality produce laps of the same length was mentioned at the beginning of this section. Probably the best way of comparing the lengths of laps is to measure the length of sliver which they produce when passed through the same Card, by fitting a revolution counter to the calender rollers of the Card. This test should be repeated from time to time, particularly when a new mixing is introduced.

TODAY AND TOMORROW
OF
INDONESIAN WEAVING INDUSTRY

Tamotsu HOSHIYAMA

Weaving Expert

Textile Industry Rehabilitation and Development Programme in Indonesia, UNIDO.

1. INTRODUCTION :

I have passed only six months and almost all the time on the spot of various weaving mills in order to improve their productivity, quality and reduce the cost.

For this reason, I have already been familiar with some of the technical common problems in your country's weaving mills, however, I have not been entitled yet to express my general opinion & view on your weaving industry's "today and tomorrow", because like this rather economical, statistical and forecasting problems I have not got the chance to study them so minutely yet.

The following lecture is only the summary of my very rough ideas which I have occasionally considered on the Indonesian weaving industry --- present and future.

2. PRESENT CONDITION OF INDONESIAN WEAVING INDUSTRY :

"Indonesia now has a healthy investment climate in terms of stability of government, realistic economic and investment policies, attractive land for plant sites and a large labor force" --- this is an opinion given by Werner Consulting Company, USA after its on the spot survey in Indonesia requested by UNIDO.

I can agree with this opinion when I compare Indonesia with some of the other developing countries in Asia and Africa.

In these points, Indonesia at present seems to have the best and biggest opportunity to rehabilitate and develop its weaving industry since the end of the World War II. But, frankly speaking, Indonesia has not throughly utilized its various advantages above mentioned. and its weaving industry's conditions are not so satisfactory yet.

The main conditions are summarized as follows, in my opinion : -

(1) Low productive efficiency
(2) Inferior quality of products
(3) High cost of production.

Due to the speciality of weaving technology, and it is manytimes so not only in the weaving but also in the other industry, these three points go together and they are unseparable --- when weaving efficiency is high, it means the yarn breakage is low and also the mechanical condition of loom is good, naturally the produced quality is superior and at the same time the production cost becomes low, and vice versa.

In the above, you need to be careful not to misunderstand in the term of "quality" --- here I do never use this word 'high quality' as luxurious or expensive one and "low quality" as cheap one itself, for instance, the former does not mean poplin cloth with fine count and combed yarn and high weaving density compared with the latter shirting cloth of course carded yarn and low density. High "quality" cloth here means, for instance, the more well produced shirting cloth with less defects than the other one with more defects consisted of the same specification.

3. REASON FOR THE PRESENT CONDITION :

In my opinion and impression, the main reasons of the poor conditions in the previous chapter are as follows:-

(1) Lack of understanding of the improvement possibility of the process without spending any extra money.

(2) Lack of practical experience and knowledge on the spot of process.

(3) Lack of training of labor force.

(4) Lack of maintenance of machinery and accommodation.

(5) Lack of revolving capital.

(6) Lack of reinvestment from its own profit and others to modernize the mills.

These items are each other the reasons and results themselves and also go together and are unseparable, some of them are, at the same time, the results of the problems mentioned in the chapter 2.

4. PROSPECTS FOR THE FUTURE OF INDONESIAN WEAVING INDUSTRY :

We can prospect it on the basis of the present conditions of the developed and already industrialized countries, because I cannot find any speciality and difference in the problems of weaving industry between industrialized Indonesian society in future and the already industrialized countries at present --- the trend and tendency of market demand and individual economic conditions, etc. can be said not so different.

Anyway, the following items are expected to be realized in future.

(1) Demand for more luxurious quality cloth

This demand has already begun in Indonesia, for instance, Polyester-Cotton cloth is day by day requested more and more by consumers and many weaving mills are now very keen to replace their cotton products into this one, and even in the case of cotton cloth the demand for poplin is gradually being increased instead of shirting-class one, traditional Batik clothes is now expected less dressed by Indonesian people in the near future under the Western influence and it has been so already.

(2) Widening trend of cloth weaving width

Due to both the change of consumer's demand and the modernization of finishing plants, this weaving width become more wider, which has already been done and still it is going on in the developed countries.

(3) Wages base-up trend

At present, the wages in Indonesia are, fortunately or unfortunately, very cheap compared with the manufactured goods price and also with those of the developed countries; however, they are prospected to be increased at the annual rate of 7-8% --- it means nearly double after only 8 years. For this reason you need to install the labor-saving machinery in the near future much more than now in order to reduce the total production cost.

(4) Intensification of competition with foreign countries

Even now Indonesian domestic weaving products are facing the better quality but cheaper price cloth imported legally or illegally from abroad. The developed textile countries are now making their desperate efforts on reducing the costs under the condition of already much higher labor wages, and, at the same time, many of the other developing countries are also trying their best to improve the quality and to reduce the cost taking advantage of their cheaper labor cost. From the both sides of the above mentioned, Indonesia will be engulfed into more intensive international textile competition than now.

(5) Invasion by knitting

Because of the Western influence and modernization of life, people are requesting day by day more light, sporty and informal cut wears, and knitted goods are prevailing more & more not only for underwears --- this is worldwide tendency, from which Indonesia also cannot escape.
The productivity of knitting is tremendously higher than weaving and the cost is naturally very low.
The enemy of Indonesian weaving industry is not only the foreign made cloth, but also this knitted goods.

5. COUNTERMEASURE FOR THE FUTURE :

This should be considered also for improving present difficult problems already mentioned in chapter 2 & 3.

(1) Understanding of possibility for raising efficiency, improving quality and reducing cost under the present machinery & accommodation.

It should be completely and without any mistake understood by all of the mill owner, management, technological staff, supervisor and worker that with the present machinery and accommodations they can definitely improve their productivity and reduce cost without spending extra money, if they can get more practical knowledge & well analysed experience, various processes are completely controlled, they are trained more systematically, rationally & patiently, and the machines are more carefully adjusted & well maintained.

(2) Study of the process

The various processes should be studied by the technological staff more completely on the spot, and perhaps it will be able to be done more quickly & efficiently with the aid of well experienced outsiders.

(3) Training workers and adjusting & maintaining machinery

Weaving industry is a labor intensive one, the productivity and quality depends upon the worker's action for the most part.

Initial installation & adjustment only are, of course, not sufficient for the machinery, daily maintenance afterwards is necessary and important.

(4) Changing cloth quality to higher & luxurious one

As mentioned in 4.-(1), this change of production needs to be done gradually, and it is not so technically easy to weave synthetic yarn cloth and fine & high density one. The above mentioned (1)-(3) in this chapter should always be carried out beforehand also for the preparation of higher and luxurious quality cloth.

(5) Rationalization of labor force

The absolute amount of wage of Indonesian worker at present is certainly very low, but comparing his/her productivity with the developed country's one, it cannot always be said cheaper.

Unnecessary workers should be rationalized after the effects of the above mentioned (1)-(3) are realized.

(6) Adoption of labor-saving & high-productivity machine

At present, Indonesian worker's wages are low, it is, however, increasing 7-8% annually, in the near future the labor-saving machinery becomes much more profitable than ordinary one.

But very mechanically and electrically complicated machinery cannot be recommended for Indonesian mills, because still now the related industries have not been so much developed that, for example, when it is out of order it cannot be repaired so easily and quickly.
In this point, see my trial calculation in the appendix.

(7) Integration of small mill

In a small mill, everything is uneconomical. In weaving, at least 300 looms should be installed and operated in one mill, because one sizing machine can operate about 300 looms.

Due to the trend of higher and more technically difficult cloth, the necessity of mechanical sizing is day by day increased and the non-sizing or hank-sizing process should very quickly be disappeared.

But the smallest mills of only 10-30 looms have the advantage of meeting ability for the change of marketing situation very speedily.

Middle class mills of 30 - 300 looms have the most difficulty of being attacked by both the smaller and larger mills.

(8) Dissolution of over-protection policy by the Government

Over-protection for industry as well as for our children is very harmful, under it the entrepreneur does not try his best to rationalize his business so eagerly.

This kind of protection policy needs to be dissolved gradually but as soon as possible, otherwise the nationally competitive power cannot be gained for ever.

(9) Dissolution of high interest policy

Now the interest of bank loan for initial investment of enterprise is 1.0 % compound for one month, it means about 13% annually, and it is 1.5% for revolving capital, which means about 20% annually. They are terribly higher than those of international standard.

This inheritance of the past economically confused days needs to be reduced nearly to the international level, otherwise no entrepreneur cannot be interested in the new investment and also the existing enterprise cannot get the proper profit.

(10) <u>Increase and substantiality of textile technical & technological educational institution</u>

For the present stage of Indonesian textile industry, the number of graduates with bachelor degrees should be increased and also they should be educated to have the ability of applying new knowledge into the actual processes on the mill spot more than now.

The real situation of the mills where the students are to be dispatched for training-on-the-spot needs to be more carefully surveyed, sometimes mis-controlled and mis-managed mills are rather harmful for the student's educational purpose.

More technical high schools are necessary for the supervisor class of the mill.

Post-graduate course should be more substantial.

Anyway, the quality, ability, performance and experience of the teacher are the most important for the education. The candidate for the technological lecturer or professor should be dispatched to some well controlled mills for at least one year at his bachelor days <u>and there senior well educated & well experienced production-manager-class technologists should train him on the spot in the practical way</u>, then he should return to the institute, university or college and recieve the master and doctor degree education. After all these courses he can become a teacher who has been trained both theoretically and practically, which the present Indonesia requires so much.

6. **CONCLUSION :**

By the depression of both legally & illegally imported textile goods and increasing foreign joint mills, the change of consumer's demand and the sharp base-up of laboror wage, the future of Indonesian weaving industry is not so easy.

All of the weaving industry relatives should carefully and minutely analyze the situations of the present and future and take the necessary actions promptly for the prosperity of both the industry itself and the nation.

APPENDIX (Related to 5. - (6)).

Estimated comparative calculation of Two Weaving Mills, Tradional Fly Shuttle Automatic cop Change Loom and Innovated Gripper Shuttle Weaving Machine in Indonesia.

This is a roughly estimated comparison of initial investment & production cost between two weaving mills, one is traditional fly shuttle automatic cOp change loom mill (Mill 'A'), the other is "Sulzer" Type ES 130 weaving Machine (Mill 'B'), which produce the same kind & the same length cloth per day.

The difference between these two mills exists in only pirn winding and weaving processes, and the others are just the same, for this reason only these two processes were analysed and compared as follows.

1. Technical Condition & Economical Assumption in Future :

1-1. Technical Condition.

(1) Cloth Kind.

$$\frac{40^s \times 40^s}{130 \times 70} \times 38'' \times 40^{yds} \times 4{,}972 \text{ ends, Poplin}$$

(2) Loom of Mill 'A'

300 looms (one sizing machine unit)

44" p/s , 170 r/m, 90% efficiency

(3) Shift & Group

3 shift & 4 group system (22.5 hours/day, No weekly holiday).

(4) Production/day

24,500 yds (605 pcs)

This is the same in the two Mills.

(5) Loom of Mill 'B'

74 looms, 130" p/s, 230 r/m, 90% efficiency

(3 cloths are woven simultaneously)

(6) Necessary Weft Yarn/Day

930 Kg.

(7) No of Looms/Operator

Mill 'A' 10 looms

Mill 'B' 5 looms.

1-2. Economical Assumption in Future.

Item	Annual Rising Ratio
Labor Cost	8%
Spare Part price	3%
Electric charge	3%
Yarn price	1%

2. Necessary Machinery for pirn :

2-1. Mill 'A'.

(1) Pirn Winder ('Abbott' Type Long Quiller, 110 spl/machine)

2 machines.

(2) Bobbin Clearer (Rotary Brush Type)

1 machine

2-2. Mill 'B'.

Both of the above ones are unnecessary.

3. Necessary Worker (Skilled, Semi-Skilled & Unskilled) :

3-1. Mill 'A'

Process	S	S.S	U.	Total
Pirn Winding		8	12	20
Weaving	156	48	16	220
Weaving Maintenance	11	2	6	19
Total	167	58	34	259

3-2. Mill 'B'

Process	S.	S.S	U.	Total
Weaving	84	12	16	112
Weaving Maintenance	5	2	2	9
T o t a l	89	14	18	121

4. Initial Investment :

Item \ Mill	" A "	" B "
Type of Loom	44" R/s, Cop Change	130" R/s, Sulzer ES
No. of loom	300	74
Price/loom (CIF)	US $ 1,500	US $ 18,000
Price of loom (1)	US $ 450,000	US $ 1,332,000
No. of Pirn Winder	2	-
Price/P.W. (CIF)	US $ 25,000	-
Price of P.W. (2)	US $ 50,000	-
No. of Bobbin Cleaner	1	-
Price of B.C (CIF) (3)	US $ 2,500	-
Total of Machinery Price [(4) = (1) + (2) + (3)]	US $ 502,500	US $ 1,332,000
Land area	2,000 m^2	1,500 m^2
Land price/m^2	US $ 1,00	US $ 1.00
Land price (5)	US $ 2,000	US $ 1,500
Building price/m^2	US $ 50	US $ 50
Building price (6)	US $ 100,000	US $ 75,000
Total of Land & Building [(7) = (5) + (6)]	US $ 102,000	US $ 76,500
Grand Total (8) = (4) + (7)	US $ 604,500	US $ 1,408,500
Difference ("A" - "B")	(-) $ 804,000	

5. COMPARISON OF ANNUAL PRODUCTION COSTS IN THE FIRST YEAR.

5-1 Labour Cost.

At present, the wages for skilled, semi-skilled & unskilled workers in the private companies in Indonesia are respectively US $ 1.10, US $ 0.80 & US $ 0.50

Item \ Worker \ Mill	"A" S	"A" S.S	"A" U	"A" Total	"B" S	"B" S.S	"B" U	"B" Total
No. of Worker (Pirn Winding, Weaving & Weaving Maintenance	167	58	34	259	89	14	18	121
Wege/Worker (US $)	1.10	0.80	0.50	-	1.10	0.80	0.50	-
Wage/Day (US $)	183.70	46.40	17.00	247.10	97.90	11.20	9.00	118.10
Wage/Year (US $)	-	-	-	86,485	-	-	-	41,335
Difference/Year at present	(+) US $ 45,150							

5-2 Depreciation.

Fixed rate method of 10 years period and 10% balance underpreciated for machinery, constant value method of 20 years for building.

Year \ Item \ Mill	"A" Machinery US $ 502,500	"A" Building US $ 100,000	"A" Total	"B" Machinery US $ 1,332,000	"B" Building US $ 75,000	"B" Total	Difference/Year (US $)
1st	103,500	5,000	108,500	275,000	3,750	278,750	(-) 170,250
2nd	82,500	5,000	87,500	218,000	3,750	221,750	(-) 134,250
3rd	65,500	5,000	70,500	174,000	3,750	177,750	(-) 107,250
4th	52,000	5,000	57,000	137,000	3,750	140,750	(-) 83,750
5th	41,400	5,000	46,000	109,500	3,750	113,250	(-) 67,250
6th	32,800	5,000	37,800	86,800	3,750	90,550	(-) 52,750
7th	26,000	5,000	31,000	68,800	3,750	72,550	(-) 41,550
8th	20,700	5,000	25,700	55,000	3,750	58,750	(-) 33,050
9th	16,400	5,000	21,400	43,400	3,750	47,150	(-) 25,750
10th	13,100	5,000	18,100	34,600	3,750	38,350	(-) 20,250
11th	-	5,000	5,000	-	3,750	3,750	(+) 1,250
12th	-	5,000	5,000	-	3,750	3,750	(+) 1,250
13th	-	5,000	5,000	-	3,750	3,750	(+) 1,250
14th	-	5,000	5,000	-	3,750	3,750	(+) 1,250
15th	-	5,000	5,000	-	3,750	3,750	(+) 1,250

5-3. Spare Parts.

Machine \ Mill	"A"	"B"
Pirn Winder	\$ 300 x 2 = \$ 600	-
Bobbin Cleaner	\$ 50	-
Loom	\$ 100 x 300 = \$ 30,000	\$ 50 x 74 = \$ 3,700
Total/year	\$ 30,650	\$ 3,700
Difference/year at present	(+) \$ 26,950	

5-4. Electricity.

Machine \ Mill	"A"	"B"
Pirn Winding	7.5 Kw x 22.5 H x 2 x 350 = 118,000 KWH.	-
Bobbin Cleaner	1 Kw x 22.5 H x 350 = 7,900 KWH.	
Loom	0.7 Kw x 22.5 x 300 x 350 = 1,650,000 KWH	1.5 Kw x 22.5H x 74 x 350 875,000 KwH
Total/year	1,775,900 x \$ 14/1,000 KwH = \$ 24,800	875,000 KwH x \$ 14/1,000 KwH = 12,300
Difference/year at present	(+) \$ 12,500	

5-5. Yarn Waste.

The warp waste in these mills are the same, but the weft one in Mill "B" is about ¼ of Mill "A" (2%), due to the absence of pirn winding. Process and bunch yarn on the pirn in Weaving. The yarn price/kg of 40s is $ 1,50 and the waste price is ¼. The selling price difference/year is calculated as follows.

$930 \text{ kg} \times 0.02 \times \frac{3}{4} \times 350 \times \$\ 1.50 \times \frac{3}{4} = \$\ 5,500$

5-6. Interest of Investment.

Compound interest of 1%/month, that is about 13%/year. This is terribly higher than international level.
The difference of investment is $ 804,000 as shown in 4, the interest for this is $ 104,520/year.

5-7. Tax on profit.

This is 50% of the profit after depreciated, tax holiday is four years.

5-8. Tax on Fixed Property.

Tax of this kind does not exist in Indonesia at present.

6. YEARLY DIFFERENCES OF PRODUCTION COSTS PER 1,000 YDS.

Under the economical assumption on annual rising ratio shown in 1-2, cost difference is calculated as follows.

COST DIFFERENCE/YEAR (x)

	Labor cost (8% up/ year)	Depreciation	Spare part cost (3% up/ year)	Electric charge (3% up/ year)	Yarn Waste (1% up/ year)	Interest of Investment	Total	Tax on profit	Cost difference	COST DIFFERENCE/ 1,000 (xx) (Final profit difference/ 1000 yards.	
	$	$	$	$	$	$	$	$	$	$	Rp.
1 st	+ 45,150	- 170,250	+ 26,950	+ 12,500	+ 5,500	- 104,520	- 184,670	-	-184,670	- 21,50	- 8,900
2 rd	+ 48,700	- 134,250	+ 27,800	+ 12,900	+ 5,560	- do -	- 143,810	-	-143,810	- 16,80	- 7,000
3 rd	+ 52,600	- 107,250	+ 28,500	+ 13,300	+ 5,600		- 111,770	-	-111,770	- 12,70	- 5,260
4 th	+ 56,700	- 83,750	+ 29,300	+ 13,700	+ 5,650		- 82,920	-	- 82,920	- 9,65	- 4,000
5	+ 61,100	- 67,250	+ 30,100	+ 14,100	+ 5,700		- 60,770	+30,385	- 30,385	- 3,54	- 1,470
6	+ 66,000	- 52,750	+ 31,000	+ 14,500	+ 5,760		- 42,[illegible]10	+20,005	- 40,010	- 4,66	- 1,940
7	+ 71,400	- 41,550	+ 31,800	+ 14,950	+ 5,800		- 22,122	+11,060	- 11,060	- 1,29	- 540
8	+ 77,000	- 33,050	+ 32,800	+ 15,400	+ 5,850		- 6,520	+ 3,260	- 3,260	- 0,38	- 160
9	+ 83,000	- 25,750	+ 33,700	+ 15,800	+ 5,900		- 8,130	- 4,065	+ 4,065	+ 0,47	+ 190
10	+ 89,600	- 20,250	+ 34,600	+ 16,300	+ 5,952		- 21,680	-10,840	+ 10,840	+ 1,26	+ 520
11	+ 97,000	+ 1,250	+ 35,500	+ 16,800	+ 6,000		- 52,030	-26,015	+ 26,015	+ 3,04	+ 1,260
12	+ 104,500	+ 1,250	+ 36,500	+ 17,300	+ 6,060		- 61,090	-30,545	+ 30,545	+ 3,56	+ 1,480
13	+ 112,000	+ 1,250	+ 37,500	+ 17,800	+ 6,100		- 70,630	-35,315	+ 35,315	+ 4,11	+ 1,700
14	+ 122,000	+ 1,250	+ 38,600	+ 18,300	+ 6,150		- 81,780	-40,890	+ 40,890	+ 4,76	+ 1,980
15	+ 131,800	+ 1,250	+ 39,700	+ 18,800	+ 6,200		- 93,230	-46,615	+ 46,615	+ 5,42	+ 2,250

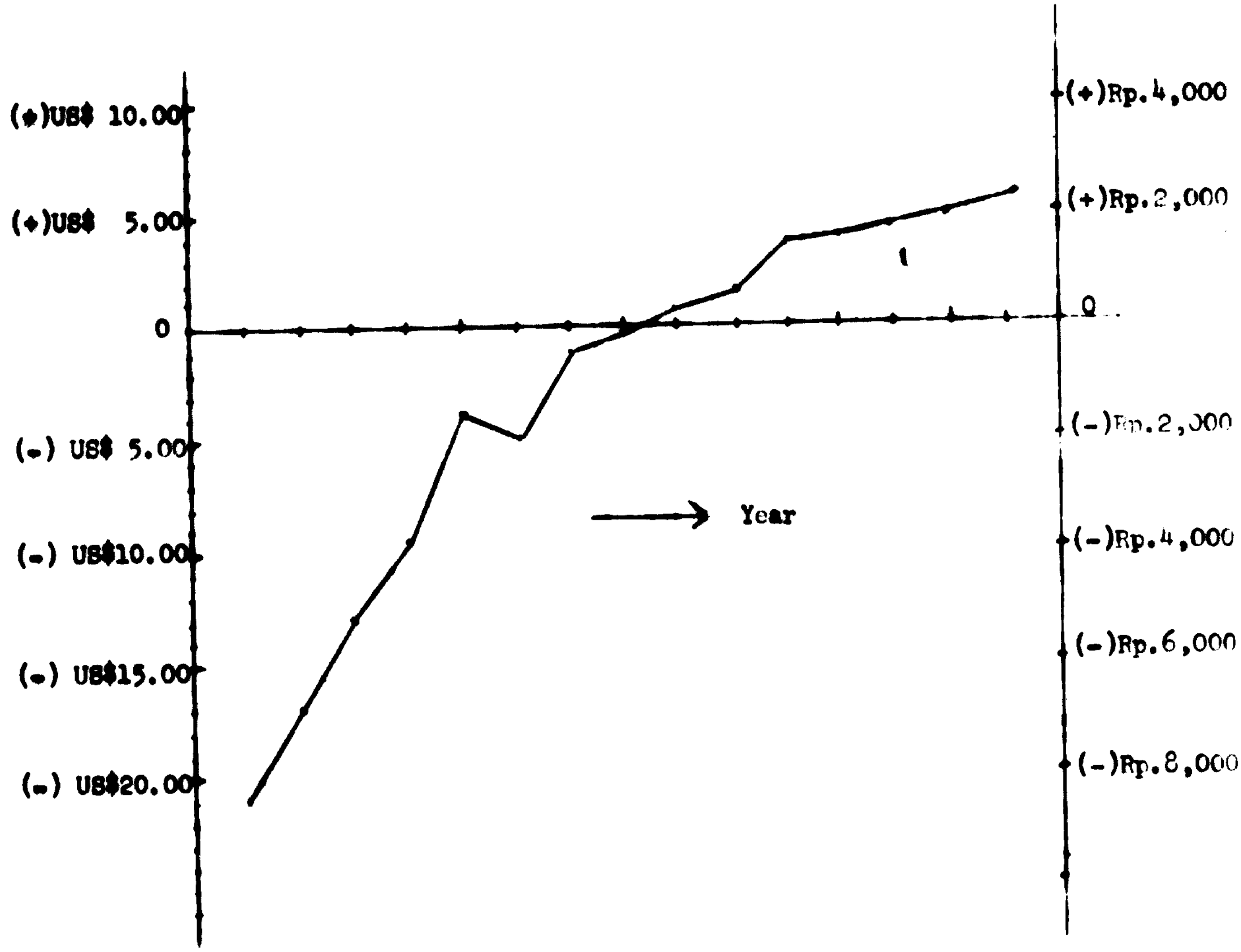
x (+) means the cost of cop Change Automatic Loom Mill is higher than that of " Sulzer" [illegible] Loom Mill.

xx 1. Annual production 24,500 yds x 350 days = 8,575,000 yds

2. Cost means here that after paid profit tax as well as depreciation

Cost Difference/1,000 Yds.

(+) means the cost of Mill "A" is higher than that of Mill "B" **after tax as well as depreciation.**



As shown in the above table & diagram, during the first 8 years the cost per 1,000 yds <u>after tax as well as depreciation</u> in Cop change Automatic Mill ("A") is lower than "Sulzer" Es Mill ("B") due to the lower depreciation and interest, but gradually the cost in the Mill "B" becomes lower than Mill "A" because of both the fast rise of labor cost and the rapid drop of depreciation.

7. CONCLUSION

Comparing the two weaving mills under the technical condition and the economical assumption in future shown in 1-2, each of which can daily produce 24,500 yds of 40s poplin cloth, one mill of 74 "Sulzer" 130" Type ES Weaving Machines is more recommendable than the other mill of 300 Cop Change Automatic 44" Looms. The reason is the lower production cost in the near future and the absence of technical difficulty.

Afterwards, this cost advantage increases much more because of the rapid wages base-up, and it will be more accelerated by the economic development of Indonesia in future.

However, there exists financial and marketing difficulties, the former is the huge investment difference of $804,000 between the two mills, and the latter is the unfamiliar "tucked-in" selvedge.

For this big investment, a special policy for low interest and profit tax is advisable to the Government to promote the installation of this kind weaving machine for overcoming the severe international competition. For that special selvedge, the consumers respond should be carefully surveyed in advance unless the produced cloth is sold to the market in the form of garments.

FINISHING SECTOR
TODAY AND TOMORROW

BY

JOHN E.H. BENNETT

FINISHING SECTOR TODAY AND TOMORROW

John E.H. Bennett
Textile Expert UNDP
June, 30 - 1972.

I was rather surprised and taken aback when Mr. Wibowo, the charming and intelligent Director of Research at I.T.T. asked me to give a lecture on Today and Tomorrow in the Finishing Industry of Indonesia.

Introduction

The Indonesian textile industry covers a wide area, it is much older than I am, and as I have been only here for a few months, it would be very arrogant of me to claim that I know everything that is wrong or good in the finishing industry and the path it will take in the future. I have however been long enough to form some definite and general impressions, and I hope that you will be interested to take what I have to say not as criticism but as a guideline to the future progress of this difficult but fascinating industry or sector of the textile trade. I must acknowledge that many of the statistics have been taken from the excellent report of a survey made by Werners U.S.A. consultants.

It is not easy to measure the finishing trade in any country and this applies to Indonesia. Unlike spinning and weaving which are difficult enough, textile finishing is more demanding and individual in its aspects. Spinners and weavers and knitters produce the raw material of the finisher. I take finishing to cover scouring bleaching, dyeing and printing and cloth finishing both in the yarn and piece, both knitted and woven.

Spinning and weaving factories are basically the same, you see one and you have seen all of them; they are more easily controlled with far fewer variables, and their production can be planned long term, there is a longer time lag from start to finish than in finishing. The finishing unit is or has to be more flexible and varied. We as the Germans say ennoble the fabric. We deal with the variables of colour, and design, and handle, with aesthetic values difficult to measure, and with customers who like to leave their orders in the greige state as long as possible until they have ascertained what the market place wants and is buying.

There is nothing so unwanted as an out of fashion dye or print and we are at the mercy of the customer who judges to know exactly what he or she wants. Any person you meet in the djalan, anyone in this intelligent audience will hesitate to pass criticism on spinning and weaving quality but will pose as an expert in judging a colour match, or whether he likes or dislikes a certain design or colour combination.

Although Indonesia is a developing country it has a long history of well designed textiles, unlike for example many of the African countries. The remarkable art and craft of the Batik printing industry illustrates the inborn skill of the Indonesian, and much of this appreciation of good design and colour has found its way into the many printing, dyeing and finishing plants which are spread over the negara.

There is also, we must not forget the great influence of climate on a peoples textile industry. In the colder parts of the world, where are most of the developed countries the great stimulus to textile production has come from the demands for warmth and protection from the icy cold winters and sometimes cold summers. Fortunately or unfortunately there has not been anything like the same need for warmth and you have been able to concentrate on the modest requirements of decency and to indulge your natural flair for adornment and fashion; to wear bright colours of gay design; to express your personality in clothes that are attractive rather than utilitarian. We must admit that here in this lovely country clothes are not essential as many happy looking children so ably demon- - strate. For most of the year a T shirt and jean shorts are enough for working comfortably whilst the addition of a sarong or kain provides an ample and sufficient wardrobe.

To digress for a moment, think that the sarong is the most comprehensive garment I have ever seen. One of my counterparts, a lover and native of Central Java, Jogja, when I was travelling with him, demonstrated its use as a colourful nether garment, a bathing robe as a dressing gown and night gown, as a blanket to keep him warm at night, as a cape in bad weather, and as a dignifed and elegant dress for worship and marriage. It is becoming in appearance easy to fasten and quick to tie, in fact it is the all purpose garment that would be useful in the so-called developed countries.

I hope that it will be a long time dying.
I must return to my theme. It is held by economists that the consumption of apparel textiles is a measure of the social development of a country. We will not argue with this general assumption except to add that climate must have some effect on demand. They point out that annual consumption varies per capita from countries like Africa with 1.5 kgs. to over 13 kgs. in the developed countries. In Indonesia the figure is about 2.9 kgs. of which about half is imported, a gap which the Government is anxious to narrow. Before we examine the Finishing sector in more detail it will be useful to consider the general supply and demand picture. I owe these estimates to Werners and I will show them on the epidiascope and as appendices. Reference Werners Report 2.3 and 2.4.

These figures and projections deserve study. It is interesting to read the figures for dyeing and printing and to notice the small relative increase in the traditional fabrics. The estimates of printing capacity and the growth in the dyeing sector.
I agree basically with their estimates but I think and this is only my opinion that the growth in synthetics is too small and too slow. Notice the estimates of growth in specialised cloth; this is the area of work clothes and uniforms which increase rapidly as a country becomes more town dwelling and urbanised. It is also forecast and I agree that knitting will increase rapidly for it is well adapted to the new synthetic fibres and is a very economical way of producing cloth. Knitting technology has made great strides of recent years. The decline in imported goods is most marked and I hope that this occurs- there is no reason why it should not.
Now we have looked at the general picture it is time to consider the actualities of to-day.
Like most developing countries Indonesia shows two contrasting or dual economies. The co-existence of a developed high income economy and a far greater underdeveloped economy. I assume that this well dressed audience belongs to the developed higher income economy with sophisticated tastes in Western clothes including polyester blends, elaborate house furnishings, sports clothes and bed linen.

There are no figures as to how large this sector is : I estimate that is between 5-10% of the population but they have a large influence on demand for fashionable clothes to which the industry is more usually geared to supply. The under-developed portion of the economy, the far greater part, consists of people in the lower income groups who so far are content with the minimum traditional dress/and singlet with a beautiful sarong or kain for special occasions and holidays. Very broadly the finishing industry tries to cater for these two divisions but obviously it is more concerned with the high price sector with the opportunities for greater profits.
There are now in Indonesia large modern plants with specialised sophisticated modern machinery quite up to world standards, capable of processing the new synthetic cloths and there is the great mass of handicraft or cottage industry with 166,000 hand looms and numerous small establishments, yarn dyeing and bleaching, tie-dyeing and batik printing operating expensively and adequately in the old somewhat primitive and ad hoc conditions with ample labour working with poor amenities.
For myself I have been concerned mainly with the more developed plants and the I.T.T. /shorts
Now to get down to business as we say, what are my impressions. I have spent forty years in the industry and it always surprises me how different and individual finishing plants are.
For the most part the buildings of the larger factories range from very good to satisfactory. Most of them being fairly new are well built and designed far better in some cases than comparable factories in the U.K. which grew haphazardly as business increased.
The machinery and equipment have a similar range or gradient from the very modern to the old and obsolete. The printing sector is far and away the best equipped and one finds the most modern rotary screen machines, roller printing machines and flat bed and hand screen printing equipment. The dyeing sector consists of both old and new but in my opinion is not so well developed as the printing. The reasons for this are probably two, the inferior raw material, dyeing is the best way to judge your spinning and weaving and/natural bent or liking of the Indonesian for printing. Werners, and I agree, consider that the printing section is adequate and well up to standard. /the

Now about the processing. The industry is well advanced with good modern machines both for printing and continuous dyeing in the larger plants. The areas where it is most weak as a whole, are in the preparation of the cloth, the scouring and bleaching processes, the finishing both mechanical and chemical and in the laboratory.

The golden rule of dyeing and printing which can never be over-emphasised in importance is that you must have a pure and evenly absorbent cloth to start with this is basic and will be obvious to all of you especially the scientists who are taught to begin at a firm datum line. Each of the basic operations - desising, alkali treatment, and bleaching in the developed countries are continuing research and development at a high level in regard to hypochlorites, hydrogen peroxide and sodium chlorite.

In Indonesia there seems to be a lack of understanding of this importance. I have seen only one works and this is a welcome exception, and I hope that it will set a target for upgrading and that is at G.K.B.I. Medari, where cloth bottoming as we call it in Lancashire is understood, for the rest I have seen the knowledge is minimal. I am glad to say that I.T.T. is making some effort to catch up. I wont go into all the gory details of inadequate knowledge and planning let me say that the plant and the chemist at G.K.B.I. are excellent, he was I.T.T. trained and there is no reason I can see why this standard is not repeated around Indonesia.

It is also an axiom in modern textile finishing that continuous dyeing or printing require continuous scouring and bleaching. This is because of the considerations of quality and uniformity. By batch processing which in general is the normal way here, either jig or pad roll you have introduced another variable of quality - it is difficult to produce even results from a dyeing or printing machine running at sixty yards a minute from cloth that varies in colour and purity every thousand or so yards. Fabrics can be handled in the rope form or open width; each methods has its advantages and disadvantages but both methods require careful chemical control and an appreciation of what one is trying to achieve. By and large I find that the managers and technicians have not a comprehensive grasp of the importance of this area. The current method popular here is some form of pad batch, or jig bleach with hydrogen peroxide with the addition of an O.B.A from recipes given by dyestuff makers.

All control is visual, there are no colour matching cabinets with ultra violet light or spectrophotometers to check, with the result that there are enormous variations in the end result which are repeated in the dyeing or printing. Only at G.K.B.I. have I seen a works doing fluiditics or D.P. measurements on the cotton cloth and even there they have as yet no colour matching cabinet. These tests are necessary and important, for we must remember that it is only the finisher who can weaken the cloth so that it is useless. The spinners waste goes back in the mixing, bad weaving is improved or hidden by printing and it is the finisher whose spoiled and rejected cloth goes as a debit against his profits. That is why quality control is so essential in a finishing works - Indonesia will find this out by hard experience.

In the knitting plants I have seen bleaching is done usually by Calcium hypochlorite with even less appreciation of the difficulties and the need for P.H control. It is possible here that good fabric made from good yarns is being spoiled by lack of elementary knowledge; yarns that are being imported because they say that local yarns are not good enough. Dr. Oweiss is working hard here to spin local yarns of the required quality.

In the main the printing sector competes for the higher income groups and is especially aware of the impact of polyester blends so much so that they have several heat setting stenters and high pressure steamers.

Now about printing methods. The usual system is singe, scour and bleach, pigment print, bake, and calender for cotton fabrics, with heat setting added for polyesters. This is a cheap and easy way of printing.

Pigment dyes, if there can be a pigment dye, are inexpensive, no washing off is required, and faults are easily seen. It is merely a way of painting cloth and the disadvantages of rough handle, poor rubbing fastness and dry cleaning fastness are ignored or not demanded by the customer.

There are some vat and reactive printing of 100% cotton but this is becoming unacceptable to the high income groups. The problem of polyester cloths is that it demands high temperatures evenly balanced, it is consequently expensive, and is the most difficult dyeing and printing operation.

The basic techniques of printing are well understood as would be expected from a Batik conscious population; the main disadvantages inthe processing as I see them, are a lack of appreciation of good cloth preparation, together with a lack of good finishing technique and the need for quality control at all stages. The Indonesian concentrates on the artistic end and forgets or is not interested in the rather mundane means of obtaining a good result, means which are just as important as the fascination of printed effects.

The continuous dyeing and printing processes are quite well organised for the obvious reasons that these are looked upon as key machines, they are expensive and so the makers offer training and so many of the technicians have been trained in Europe or Japan and they are good. The major criticism here is that they have not in most cases laboratory pilot plant and so the bulk of the matching is done at the offices of the dyestuff makers. My opinions about relying too much on the dyestuff makers is rather mixed. They certainly do a great job in helping the industry with its many problem and I'm certain that the reason the finishing sector is more advanced than I believe the spinning and weaving areas is that the dyers and printers have had the backing of the applied research of the makers which is enormous. You certainly cannot do without them but there are dangers which I will not emphasise or detail.

Indonesia keeps a sharp eye on what the competitors are doing and because of this I regret that there are no machines that I have seen where mercerisation is done by the clip chain method. Although production speeds are not so great as the chainless type the cloth is properly mercerised with brilliant lustre and not causticised as in the chainless method.

Dyeing as I have mentioned is more difficult and exacting than printing in that it discovers and brings to light all the spinning and weaving imperfections which are usually hidden in printing. Here again there is inadequate understanding of the need for good cloth preparation and the finer points of finishing and quality control.

This does not apply to the yarn dyeing sector, the mainstay of the sarong trade, which in the larger works has good and modern equipment. The chief dyeing methods are vat and naphtol not the easiest techniques of colouring fibres and good results are obtained even on the primitive tub handicraft dyehouses.

I was most impressed with the tie dyeing technique in Bali and I was amazed at the artistic end products from rather crude equipment.

That is a somewhat short and sketchy outline of the machines and methods I have observed in Indonesia. It is at this point that I should repeat that the finished material of the spinner and weaver is the raw material of the finisher. According to my colleagues Mr. Curran and Mr. Hoshiyama there is much room for improvement in the quality of these operations. As the quality of the cloth improves so the job of the finisher will be better and the standard raised. It is a team effort.

Bound up with the question of machines is that of maintenance - the care and preservation of the assets of the business. This is a major area, a problem area of Indonesia, and I must bring it to the attention of this important audience. There are many reasons for this weakness and I will list a few that come to mind:

i. A heterogeneous grouping of machines from many parts of the world with the consequent difficulty of obtaining spare parts.

ii. Finishing is becoming more and more a chemical engineering technology and there is a lack of expertise and realisation of the importance of maintenance.

iii. Lack of capital.

iv. The importance of the engineering function and the engineer, perse, is not fully appreciated. He should be a member of the management team.

v. It is always a temptation for management when business is difficult for them to allow the assets to run down in order to save expenses and show a paper profit.

The best answer to these problems, which are not easy is to go in for preventive maintenance as opposed to break-down maintenance and for people to realise that it is their duty to preserve the companies assets even if they are old. This brings me to another important function, that of management and men.

Indonesians have plenty of intelligence and native skill. They are good with their hands, as we say, and their eyes are quick, never missing anything. One has only to drive along the djalan-djalan to be made aware of this fact. You see them on their betjak and jazzy motorcycle swerving and dodging about, weaving intricate patterns, spinning from side to side just avoiding dyeing by narrowest of margins.

They have much however to learn in managing and manipulating large industrial concerns. There must be proper planning with clear objectives and market research before machinery is purchased. Work study, quality control, market reports, costing figures relayed to the colourists and finishers. The proper organisation must be established. I have not yet met a finisher as such in Indonesia. This is an important position in all developed countries. He should be a specialist in finishing both mechanical and chemical he also acts as quality controller. In finishing which is not so labour intensive as spinning and weaving the most important people are the technologists and supervisors.

I.T.T. is doing a fine job in this area but there are not enough of its graduates in industry and industry has such a need of them that they are often given responsible assignment before they are fully experienced. I have met many of them and they have a good knowledge of theory and book learning. It is in the practical aspects of the work where they sometimes fall down. There are in my opinion two reasons for this.

i. A lack of modern machinery in the college and a shortage of practical instructors.

ii. Usually when they enter industry they are given responsible jobs without the opportunity to gain adequate experience.

iii. there are not enough of them.

All these disadvantages will be overcome I am quite sure by the efforts of Mr. Wibowo and his not only intelligent but good looking staff.

The other major point I wish to bring to your notice for you are the important people who can help is the importance the supreme importance of a well equipped well staffed laboratory. This department should be the key, the golden key of any textile finishing works.

A trained experienced chemist is not an overhead expense, he or she is an integral part of the management team. The testing of dyes and chemicals, most expensive raw materials, the testing of the substrates the pilot trials before launching into bulk orders, the examination of all processes, quality control, fastness testing, washing and light fastness, colourimetry and advancing technique and tool, the needs are ever growing.

This should be the nerve centre, the controlling mechanism of any works. I repeat that the laboratory of G.K.B.I. Medari is a good example of what I am saying. The question of the laboratory is made apparently less urgent for unlike the Spinning and weaving sectors, bleaching dyeing and printing have for many years been wet nursed by the large dyestuff makers who to sell their products provide excellent laboratory facilities and advice; they take over the task of matching patterns and so on. This is very good in its way and they have certainly helped to raise the standard of Indonesian finishing but it is a crutch, quasi a colonisation as it were and it should be the object of all here to help Indonesia to stand on its own feet. The makers are concerned mainly with selling their products. It is difficult to test their dyestuffs which sometimes vary for they make mistakes and to accept unlimited help at the same time. Last but not least the laboratory should be the training around for all graduates entering industry. A place to initiate them into the mysteries of works production before they descend to the shop floor.

It is in the bread and butter area of the trade we might call it the intermediate technology where there are many weaknesses. I refer to jig and winch processing. The jig and winch has been the stand - by of the dyeing trade for well over a hundred years and they still hold a large part of the business in the developed countries. Continuous dyeing or printing demand long runs of cloth.

Jig and winch dyeing are labour intensive - not so labour intensive as Indonesia would make them - but the operatives have to be skilled and experienced, in order to handle efficiently the smaller orders.

They are of course designed mainly for dyeing at atmospheric temperatures and are being replaced in man made fibre processing by beam dyeing machines and jet dyeing machines. Nevertheless they still have a useful part to play in scouring and bleaching and should be used efficiently.

Perhaps this is good time to refer to the equipment of I.T.T.

They are moving into a new department and it is not before time. How can one hope to upgrade an industry if the students who are the mainspring and hope of the future are trained on obsolete machines and the poorest equipment. ?

The other weak area I referred to is in the cloth finishing both mechanical and chemical. Here in Indonesia the machines range from very good to obsolete with the technical knowledge rather low,,from the managers downwards. I refer to drying machines, stenters, calanders in fact the whole processing after the fabric has been dyed or printed or even just bleached. The removal of water from cloth is expensive and must be kept to a minimum. This is realised so well here that much drying takes place in the open air, the sunlight. This is really a cheap way and you are very lucky to have such a climate but modern fabrics demand strict control of dimension and in the open air unfortunately this is not possible.

The drying machines range again from good to obsolete. Many of the new ones lack refinements such as big batch equipment weft alignment mechanisms. This question of weft alignment is very important especially in developed countries with their mass production methods of garment making and it may not be so important here except in the case of check cloths. Some of the machines are not long enough for economic running and it would have been as well as if they were equipped for heat setting. Indonesia can't be blamed here for many of them are grants in aid and in England we have a saying "you cannot look a gift horse in the mouth".

Chemical finishing the application of resins to the cotton and rayon components of blends is carried out with little appreciation of the finer point of quality control. A recipe is obtained from a dyestuff maker and away we go. Padding expressions, bowl levelness, fixation tests, crease recovery angles, pilling tests, abrasion tests are for the most part missing and if the customer does not demand them why bother. If imports are to be dimished this will have to change and you should be aware and ready. This also applies to the good plain cooking area the ordinary day to day finishing which is done with tapioca.

I wont bore and annoy you with unnecessary detail to summarise the preparation, finishing, laboratory control, quality control, maintenance are all weak areas - the actual dyeing and printing techniques are better. ITT has as yet poor equipment but has a good nucleus of staff who could be used by industry more than they are.

Othe weak areas in my opinion are marketing costing and training but Dr. Oweiss has experts arriving in these fields and we must await their help. The areas are weak but can be upgraded and that is the purpose of this meeting.

Bound up with all this and one of the difficulties of management is the wage system where the basic wage is not so large as the social and fringe benefits.
One has only to list these perquisites to see why.
Benefit for housing, holiday pay, medical care, free meals, rice allowance, cooking oil, sugar and soap allowance, uniforms, transportation, birth benefit, death benefit, incentive pay, recreation and tax. Quite a list.
Well that is my look at the textile industry of Indonesia today - dont be disheartened once one knows the weaknesses it is easy to do something about it. There are many bright spots you have a very intelligent people with a latent determination to catch up and with your help I'm sure they will.
Now I am asked to peer into the future of the industry - this is really out of my expertise but I will do my best if I dont blame Mr. Wibowo. I can only say that without doubt that as depicted in the cultural history of Indonesia the fight between good and evil will continue unabated.
Textile finishing will always be a battle ground until we are fully computerised and automated which will be in a very long time to come - we shall have to make do with intermediate technology.
I have really not been here long enough but we will try.
The growth of modern knowledge and technology is tremendous and amasing. It increases from year to year and the curve is exponential. And yet the Japanese caught up within a hundred years and so you can do it. How did they do it ? By education at all levels and education is the key area.
What are the immediate objectives ? First I understand from Mr. Saficens lecture that you are to become as self sufficient as possible and replace the large textile imports,, by upgrading and expanding your production. I have pointed out kindly I hope some of the weak areas, Industry will aggregate into larger units and the handicraft industries will gradually fall by the way.

The experiences of Europe and America are that with the growth of man made fibres requiring expensive machines and equipment the trade will become an integral part of a merchanting spinning weaving group organised on the lines of the motor car industry to get the benefits of large scale operating with marketing comprising sales and advertising geared to the production units which are kept fully occupied. In U.S.A. have continuous bleaching plants with J boxes and autoclaves going at speeds of up to 200 yards a minute with matching dyeing thermosol and printing ranges. Europe has not so large plants but the tendency for the industry there is to move into larger units. What will happen here is not clear but undoubtedly there will be some large units probably integrated.

There are not the same pressures here of high wages and much of the development overseas has been because of the increasing cost of labour. There is no doubt that as Indonesia is exposed to world competition that standards will have to improve as its people demand comparable quality. You have an obvious weakness in the raw material area, Dr. Oweiss has suggested some cotton growing for which the climate in many parts of Indonesia may be suitable. With your oil resources you should be started in the man-made fibre industry, polyester and acrylics seem to be indicated. In my opinion a heavy chemical and small dyestuff making plant feasibility should be examined. For many reasons the outlook for Indonesia is not depressing but very bright. You are not in the forefront of research but that cant be helped - but you can pick and choose whatever is good around as you have done in the matter of polyester blends. Not for you the trials and struggles of trying to make cotton something it is not meant to be. The reason for the spate of research and enquiry into cotton resin finishing was a vested interest of the American cotton in competing against the synthetics with their crease recovery properties. But in order to pick and choose you must have the people ready and trained to take advantage of what comes along and whatever is growing.

The growth areas in the developed world are knitting, the cheapest way of producing fabric - non-woven fabrics which is not too difficult an operation carpets colourimetry. There is enermous interest in the measurement of colour. The application of this technology is quite recent since the World War II and it should be easy to catch up - this technology has not only application in textiles but the paint industry, agriculture, biology, and colour T.V. These are some points of growth that come to mind but there are also the weaknesses I have mentioned - cloth preparation and finishing, quality control, the importance of the laboratory, maintenance costing and training in all aspects of modern management. In all of this development you are the key people. According to Werners estimate industry will require at least 196 textile engineers per annum. How many are you producing Mr. Wibowo. ? 21.
Not for you the researches into the fabrics of intricate molecular architecture but the application of pioneer studies else where. I forgot to mention the growth of transfer printing.
Your priorities in education and I know that you are aware of this is concentration on mathematics, the Queen of sciences. It used to be that chemistry required the minimum but all has changed we need mathematics in colourimetry in statistics, we talk about the numerate manager, it enters ecomomics and marketing it is the basis of computer studies you all know this and are preparing your students.
Talking about students reminds me of books for them. This is a definite weakness in the I.T.T. Students cannot borrow book from the library and they are very expensive to buy. Books are the life blood of education and in my country at all colleges there is a central book store that buys books at wholesale prices and sells them cheaply to the students. Could not this be worked here ? I sure that Dr. Owais would be able to help in starting the money float.

Well it is time I ended my look at the Indonesian textile finishing industry. In my opinion you have made a good start; you are a textile concious people with a proud heritage of printing craftmanship. It is perhaps not such a glamerous industry in the public eyes as some others but the finishing has always demanded scientists and in fact the textile industry was the catalyst in the development of organic chemistry industry and the dyestuff industry and even in the economic development of the world. You have been told by Mr. Safioon the Governments plans. The Textile has to develop and increase and it requires upgrading. You all have a special responsibility and I am certain you can do it. The task yours to upgrade and encourage.

FORECAST OF FABRIC DEMAND BY YEAR

(Millions of Pounds)

	LOW(1)			HIGH(2)		
	DOMESTIC	IMPORTS	TOTAL	DOMESTIC	IMPORTS	TOTAL
1971	181	188	369	186	187	373
1972	193	185	378	204	182	386
1973	205	182	387	223	176	399
1974	218	179	397	244	169	413
1975	232	175	407	265	162	427
1976	250	167	417	292	150	442
1977	269	158	427	320	137	457
1978	289	149	438	250	123	473
1979	314	135	449	386	103	489
1980	340	120	460	415	80	495

(1) Assumes demand will grow at same rate as population.

(2) Assumes increasing effect of affluence (disposable income) by 1% per year through 1980.

Finished Goods.

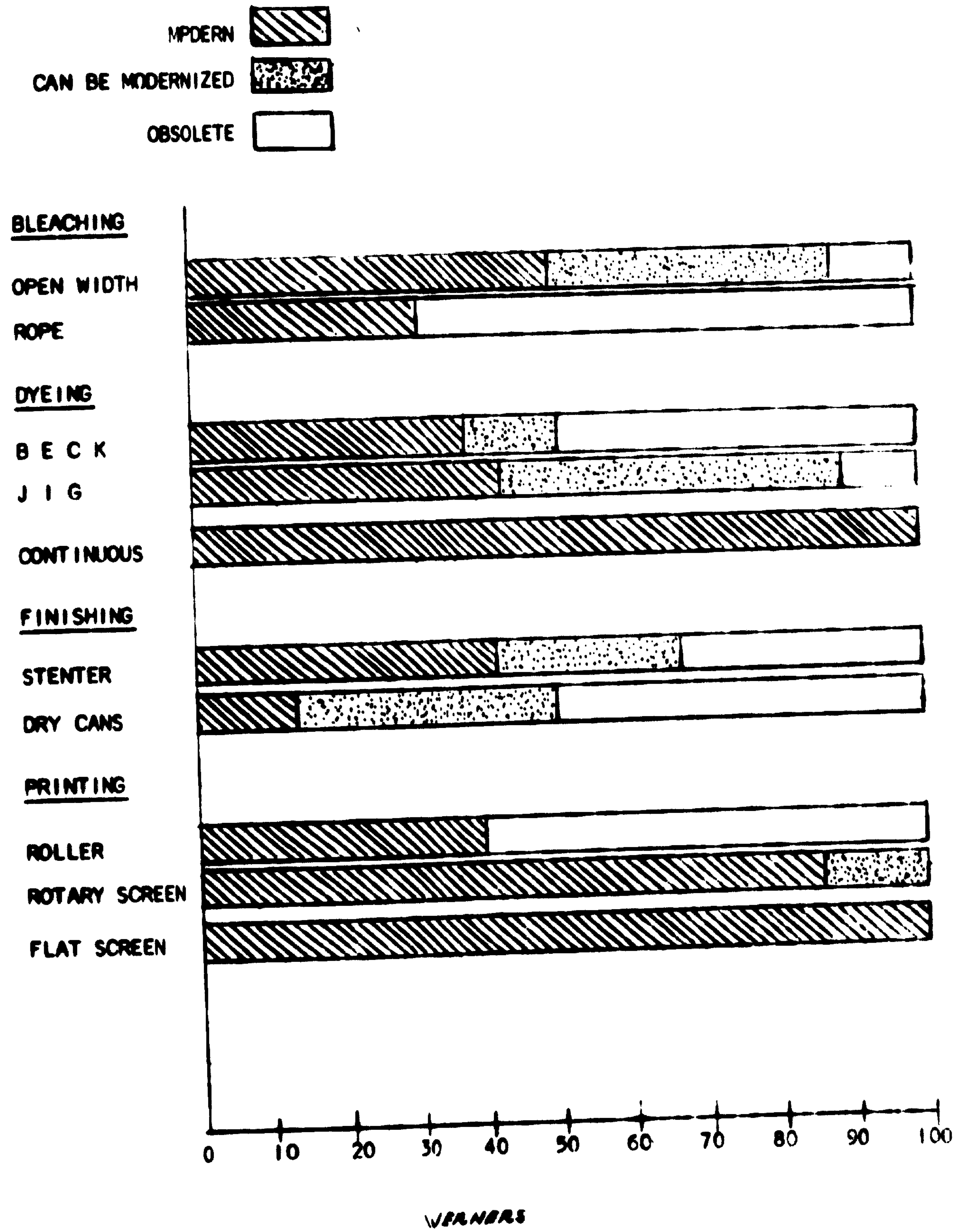
Current and future requirements of finished fabrics in Indonesia are as follows.

FINISHED FABRIC DEMAND ESTIMATES FOR 1980
(Millions of Pounds)

			Printed	Dyed	Bleached	Greige
Cambric :	1970	63	45	12	6	-
	1980	76	56	20	-	-
Shirting :	1970	47	19	8	-	20
	1980	62	20	18	-	24
Sarong :	1970	27	10	13	-	4
	1980	24	9	11	-	4
Heavy :	1970	33	-	9	-	24
	1980	48	-	15	-	33
Home :	1970	14	3	11	-	-
	1980	29	8	21	-	-
Specialty :	1970	57	14	43	-	-
	1980	91	26	65	-	-
Rope :	1970	3				3
	1980	4				4
Bags :	1970	41				41
	1980	48				48
Hand :	1970	25	5	7	-	13
	1980	24	5	7	-	12
Knitted :	1970	50	8	10	29	3
	1980	71	11	15	45	-
Total :	1970	360	104	113	35	108
	1980	477	135	172	45	125

WERNERS

APPRAISAL OF DYEING, PRINTING AND FINISHING



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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
(SPECIAL FUND PROJECT/INS - 71/531)

04460
(6 of 17)

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11-12-72

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 6

THE REHABILITATION OF G.K.B.I. FINISHING & BLEACHING MILL

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

NO

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ABSTRACT

G.K.B.I. Textile Factory is located in s small village in Central Java Province called Medari, about 15 km. far from the town of Yogyakarta. It is an integrated unit of 34,000 spindles, 496 automatic looms and a bleaching unit with the capacity of about 30 millions yards per annum. G.K.B.I. is a general cooperative. It has a big number of members either weavers or printers. This factory is receiving UNIDO assistance since March 1970. Although the production of spinning has increased by more than 80% and still increasing however the requirement of the weaving sheds either the integrated or those belonging to the members is higher than the potentiality of the present spinning unit.

So s program of adding about 10,000 additional spindles is under completion. The increase in weaving production, for all units belonging to the cooperatives or the members since the assistance of UNIDO, is substantial. This leads to a bigger and regular supply of grey to the bleaching department and thorefore the production of this department has increased during the first half of year 1972 to about 100% over the production of 1969. This production is still below the potentiality of this unit which is estimated at 30 millions (the production during the first half of year 1972 is about 12 millions yards compared with 13 millions yards the production of the whole year of 1969)

The present problems of this unit are as following :

1. The unbalancing in the different processes where there is a shortage in the water mangle and drying capacity.

2. The poor maintenance of the existing facilities.

3. The irregular supply of the raw material.

4. The labour forces skillness and the necessity of upgrading.

The details of these problems with the recommendations to solve them are in the report of Mr. Bennett, the finishing technologist.

INTRODUCTION

1. The objects of this reports are :

   I. To follow up the implementation and the results of the previous rehabilitation program drawn by the ex UNIDO textile adviser on management (see report part V Textile Industry in Indonesia rehabilitation programme of the Pabrik Cambric GKBI Medari dated April 10, 1971).

   II. To study the existing problems and to give recommendations.

2. Most of the previous recommendations including the removing of the bottle-necks and the extension in the spinning had been either implemented or under completion, and the result is the big increase in the productivity of all units of this factory including the bleaching unit.

3. The present investigation and the result as described in Mr. Bennett's following report, show the existing problems and the solutions to remove them.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing informations and facilities to do this work.

REPORTS ON VISITS TO G.K.B.I.

May 1972

Drawn by

JOHN E.H. BENNETT

Finishing Technologist

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

SUMMARY

1. This is a fine modern bleaching plant well designed with good extensive buildings.
2. It is working with high productive efficiency and the processes are well controlled by an adequate laboratory staff by an excellent chemist.

   I recommend that the laboratory organisation be taken as a model for the Indonesian Textile Industry.
3. The problems are as follows :
   a. There is difficulty in finishing the good quality Primissima cloth without creasing.
   b. The pressure of metal in the grey cloth has rendered the water mangle out of action with consequent lower drying production.
   c. Boiler breakdowns frequent due to scale formation.
   d. Drying capacity bottleneck.
   e. Maintenance is poor.
   f. Operaters need upgrading.
   g. The factory is not well balanced.
4. Our recommendations are as follows :
   a. A metal detector to be installed in the weaving department.
   b. Water softening plant required as soon as possible for the boilers.
   c. It is recommended that a first class supervisor mechanic is introduced into the department with the object of starting preventive maintenance and that more attention be given to machine cleaning.

Some of the stenter clips are slow to operate and it recommended that they are lubricated with a penetrating oil. Faulty clips to be marked with chalk and checked for quick opening and closing.

d. More research and development in finishing i.e. variation in finishing sizes and different weights of calendering.

e. Two or three women to be employed to render "first aid" to stained cloth i.e. removing stains with steam laundry gun or soap and water in bucket.

f. That the men behind the machines are trained to inspect and note faults and more attention given to quality control.

g. That the laboratory is supplied with :

   i. Spectrophotometer for recording degree of whiteness on cloth.

   ii. Colour matching cabinet with ultra violet. This will be useful for detecting oil stains and fluorescence.

   iii. A cloth tensile strength testing machine.

h. If it is required to increase production it will be necessary to modify if possible the capacity of the J boxes, reference to this is to be found in the Project Manager's report - Textile Industry in Indonesia Rehabilitation Programme of the Pabrik Cambric G.K.B.I. Medari, dated April 10, 1971 page 23, and to increase the drying, and finishing capacity by the purchase of additional machines.

5. Conclusion.

This is an efficient plant which with a little more effort can become one the best examples of a bleaching plant in Indonesia.

REPORT ON VISITS TO G.K.B.I. ON 8, 9, 10 MAY, WITH Dr. GWEISS, Mr. SANTOSA, Mr..ROETJITO COUNTERPART

1. Background

Gabungan Koperasi Batik Indonesia (the Indonesian Batik Cooperative Union) abbreviation G.K.B.I. was founded on September 18, 1948 to unify the 40 cooperative batik organisations representing about 16,000 printers members.

One of the production units belonging to both the members and the G.K.B.I. is the Pabrik Cambric G.K.B.I. Medari in Yogyakarta.

P.C. G.K.B.I. Medari, officially inaugurated in 1962 is a modern integrated unit spinning, weaving, and bleaching, with 34,000 spindles, 496 automatic looms and a bleaching unit. The spinning unit produces yarn for the integrated weaving unit and the other weaving sheds belonging to the members of G.K.B.I.

The finishing unit bleaches and finishes woven cloth produced by all these weaving sheds and the integrated weaving unit.

There has also been added in 1972 a very modern spinning and weaving plant, some few hundred metres away named Primissima.

Primissima contains 9,000 spindles maker Reiter and 180 looms made by Picanol.

It spins and weaves fine quality cambric of 60's count which is bleached in the G.K.B.I. finishing unit.

2. Building

The buildings are extensive and of modern design with saw toothed roofs.

The bleaching plant is housed in a building 100 metres long by 30 metres wide adjacent to the larger weaving unit of G.K.B.I.

Finishing manager Mr. Panut Moh. Human, Finisher Mr. Prijono, bleacher Mr. Samsudin.

3. Laboratory

There is a most excellent laboratory in the main office block with a first-rate chemist in charge Mr. Soepardi.

This laboratory should be a model for Indonesian firms for it has a good library, adequate equipment, and monitors the scouring and bleaching processing by carefully controlled chemical and fluidity testing.

4. Work Force

The workforce is devided into four teams working three shifts : 24 hours day 7 days a week. This system was installed this year on the recommendation of the Project Manager.

1 shift 32 persons 4 teams 3 shifts 128 persons.

5. Production

The production figures are as follows :

1969	12,774,507.85 yds.			
1970	17,908,873.86 yds.			
1971	22,679,090.48 yds.			Total
January 1972		G.K.B.I.	778,886.50 yds.	] 2,025,194.45 yds.
		Primissima	1,246,307.95 yds.	
February 1972		G.K.B.I.	957,121.50 yds.	] 2,053,283.00 yds.
		Primissima	1,096,161.50 yds.	
March 1972		G.K.B.I.	1,002,300.50 yds.	] 2,119,806.50 yds.
		Primissima	1,117,506.00 yds.	

Start of 4 teams 3 shifts working

April 1972 G.K.B.I. 1,416,278.20 yds.] 2,364,799.00 yds.
Primissima 948,520.80 yds.

They calculate the percentage efficiency of production to be 92.59% based on a 100% 60 ypm - 24 hrs a day production of 86,400 yds.- actual production 80,000 yds.

6. **Qualities Produced**

The qualities produced by G.K.B.I. are

1772 - $\frac{72 \times 62}{32 \times 32}$ 44" grey 42" fin., selling price Rp. 4,400,-- per 50 yds.

1572 - $\frac{72 \times 70}{32 \times 36}$ 44" grey 42" fin., selling price Rp. 4,650,-- per 50 yds.

It was arranged that the two qualities should be examined for evenness at I.T.T. The comment was made that quality 1772 was the more profitable.

7. **Machines**

The machines are made by Kyoto of Japan and were installed in 1962. The work flow is good. The key machines in the scouring and bleaching process are two J Box units and production must be based on their capacity.

1. Singer

4 Burners 52" wide speeds maximum 100 ypm
normal 70 ypm

with quench box

desizing recipe : Biotex PW2 1 kg.

Teepol 50 cc.

Water 500 lt.

2. Grey Pits - 4 tiled capacity 80,000 yds.

cloth dwell in pits 12 hrs. to digest starch size - automatic piling.

3. J Boxes

There is a complete two stage J box scouring and bleaching unit. The cloth is taken from the grey pits washed twice and saturated with 3.5% NaOH and piled into J Box Du Pont type 750 lbs capacity 1 hr. dwell two washes and fed into.

J Box Du Pont 750 lbs capacity 1 hr dwell in H_2O_2 and washed into white pits capacity 80,000 yds. with automatic piler.

The process is chemically monitored fluidities range from 6 - 8.

Speed 60 ypm.

4. Scutching and water mangling.

Horizontal scutch and 3 Bowl water .mangle speed 60 ypm.

5. Cylinder drying.

Two stack 16 cylinder Double draft 60 ypm cloth half dried.

6. Starching machines.

Two back size type.

a. Pad two bowl doctor blades, large copper cylinder.

b. Pad two bowl doctor blades, large copper cylinder plus 16 copper cylinders speed 60 ypm cloth damp.

Sizing recipe :	Tapioca	15 kg.
	Mikephore	360 grs.
	Turquoise Blue G.L.	1.5 grs.
	Teepol	2 lts.
	$CuSO_4$	50 grs.
	Water	600 lts.

7. Stenters

Two clip type machines knife edge clips, no cooling devices or weft straightening, no pads. Speed 60 ypm.

8. Calenders

1 - 5 Bowl - 2 steel - 3 wool and paper out of line speed 60 ypm.

1 - 7 Bowl chasing calender 3 steel 4 cotton damaged in revolution three bowls used speed 60 ypm.

9. Inspection machines

3 plait to plait 1 a modified clamping machine speeds 40 ypm.

10. Making up

2 plaiting machines speeds 40 ypm.

1 infra red heated stamping machines speed 15 ypm.

1 bale press.

11. Boilers

Total 4 boilers 2 boilers capacity 3500 kg. steam hrs.

2 boilers capacity 2500 kg. steam hrs.

8. Water

The water is obtained from seven wells hardness 8° German. There is a shortage in the dry season the water then becoming harder.

C-586

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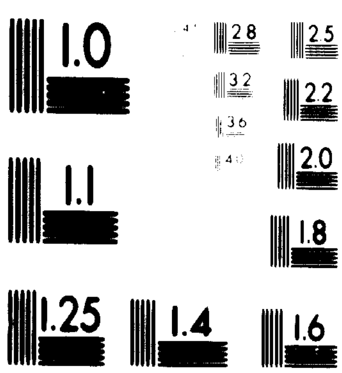
5 OF 7



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

24x
F

The water treatment is aeration to remove iron and filtering no softening treatment. The usage is 1500 cubic metres a day for the factory - 1200 cubic metres for the finishing.

9. Effluent

Drains to river.

10. Problems

a. There is difficulty in finishing the good quality Primissima cloth without creasing.

b. The presence of metal in the grey cloth has rendered the water mangle out of action with consequont lower drying production.

c. Boiler breakdown frequent due to scale formation.

d. Drying capacity bottleneck.

e. Maintenance is poor.

f. Operators need upgrading.

g. The factory is not well balanced.

11. Comments and Conclusions

a. This is an excellent plant with good work flow, working to a high capacity. The processes are under the careful chemical control of a very good chemist with an adequate laboratory.

b. The maintenance is only fair and needs improving It is the normal "breakdown" maintenance system.

c. There is the great problem of metal in the grey cloth so much so that the water mangle is by-passed putting a great strain on the drying capacity.

d. Due to the absence of the water mangle the cloth is half dried and is very creased because of lack of expanders. This militates against good quality i.e. problems of mildew and dried selvedges.

e. The five bowl calender is out of true causing the cloth to crease. The seven bowl calender is in poor condition.

f. The stenters produce many miss clips and the knife edge clips are inclined to make double selvedges.

g. There is no definite quality control or research into new finishes.

12. Recommendations

a. A metal detector to be installed in the weaving department.

b. Water softening plant required as soon as possible for the boilers.

c. It is recommended that a first class supervisor mechanic is introduced into the department with the object of starting proventive maintenance and that more attention be given to machine cleaning.

Some of the stenter clips are slow to operate and it recommended that they are lubricated with a penetrating oil. Faulty clips to be marked with chalk and checked for quick opening and closing.

d. More research and development in finishing i.e. variation in finishing sizes and different weights of calendering.

e. Two or three women to be employed to render "first aid" to stained cloth i.e. removing stains with steam laundry gun or soap and water in bucket.

f. That the men behind the machines are trained to inspect and note faults and more attention given to quality control.

g. That the laboratory is supplied with :

  i. Spectrophotometer for recording degree of whiteness on cloth.

  ii. Colour matching cabinet with ultra violet. This will be useful for detecting oil stains and fluorescence.

  iii. A cloth tensile strength testing machine.

h. If it is required to increase production it will be necessary to modify if possible the capacity of the J boxes, reference to this is to be found in the Project Manager's report - Textile Industry in Indonesia Rehabilitation Programme of the Pabrik Cambric G.K.B.I. Medari, dated April 10, 1971 page 23, and to increase the drying and finishing capacity by the purchase of additional machines.

My thanks are due to Mr. Human and Mr. Soepardi for their help and cooperation.-

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME (SPECIAL FUND PROJECT/INS - 71/531)

04460 (7 of 17)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 7

THE REHABILITATION OF KAMADJAJATEX DYEING, PRINTING AND FINISHING MILL

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

10

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ABSTRACT

1. Kamadjajatex is an integrated unit, weaving and chemicals (bleaching, dyeing, printing and finishing) units. It is owned by East Java Provincial Government. The report enclose is dealing only with the chemical department.

   This department is composed of two separate units but in the same place. One of them is old and consist of yarn and piece dyeing. Its machines are old, but they can run although some of them need modernization. The second is a new unit in both building and machinery. It has been inaugurated June 10th, 1972. Since then it was and this still on trial production and some of the machines are not yet arrived.

2. The problems of this new factory are :

   1) The processes are not balanced, while some has the potentiality of 5 millions metres per year, others have bigger capacity of about 21, or 26 millions metres per annum.

   2) Besides the bottlenecks there is a shortage of a mercerizing machine which is necessary in printing polyester blend.

   3) Also there is no provision for water softening.

   4) A program for training is absolutely necessary.

The report enclosed drawn by Mr. Bennett shows in detail the bottlenecks, other problems, and the solutions to remove them.

It is proposed 3 phases for realizing a good productivity for this factory. In the first phase we put a target for production about 5.6 millions metres per annum with the existing machines.

The period estimated for this phase will take about 6 - 12 months during which better study for the marketing pattern and training the labour force can take place. The second phase is to improve some other bottle-necks by adding new facilities which cost US $ 325.000. The production target will be raised to 8.8 millions metres.

The third phase is to increase the productivity to 18 millions and to add new investment of about US $ 275.000 also to remove another bottle-necks.

INTRODUCTION

The purpose and the scope of this report is:-

1. To put the new chemical unit in full running condition by studying the condition and the balancing of the different processes of the factory.
2. To put a program for training the labour force.
3. To organize the function and to put a sure foundation for the maintenance function.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing information and facilities to do this work.

REPORT ON VISITS TO P.T. KANADJAJATEX

June 26, 1972

Drawn by
JOHN E.H. BENNETT
Finishing Technologist

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

REPORT ON VISITS TO P.T. KAMADJAJATEX ON 26 JUNE WITH Mr. ROETJITO

SUMMARY

This is a new department of an old established weaving and finishing sarong company.

1. The major problem is the unbalanced productive capacity of the new machines.

The other problems are :

(i) lack of experience in printing and thermosol dyeing.

(ii) no provision as yet for a merceriser.

(iii) no laboratory matching equipment.

(iv) lack of water softening.

(v) maintenance.

We suggest a three phase development programme.

PHASE I

The running in of the present machines to give experience in bleaching, printing and thermosol dyeing and to gain knowledge of the marketing possibilities in polyester blends. During this period the staff and workers can be trained with UNIDO assisting as required.

PHASE II

This phase to be developed as quickly as possible to a target production of 8,820,000 metres per year with three shifts working, four teams, 24 hours a day, 350 days per year at 70% efficiency on the scouring, bleaching, and heat setting. These are the bottleneck sections and the printing machine can cope with this with one shift and overtime.

The new plant required for this phase will comprise :

One washing machine	approximately cost		Rp. 20,000,000.--
One mercerising machine	"	"	Rp. 40,000,000.--
One heat setting stenter	"	"	Rp. 40,000,000.--
Plus ancillary equipment for laboratory matching and making up department.	"	"	Rp. 30,000,000.--

PHASE III

Further development of the plant will depend upon a number of imponderables, such as the marketing experience, the product mix, and the finance available.

We suggest that they should aim at a possible production of 18,000,000 metres a year, a figure we estimate to be the limit of the present buildings and lay out.

The purchase of a foulard to free the pad roll machine from the bleaching run would enable them to scour and bleach up to 18,000,000 metres per year. Approximate cost Rp. 10,000,000.--

They would require increased stenter, washing & drying capacity and ancillary equipment. Approximate cost Rp. 110,000,000.-- and additional Boiler capacity.

We understand that the intention of this venture is to concentrate on polyester blend fabrics which will be woven on the new 150 Japanese looms which are now being installed. Their production is estimated at 3,125,000 metres per year. Therefore it is necessary that the plant will seek commision business in cottons or polyester blends to fill the capacity available.

HISTORY

P.T. Kamadjajatex is owned by the provincial government and located at Sukorodjo a village about 70 kilometers from Surabaja. It is managed by Mr. Sulaeman who was in Surabaja. We met Mr. Nuri the manager of the new plant. Mr. Nuri was formely at Ratatex, bleaching, dyeing & printing factory.

The factory was originally established for the weaving of sarongs and contains 291 old box looms and a finishing department with Thais Yarn Dyeing equipment, hank dyeing machines, four jigs piece dyeing sulphur black and vat shades plus an old 16 cylinder drying machine with an old conditioning clip machine and six inspection machines.

The yarn dyeing is under the management of a Mr. Crawford who seems very capable.

The new plant was opened on June 10th and it is now running on trial production under the temporary guidance of a Japanese expert who left for good. He agreed with us that the production was unbalanced.

This new dyeing and printing department has been developed with the idea of finishing the polyester cotton production from the new 150 Japanese looms which are now being installed. An additional Thermo-soling department with new machinery is planned in the near future.

The factory has benefited from the Dutch Grant similar to Texin Tegal but they themselves have added to the grant and so there has been a wiser choice of more balanced machinery. For example the Famatex stenter has four chambers and can heat set and there is a pad roll bleaching machine.

Nevertheless as will be mentioned is this report the unit is still unbalanced.

BUILDINGS

The building is new, similar to Texin with a high roof and concrete tiled floors.

There seems to be adequate strip lighting.

The roof structure is of mild steel with a corrugated iron roof.

This will have to be well maintained to prevent rust stains from dropping on the cloth. There is adequate laboratory accommodation and a well designed areas for the production of the engraved screens.

STEAM

There is a new boiler capacity 6000 kg per hour maximum pressure 10 atmosphere, maker Achenbach 1968.

WATER

The water is filtered from the adjacent river or stream. They say the supply is adequate. There is yet no provision for water softening.

EFFLUENT

This flows untreated into the river.

MACHINES AND EQUIPMENT

The machines in the finishing department are new and modern. The machines in the yarn dyeing department are old, but can be modernized.

There is on order an Arioli High Temperature Steamer and they are considering the purchase of a mercerising machine, and washing machine.

Discussion have been held with the management about the advantages and disadvantages of chainless mercerising as compared with clip mercerising.

High temperature steaming was also discussed.

Thermosoling machines are to be installed.

1. **Singeing Machine**

Made by Walter Osthoff

Speed Normal 75 mpm

Maximum 100 mpm

This machine has no provision for a desizing quench tank and we have advised them to fitone.

2. **Pad Roll Scouring and Bleaching**

Maker Max Goller

3 reaction chambers

Capacity speed 50 mpm

This is a good machine with impregnating foulard and saturator tank. The cloth is wound on a big batch of 5,000 metres and placed in a steam heated cottage which can be transferred to a spinning station for one hour. The difficulty now is that it has to be used for desizing, caustic scouring and hydrogen peroxide bleaching - three runs on the same machines with intermediate spinning, washing and drying. We estimate that with the present method the production per year 24 hours a day, seven days a week will be no more than 5,644,800 mpy at 70% efficiency.

This is one of the major bottlenecks.

3. **Rope-o-matic - Stork**

Speed normal 25 mpm

Maximum 80 mpm.

This is a new machine part of the Dutch grant and is designed primarily for washing off prints. At Kamadjajatex it is being used for washing off after desizing, washing off after scouring and washing off after bleaching.

We have advised them to wash off the desizing and scour at maximum speed 70 mpm and the bleaching wash off at 30 mpm. This gives an overall washing off speed of 16 mpm with a total yearly production 24 hours a day, 7 days a week at 70% efficiency of 5,644,000 metres a very unbalanced figure.

4. **Fematex Stenter**

4 sections with heatsetting total length 12 metres plus foulard maximum drying speed 60 mpm - heat setting 24 mpm oil heating booster to temperature of 220°C.

This is a good machine but if it is to be used for heat setting, and resinating its overall speed will be 17 mpm with a total capacity per year 24 hours a day, 7 days a week, 70% efficiency of 5,997,600 mpy, another low figure.

5. **Rotary Screen Printing Machine RD II Stork**

Speed normal 30 mpm

Maximum 80 mpm

If the speed of this machine is taken as averaging 60 mpm for 1 year 24 hours, 7 days at 70% efficiency the total yardage per year would amount to 21,168,000 metres.

Even at half this speed 30 mpm the scouring, bleaching, washing or stentering in unable to cope.

When the printing of polyester blends starts the washing off will require further expansion.

6. **Drying Cylinder Machine**

This is a good machine with 16 drying cylinders the first three being coated with Teflon.

The width is 2.2 metres and is suitable for two draft running speed normal 30 mpm, maximum 60 mpm.

If this machine is used for twice drying the capacity should be adequate at 21,168,000 metres per year.

7. Calender

3 Bowls, 2 cotton, 1 steel made by Ramisch & Co., Krefeld Germany.

Speed normal 70 mpm.

This is a good machine of adequate capacity.

8. Crease and Lapping Machine new

The making up department is inadequate and will need more inspection and making up machines.

9. The Arioli Steamer and the Thermosol are not yet installed.

Original Finishing Department for yarn dyeing and sarong finishing.

10. Two cone dyeing Units

Made by Theis, with scouring and drying machines.

These are old but in fair condition. Production 500 kg a day of yarn dyed vats and naphthols. Several hank dyeing becks for naphthols.

11. J i g s

2 Jigs made in Poland

1 Jig made in Holland

3 Jigs locally made, out of order.

12. Old Cylinder drying machine

16 cylinders plus foulard for sizing sarong - poor condition.

13. Conditioning clip - old.

14. Six inspection machines - old.

PRODUCTION AND CAPACITY

The yarn dyeing department seems to be a very efficient production unit and capably managed. The old cloth finishing for the sarong cloth consists of old machinery and no doubt this will be transferred to the new department in time. The new department is starting trial production with a cheap cotton cloth 68 pick and this is being printed with pigments under the guidance of the Japanese.

The new high temperature steamer is not yet installed. The capacity is as calculated in the appendix. The main bottlenecks are in the desizing and bleaching and washing machines and the heat setting.

The Goller pad roll bleach unit has to be used three times, first to wash off after desizing, secondly for scouring and thirdly for bleaching --- this of course reduces its capacity by or third.

Another limiting factor will be the heat setting on the Famatex and the regularization of the width. The work force is divided into two shifts.

NEW DEPARTMENT

1. **Singeing Machine** - speed 75 - 100 mpm.

   There is no problem of production capacity here, except that it must be fitted with a quench tank for the application of desizing liquor and so free the pad roll machine from the desizing process.

   Production 26,400,000 mpy.

2. **Pad-roll Scouring and Bleaching**

   This machine has a speed of 50 metres per minute but as it is now used three times, for desizing, scouring, and bleaching; its overall resultant speed is only 16 mpm. In this machine the cloth is big-batched 5,000 m successively in caustic soda, and hydrogen peroxide and revolved for one hour in a steam cottage. After each process it is washed down the Rope-o-matic washing machine.

	One passage	Two passages	Three passages
Capacity	17,640,000 mpy	8,820,000 mpy	5,644,800 mpy.

We propose that this machine has to be free for only bleaching.

3. Rope-o-mat!c washing machine

This machine has two washing actions; one reciprocating, the other direct. Speeds-reciprocating 30 metres per minute continuous up to 80 mpm.

We suggest that the desizing and scouring washing are done at 70 mpm and the bleaching at the reciprocating speed of 30 mpm.

Capacity with present wash run 2 washes at 70 mpm.

1 wash at 30 mpm giving a resultant speed of 16 metres per minute. 5,644,800 mpm at 70%.

When the recommended washing machine is purchased this will deal with the desizing and reduce the runs to one of 70 mpm and the bleaching at 30 mpm resultant speed 21 mpm 7,408,800 mpy at 70%.

4. Drying Cylinders

This machine of 16 cylinders with a width of 2.2 metres and will take two drafts of cloth. Speed 30 mpm - 50 mpm. Taking an average speed of 40 mpm this will give a capacity of 35,280,000 mpy.

The machine however is used three times; drying after desizing, scouring, and bleaching, giving an overall production of 11,760,000 mpy.

5. Famatex Stenter

This Famatex has four section heaters with oil booster with a total length of 12 metres. Heat setting requires 30 second dwell at 180°C and so the heat setting speed is about 24 metres per minute; drying speed 60 mpm giving a resultant net speed of 17 mpm - 6,116,600 metres per year.

The drying function will mainly consist of resinating the fabric.

This figure of 6,116,000 mpy is the limiting figure of production and in order to exceed this the machine will have to be extended or better to purchase a stenter for heat setting only to accomplish Phase II, of the proposed plan.

6. Stork Rotary Screen Printing Machine RD II

During its trials the speed is only 30 mpm but with increased experience this will be increased to a working target speed of 60 mpm; the maximum speed is 80 mpm. Calculating on 24 hours per day, 7 days per week, 350 days per year at 70% efficiency we get a yearly capacity of 21,168,000 metres.

This potential production is far greater than the scouring and bleaching capacity and in Phase II we propose to work to a target figure of 8,820,000 mpy.

This figure can be easily obtained by the printing machine working one shift plus overtime.

7. Calender

The normal speed of the calender is 70 mpm and so there are no problems with this machine about capacity.

8. **Arioli Steamer and Thermosol Dyeing Machine**

The Arioli steamer has arrived but is not yet installed. It is similar to the machine at Texin and will have enormous production capacity for eight drafts of cloth can be run simultaneously.

The Thermosol machine has not yet been installed and it is therefore difficult to estimate production figures except to state that cloth for thermosoling will require to be heat set on the Famatex stenter.

9. **Making-up Machines**

There is now only one making-up machine and so further machines for making-up and inspection will be required.

PRODUCTION AND CAPACITY

From the graphs illustrating production figures it can be clearly seen that the machines are unbalanced. The main factors causing this unbalanced are the desizing, scouring and bleaching processes and the heat setting capacity of the stenter.

We understand that it is the intention of Kamadjajatex to concentrate on polyester blend fabrics and these qualities will require mercerising to obtain the best results. Discussions have been held with the management comparing the technique of clip chain mercerising compared with chainless. The chainless machine is cheaper with greater production but the result cannot be called mercerising but causticising. They are not yet clear as to how the production will be devided between plain dyed and printed cloths or between cottons and polyester blends, although as we have mentioned the intention is to concentrate on polyesters which will be made on the new Japanese looms about to be installed.

PROBLEMS

1. This is an unbalanced plant stemming from thr adhoc nature of the Dutch grant and the limitations of finance. Even so it will be able to cope with the estimated production of 3,125,000 metres per year of polyester blend fabric to be manufactured on the new Japanese looms.

2. The unit is starting up in a new field of polyester dyeing and printing and the staff and workers are consequently inexperienced.

3. There is as yet no provision for a merceriser which is considered necessary for polyester cellulosic blends.

4. The laboratory has no equipment for the matching of polyesters. With high temperature dyeing it is absolutely essential to have small high temperature ovens and preferably a small pin stenter.

5. There is no provision for the repairing of faulty cloth by means of pressure jiggers or beam dyeing equipment. It may be of course that cloth will not be repaired but down graded; this is a question of policy. Mistakes do occur in thermosoling and sometimes very large quantities of expensive cloth are involved.

6. There is as yet no provision for water softening. Soft water is considered essential for the high temperature dyeing of polyester fibres.

7. Maintenance is not yet a problem but judging from our experience it will be necessary to ogranise this important function on a sure foundation by allocating definite responsibilities.

RECOMMENDATIONS

1. Our suggestion for dealing with the unbalanced plant of low production capacity is to develop a three phased programme.

PHASE I

In this phase the works would concentrate on gaining experience in printing and thermosol dyeing of polyester blend fabrics, in the marketing of their products, and in the training of the staff and workers. The Japanese expert would no doubt be in charge of the initiatory training but UNDP will be ready to assist in this function. We estimate that this period will last from six to twelve months and in this time preparations will be made for PHASE II.

In the first phase we put as a target the production of the 5,600,000 mpy. In phase II we propose to set a target figure of 8,820,000 mpy. It had been intended by Kamadjajatex to purchase a washing machine but it has been held back for financial reasons.

It is necessary in Phase II to buy a washing machine and to add a quench tank to the singeing machine. This will reduce the operations of the pad roll machine by one passage, and so increase its production to 8,820,000 the figure we are setting as the target.

The new washing machine so purchased will have additional capacity as also will the Rope-o-matic to deal with the washing and cleaning required for the thermosoling and probably other printing techniques.

The stenter capacity will also have to be increased and we suggest here the purchase of a stenter designed primarily for heat setting.

The possibility of the Fematex being extended has been rejected because of lack of space.

There is then the question of a mercerising machine which we consider to be essential. Finally there is the need for softened water and studies must be made to this end.

We estimate that the expenditure required to balance the production at the stated figure of 8,820,000 mpy will be

- One washing machine say 80 mpm Approximate cost		Rp. 20,000,000.--
- Heat setting stenter	approx.	Rp. 40,000,000.--
- One mercoriser	approx.	Rp. 40,000,000.--
- Plus laboratory equipment ancillaries for matching and making-up machines	approx.	Rp. 30,000,000.--

The department will now be balanced at a capacity of 8,820,000 metres with one shift plus some overtime working on the Stork Printing.

PHASE III

The third phase of extension will be to utilise the full capacity of the Stork and the Thermosol machines. There are many imponderables in this area such as marketing experience, the product mix, and the finance available.

We suggest that the management should aim at a possible production of say 18,000,000 mpy which in our opinion will be about the limit of the new building space available and the present lay-out.

We suggest and recommend that in this phase they buy a foulard for bleaching which will free the pad-roll from a double run and raise the scouring and bleaching production to 17,640,000 mpy. This increase would require additional stenter capacity and probably an increase in the drying cylinders and ancillary equipment.

Approximate cost Foulard	Rp. 10,000,000.--
Stenter Drying and ancillary equipment	Rp. 80,000,000.--
Washing machine	Rp. 20,000,000.--

We have assumed in all our studies that the works intend to specialise on polyester blends and that they will solicit commission work or increase the number of new looms. Cottons can also be printed if necessary.

2. We understand that training will be given by us and we will be available for this assistant.

3. It is considered necessary to have a merceriser for the preparation of polyester blend fabrics in order to increase the lustre, improve the handle, and to improve the dye substantivity of the celluiosic components. We would advise them to consider seriously the clip chain type and to weigh the various factors of lustre and width stabilisation against the chainless type which has a higher production but gives a causticisation rather than a mercerisation.

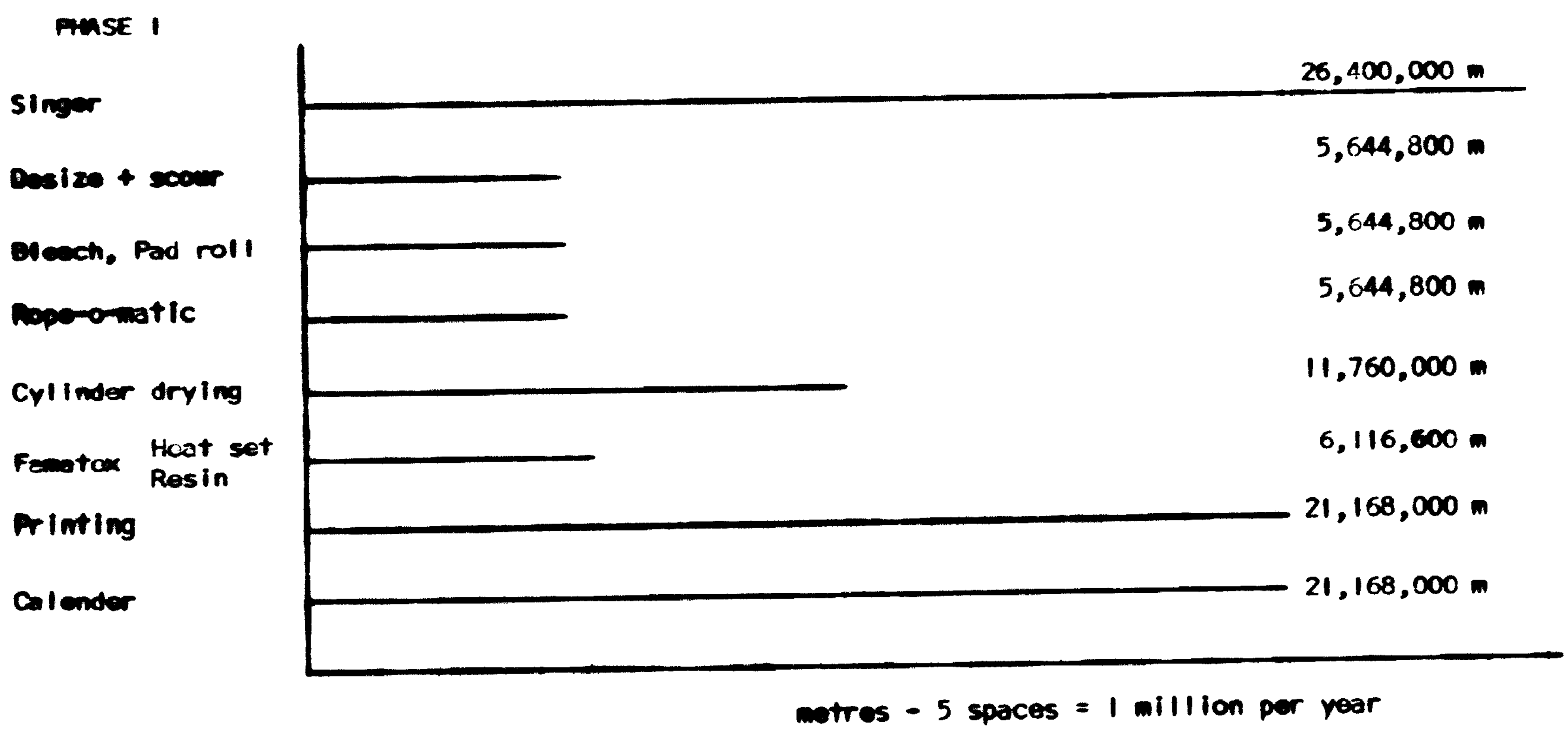
4. It is essential that the laboratory is provided with a small scale machine for heat setting and high temperature dyeing, otherwise the control will pass into the hands of the dyemakers.

5. The problem of water softening will have to be considered and they should seek the advice of I.T.T. who can carry out the tests.

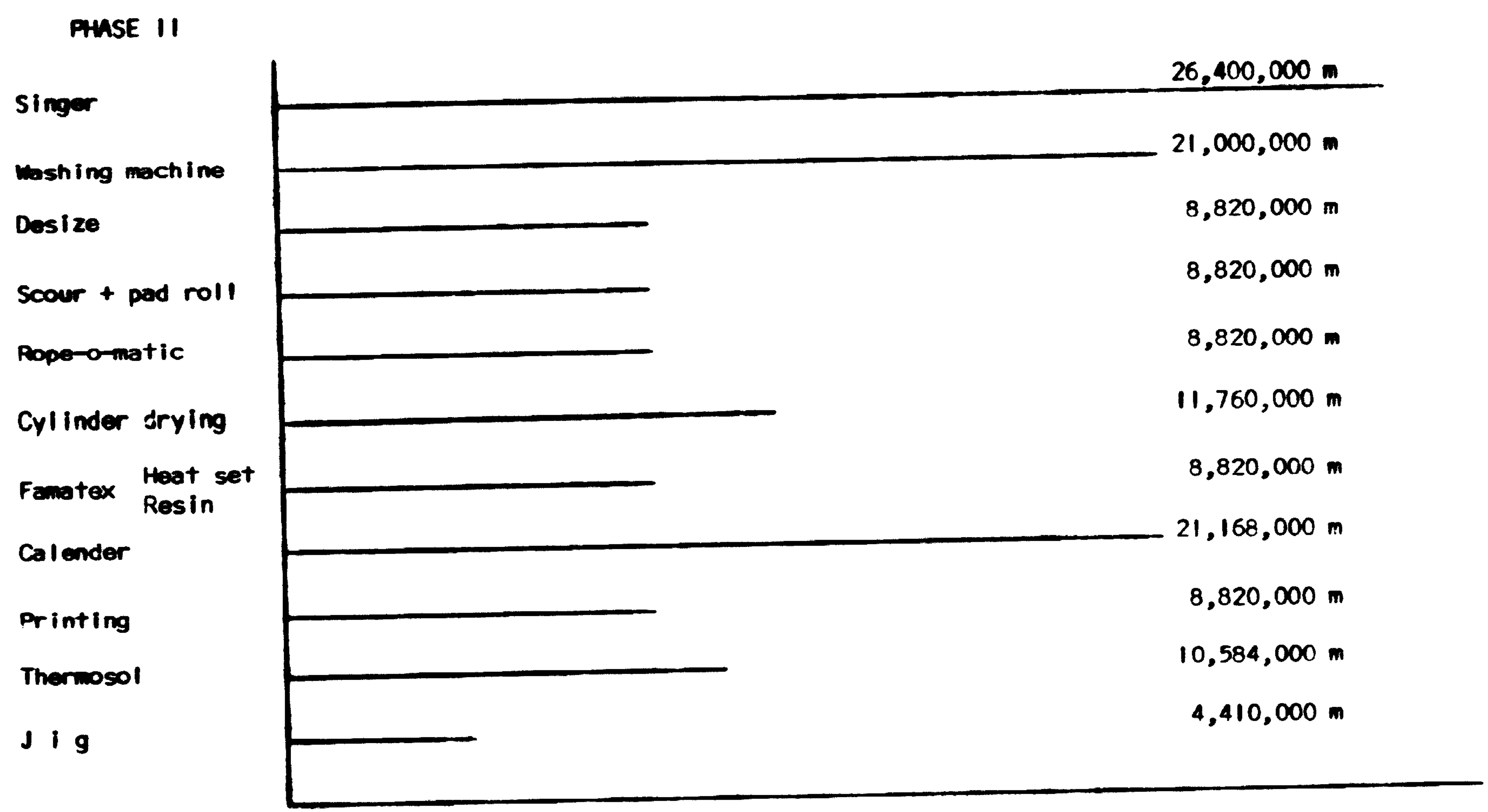
6. This problem of repairing faulty cloth is a policy decision. It is better if possible to downgrade fabric rather then try to repair but if business is sought on commission the expense can be prohibitive. For cloth repairing a beam dyeing machine would be required.

7. It is our advice that maintenance problems are tackled from the start. We recommend that a competent mechanic be put in charge with responsibility for the maintenance of the new printing department. Finally we recommen the utilisation of the present assets by directing attention to the benefits of three shifts four teams working, 24 hours per day, 7 days per week, 350 days per year by the workers. All our figures have been worked out on this basis.

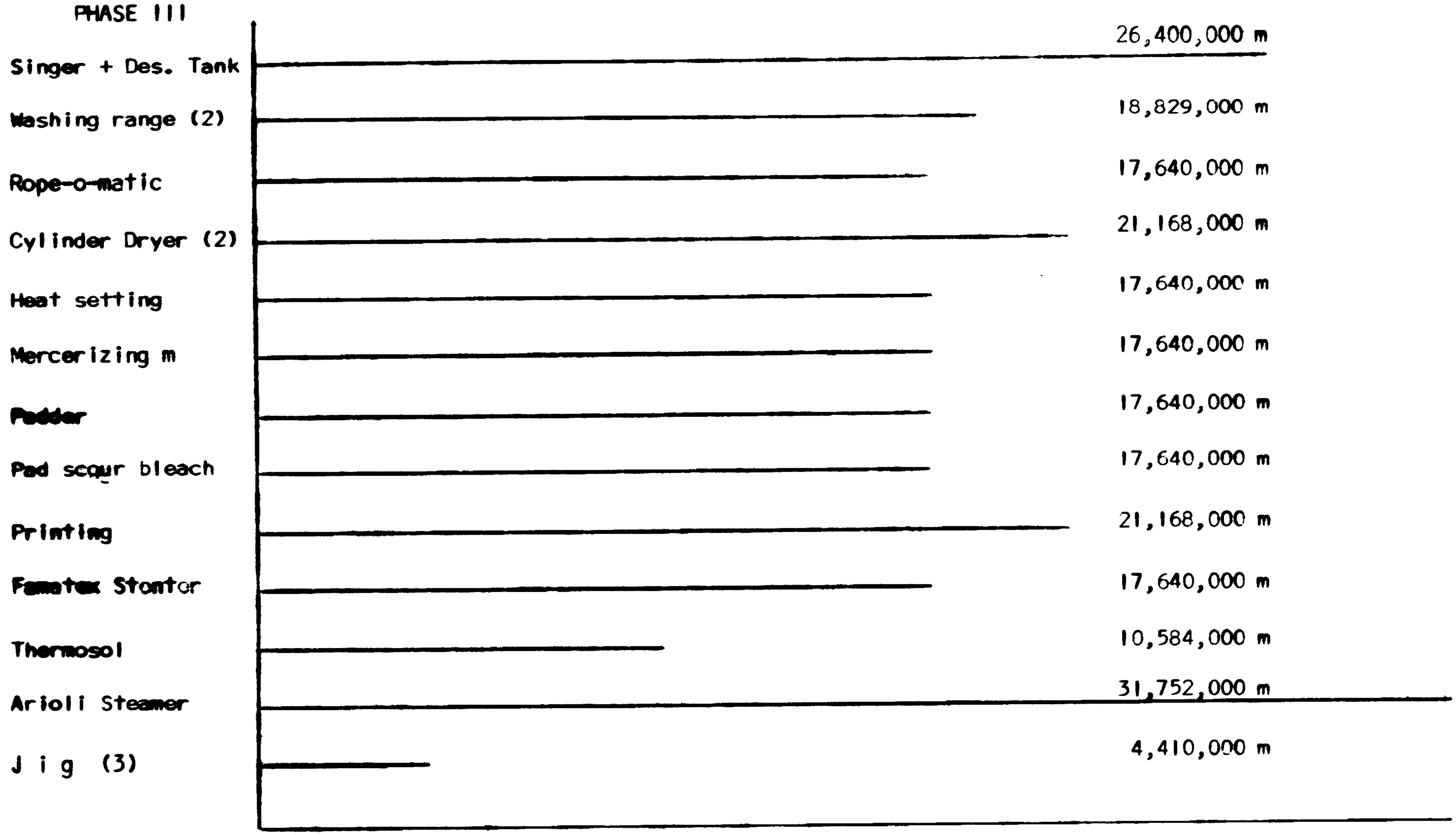
The Capacity of Namadjajatex - working 24 hours a day, 7 days a week
350 days a year at 70% efficiency



The Capacity of Kemadjajatex - working 24 hours a day, 7 days a week
350 days a year at 70% efficiency



The Capacity of Kamadjajatex working 24 hours a day 7 days a week 350 days a year at 70% efficiency



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INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 8

THE REHABILITATION OF TJIPADUNG SPINNING MILL

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

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ABSTRACT

1. Tjipadung spinning factory is located about 15 km far from the centre of Bandung. It has 30,000 Platt spindles. This factory is new. It started its production in 1967.

   a. Building : It is modern with suitable span, good lighting, air - conditions and has fire protection.

   b. Machinery : They are all new, mostly from English origin with the few Japanese drawing, combing, and speed frame. This Japanese machinery have been erected recently to assist in realizing the balance between the different processes, besides to assist in the production of polyester/ cotton yarns.

2. Problems : They are mostly mechanical and partially technological. The main of both are :

   a. Air conditioning must be automatically control to create some stability of humidity inside the factory despite the big change in the outer zone.

   b. The shortage of parts creates problems in this factory. Three sets of ring frames are out of production for this reason.

   c. Maintenance is poor specially in ring frames section where slip stick is taking place on the ring frame back bottom steel rollers.

   d. Machines are not in correct alignment and this causes breakdown of the ends and bad running.

   e. Difficulties in processing of the polyester specially in the blowing and the carding rooms are many.

3. Recommendations : As the big part of the mechanical problems are due to bad erection which have taken place by national unexperienced staff, so a help should be sought from the machine maker to provide a skill fitter to supervise the re-setting of the machines.
Detail explanations on this factory including the recommendations can be seen in the enclosed report drawn by Mr. Curran the spinning technologist in our team of experts.

INTRODUCTION

1. The scope of this report is Tjipadung spinning factory, one of the central government spinning units which is run under the administration of P.N. Industri Sandang.

2. The purpose of the report is :

   a. To follow up the implementation of the previous advices given by ex UNIDO expert.

   b. To inspect the prevailing conditions, mechanical, technological and managerial.

   c. To detect the existing problems, the reasons and the solutions.

3. From the following detail report of Mr. Curran it seems that a lot of work has to be carried on to enable the factory to realize the targets required.

4. Grateful thanks are due to the Directorate General of Textile, P.N. Industri Sandang, management and the staff of the factory, I.T.T. and the other individuals for providing informations and facilities to do this work.

PATAL TJIPADUNG, BANDUNG, JAVA

Agustus, 1972

ARTHUR E. CURRAN
UNIDO Expert

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

REPORT ON MY VISIT TO THE SPINNING MILL
PATAL TJIPADUNG, BANDUNG, JAVA

Submitted to Dr. Oweiss by A.E. Curran, UNIDO Spinning Expert

1-0 SUMMARY

This report is the result of observations made and work done during my visits, accompanied by my counterpart, Mr. T. Hartono, on the following dates.:

16th March, 26th to 28th April, 1st to 3rd May, 12th and 13th June, 4th and 8th July, and 19 to 25 August, 1972.

The plant is one of three supplied by Platt Brothers (Sales) Limited England, in 1962/1963. The other mills are Patal Setjang at Magelang and Patal Grati at Pasuruan.

They aro owned and managed by P.N. Industri Sandang.

Due to delays in erection, the machinery suffered some damage, as it was in a packed condition on the site for two or three years.

There are also some parts missing and, in fact, some of the plant is still short of parts, particularly three Ring Frames which are out of production.

The plant is a complete project from the one supplier - Building, air conditioning, full electrical equipment, diesel engines, sprinkler and fire protection equipment.

The air conditioning system is reasonably efficient, although some difficulty is encountered during changes in climatic conditions at different times of the year.

Raw material is mainly cotton, but this is augmented by the production of Polyester of German manufacture.

2-0 MACHINERY

a. Blowing Room

Two opening lines each having :

1 Waste Blender

4 Blenders

1 High Speed Lattice

1 Step or Super Cleaner

1 Twin Opener

1 Hopper Feeder

1 Airstream Cleaner with Kirschner-type beater

1 Two-way Distributor

2 Hopper Feeders with extended delivery

2 Scutchers - Auto Lap Doffer

Raw Material : American type Cotton Texas, Californian 1 1/16" to 1 3/32" staple, S.M. Mid. S.L.M. grades.

Polyester - Trevira 1 1/2", 1.5 denier.

b. Carding

Total 108 of conventional pattern

78 on Metallic wire (English Card Clothing);

30 on Flexible wire.

One Card on metallic wire has been converted by Graf, Switzerland, to semi-high production conditions by fitting new coiler to take large-size cans, approximately 20" diameter by 42" high. Dust extraction from flats and doffer/cylinder area, Roller doffing motion, Draft unit on calender rollers, delayed start to doffer and "sliver down" stop motion. Cylinder speeded up to 220 rpm. (from 180 rpm), Doffer speed and production increased to approximately 20 lbs. per hour.

c. **Draw Frames - Platt**

6 Frames each with 4 deliveries in two passages.

3 over 3 drafting, top arm weighting.

Under centre coiling. Cans 16" dia. x 42" high.

Front roller speed 1,250 rpm. 1 1/8" dia. F.R.

In addition, two sets of Howe Draw Frames have been installed; each has 3 porcupine creels feeding 2 by 8 ends Polyester, 1 by 8 ends combed cotton, giving a blend of 66 2/3% Polyester, 33 1/3% Cotton.

The Platt Draw Frames are set out with 3 frames acting as second passage on this blend, receiving material from the two Howe Draw frames. The remaining Platt Draw frames are set out in four sets of two passage, leaving one frame stopped.

d. **Draw Frames Combing Section**

One frame Toyoda, 4 over 5 drafting, 8 ends up per delivery, 2 deliveries to the frame.

e. **Lap Former - Toyoda**

20 ends into each lap; porcupine-type creel.

f. **C o m b e r s - Toyoda**

3 High speed type machines, each having 8 heads with 2 deliveries, therefore two draft boxes each with a 3 over 4 drafting system.

g. **Speed Frames - Platt**

10 frames, each of 102 spindles. 12" lift, 6" dia. bobbin.

3 over 3 roller drafting with "Tray" weighting. Spindle speed 700 rpm.

h. Ring Frames - Platt

81 frames, each with 372 spindles. SKF PK 211 3 over 3 roller double apron drafting. Ring dia. 2", lift 10", Gauge 3 1/4".

Counts spun are 40s Blended Cotton Trevira;
30s Cotton;
42s Cotton.

Spindle Speeds :	40s Blended	-	10,450 rpm.	TPI	24
	30s Cotton	-	11,000 rpm.	TPI	22.5
	42s Cotton	-	11,000 rpm.	TPI	26.6

i. Twisting - Platt

Ring frame type, 15 machines each with 324 spindles.

Ring dia. 2 1/2", Lift 10", Gauge 3 3/4".

Single centre roller beam.

All machines stopped - no twisting taking place.

One OM Twisting machine transferred from Patal Laweng :

Ring dia. 2", Lift 8", Gauge 77 mm.

j. W i n d i n g

5 frames doubler winder - Total 480 drums;

8 frames cone winding - Total 768 drums;

10 frames Reeling machines, double sided.

3-0 BUILDING

The building is of the Arcon type, having an arched structure over wide bays.

The walls have no windows, being entirely dependent on artificial light provided by two-strip units flush to the ceiling.

The lighting is good and very adequate for processing in all departments.

A false ceiling is set at approximately 15 feet, the roof void carrying all the services, air conditioning ducting, electrical cables for lighting, sprinkler piping, etc.

The roof void is itself ventilated on an expansion and exhaust system by Colt ventilators. The roof void is also protected by a second system of sprinkler units.

The floor is of cement tile over concrete. In the past this has given a lot of trouble, as it was originally laid too thin. Concrete has been relaid to give additional strength; that under the spinning plant is completed and work is proceeding in the winding section.

4-0 LIGHTING

This is by individual two-strip units at ceiling height. Illumination is very good and adequate in all areas.

5-0 AIR CONDITIONING

There are no precise complaints, but from time to time some difficulty is experienced in obtaining the required conditions. This is thought to be due to outside climatic conditions, but more time for observation is required before the writer can be specific on this point.

6-0 PROBLEMS

a. Shortage of spare parts.

b. Difficulty in processing Trevira in the Blowing room.

c. Lapping of Trevira on the Cards, particularly laps run from re-processed Polyester fibre.

d. Web on re-processed polyester fibre falling down and catching on the shaft of the doffer comb.

e. Nep in the web on some Cards.

f. Breaking down of slivers on the porcupine creel of the Howa Draw frame. This machine has a long, inclined table, and it is on this table that the sliver stretches and breaks, particularly the Polyester.

g. Sliver irregular from the Draw frames.

h. Roving irregular from the Speed frames.

i. Yarn irregular from the Ring frames.

j. Yarn end breaks at spinning frames; Roving end breaks at Speed frames; sliver end breaks at Draw frames.

k. "Slip Stick" taking place on the Ring frame back bottom steel rollers.

l. Machines not in correct alignment, which causes breakdowns and bad running.

7-0 RECOMMENDATIONS

A great deal of work is necessary in order to improve this mill. Many of the problems are the result of the plant having been erected by local fitters, but much of the fault is also due to the fact that the plant was originally erected on a weak floor which had no proper, firm foundation. This resulted in large portions of the floor subsiding, causing the machines to be out of line on both the horizontal and vertical planes.

The floor was later strengthened, but in order to do this the plant had to be dismatled and later re-erected, again by local fitters, and it is evident that the erection was not up to required standards. The recommendation is, therefore, that help should be sought from the machinery manufacturer, i.e. Platt, England, for a skilled fitter to re-align al the spinning machines and probably also the speed frames. This is essential.

a. **Blowing Room**

The mixing is generally good in this mill, as they have a system of trucks patrolling round the bales laid our on the floor, each taking only a small amount of cotton from each bale in turn to provide a blend. However, there is the same fault as at all the other mills, in so much as they have no continuity of sorts from one mixing to the next. The only way to obtain this is to stack the bales in the godown according to the MARK given at ginning, and the mixing to contain 5 or 6 MARKS, each MARK having 5 or 6 bales.

The cotton contained in each MARK will be known by staple length, grade, micronaire; by running a test sample of 100 lbs. (or kilos), a Count x Strength figure, and a Clean Cotton price can be obtained. Using these particulars a mixing can be laid down to give a continuous spinning performance over weeks of running, and the bales will be averaged out to give this standard spinning performance.
At the present time the bales are laid down with a minimum of information, which results in variations in performance, no continuity and, if bobbins are mixed, will result in Weft Bars in the cloth, particularly when the cloth is to be dyed one colour.

Licking is taking place on the Trevira Scutcher laps and altogether the fibres have no cohesion, consequently the laps easily fall apart. The main reason for this would appear to be lack of humidity; even in the Blowing Room it is required to be about 60 to 65% R.H. The best method of imparting moisture would be to equip the Hopper Feeder behind the Scutcher with sprays inside the Hopper section.

Roving bobbins run in with the lap will help to keep the material together. Although Shirley fingers (Lap Falters) can be tried, it could be possible that these could set up static electricity and thereby increase the problems.

The following technical details should be followed :

Short processing, Bale Breaker, Hopper Feeder, Scutcher with Kirschner beater. Kirschner beater speed 750 to 1,000 rpm. Fan speed 1,100 to 1,500 rpm.

Stripping plate as close as possible.

Kirschner beater to feed roller 1/4" (6.5 mm). Humidity 60 to 65% R.H. Lap Weight rather light - say 12 ozs. per yard.

b. Carding

On the Trevira the laps are licking rather badly, especially on the re-processed material. Here again, the only help can be humidity, 60 to 65% R.H. This also applies to the balloning which is taking place at the web.

It would be appear that card wire grinding in the past has been too heavy, and probably too frequent. A suggested system of grinding has been passed to P.N. Sandang, which is based on only grinding when necessary and only for a short period based on the examination of the wire. Illuminated magnifiers are to be distributed to the mills, which will enable the maintenance staff member to examine the wire in order to determine when to grind, and also to check when the wire has been sufficiently ground. The periods of grinding will be in the region of 10 minutes only.

Care should be taken to see that the quick traverse grinder is in order; for metallic wire this is a stone of 60 or 80s Grit (varies with different wire manufacturer's opinions). The stone should at all times be grinding over its whole surface, but to do this it must be equally balanced and have no sidewobble on the shaft. Nep will be improved with better grinding of the wire.

c. Yarn Irregularity

Once an improvement has been made in preventing lap licking, some of the sliver and consequently yarn regularity, will be improved. However, some work needs to be done on roller settings and draft distribution at the Draw frames and Speed frames. Platt's re - commendations for those at the Speed frames have been forwarded to the mill. However, the system of drafting on the Speed frame is causing some difficulty, especially that of weighting the top rollers. A replacement with a modern top arm weighting system would be a decided advantage, but also at the same time, the conversion should be made to a conventional three roller drafting system having the BREAK draft in the back zone and the main draft in the front zone.

This would need to be a double apron system if the range of drafts required is to be above 8 - 0 on the Speed frames.

d. Ring Frames

The slip and stick motion of the back steel rollers is giving cause for concern. Generally this results from two things

(a) the rollers being badly set and out of line and

(b) the lack of oiling.

At this mill, four frames have had the rollers relined by the writer, and something like 30 frames relined by the staff. It is, however, thought that this is not enough and that it is essential that the frames be completely re-aligned under the supervision of a skilled fitter. Platts have been requested to help with this, but to date there has been no reply to the request. (A second letter has recently been sent to Platts with a repeated request for aid)

During the period in which the writer re-set the frames, it was found to be necessary to knock out the fixing pins to Roller Beams and Ring rails, and to re-pin the same. However, this requires the skills of a fitter and so was not undertaken.

More attention can be given to the problem of oiling. The roller necks (bearings) run in brass bearings which are in contact with half of the roller neck. Such a system requires a constant film of oil and to maintain such a film it is essential to have a reserve of oil constantly in touch with the roller neck. The machinery manufacturer allows for this by fixing a pad of some oil-retaining substance to the cap placed above the roller necks. It is essential that the mill staff find some material, in foam rubber or wool felt, which will retain oil in reserve for a period between the oiling times. A non-flow oil would be an advantage, if the right type of material for an oil reserve cannot be obtained.

Spares are no longer available from S.K.F. for the P.K. 211 Pendulum top arms.

A suggestion is made by the mill staff, with which I would agree, and that is that new top arms be purchased for 3 or 5 frames, and that these top arms be capable of extra weighting; 13 - 10 - 10 kilos per line is suggested.

These weights are of advantage for running synthetic fibre blends (The existing weights are 10 - 8 - 7.5 kilos). The danger is that additional weight will make the problem of slip stick worse than it is at present.

The P.K. 211 top arms taken off would be used as spares for other frames.

8-0 BALANCE OF PLANT

The additional Draw frames used in the fibre blend and combing section greatly assist the balance of this plant.

Henks, Counts and Drafts are in general as follows:-

a. Cotton

Carding		0.13 Hk.	25.91 yds.per min.	27" doffer.	
Drawing - 1st passage		0.13 Hk.	122 " " "		
2nd "		0.13 Hk.	122 " " "		
			T.P.I.		
Speed Frames	(30s Ne)	0.75 Hk.	1.0	700 rpm.Spindle Speed.	
	(42s Ne)	1.1 Hk.	1.2	750 " " "	
Ring Frames	(30s Ne)		22.5	11,000 " " "	
	(42s Ne)		26.6	11,000 " " "	

b. Polyester/Cotton Blend

Carding	0.16 Hk.	15.3 yds.per min. (average)	
Drawing - Pre-comber	0.16 Hk.	170 " " "	
Super Lap	63.72 grms/mtr.	275 " " "	
Comber	0.16 Hk.	48 " " "	150 nips per min.
Blending	0.155 Hk.	180 " " "	
Drawing	0.155 Hk.	84 " " "	
Speed Frame	1.4 Hk.	T.P.I. 0.98	700 rpm.Spindle Speed
Ring Frame (40s Ne)		T.P.I. 24.0	10,450rpm. " "

9-0 CONCLUSIONS

There is a great deal of work to be done at this mill. That in the Blowing Room, Carding, Draw Frames can be accomplished by steady perseverance.

The Speed frames can be improved by perseverance, but the suggestions regarding drafting conversions should be considered.

On the Ring frames it is essential that outside skilled fitter experience to obtained, as the work of re-aligning must be carried out in a better way than has been done to.date.

10-0 APPRECIATION

I wish to express my thanks for the kind assistance given by Mr.Sapei Prawiradilaga, Mr. Ibnu Hadjar Tahar and Mr. Ruchijat Ellydajat, during my many visits.

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INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 9

THE REHABILITATION OF TOHPATI SPINNING MILL

Jakarta, November 20, 1972

EL-SAYED M. OWEISS
Project Manager.

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
(SPECIAL FUND PROJECT/INS - 71/531)

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S. [signature]

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

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ABSTRACT

1. Tohpati spinning factory is located in Denpasar on Bali Island Indonesia. It is owned with other eight spinning factories by the central government and run under the administration of P.N. Industri Sandang. It is specialized in spinning of both cotton and man made fibres.
It is equipped with about 15,000 O.M. Japanese Super High Draft spindles with 9,600 Japanese twist spindles which are going to be converted to spinning ring frames.

2. Building.
   a. It is of sawtooth construction, having a false ceiling following the contour of the building.
   b. The floor is of concrete, but it is damaged in some places.
   c. Lighting, air conditioning and fire protection are O.K. although the lighting is unsufficient in some areas.

3. Machines :
All machines of this factory can be considered new.

4. The main problems of this factory are :
   a. Lapping on the third roller of the ring frame drafting system when working on Rayon staple fibre.
   b. Blending of cotton is not systematic.
   c. The twist in the rayon staple yarns is very high.
   d. The R.P.M. in the ring frames is low.

5. The recommendations to remove these problems are :
   a. To use 1 1/4" rayon staple length instead of 1 1/2".
   b. It is necessary to follow the right principles in blending by

using a systematical system not only for raw cotton but also for its waste.

c. We recommend to make tests reducing the twist and to compare the result in the strength. It is enough for this length of fibre to reduce the T.M.I. to three or less.

INTRODUCTION

1. The field of this report is Tohpati spinning factory.

2. The objects are :

   a. To follow up the fulfilment of the previous advices given by the ex UNIDO textile adviser.

   b. To continue the rehabilitation and developing program for this factory which lead to increase the productivity and to cut down the cost of production.

   c. The present investigation led to give new recommendation on cotton blending, drafting system in the ring frames, how to make the right grinding in carding and etc.

Grateful thanks are due to the Directorate General of Textile, P.N. Industri Sandang HQs office, management and the staff of the factory, ITT and other individuals for providing informations and facilities to do this work.

In the enclosed report of Mr. Curran the spinning technologist in our team of experts the details of the problems, reasons and reccommendations are drawn.

REPORT ON THE VISIT TO THE SPINNING MILL
PATAL TOHPATI, BALI

August, 1972

ARTHUR E. CURRAN
UNIDO Expert

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

1-0 SUMMARY

This report is the result of observations made and work done during my visit, accompanied by my counterpart, Mr. T. Hartono, from the 7th to the 15th August, 1972.

The plant was supplied by the O.M. Textile Machine Company of Japan and is one of two similar plants, the other being Patal Lawang in East Java The plant is situated approximately 10 kilometers from Den Pasar, on the Island of Bali.

It is owned and managed by P.N. Industri Sandang.

The machinery is running reasonably satisfactorily, and although there was some delay between delivery and starting up, there seems to be no serious consequence of this.

The building is of the saw tooth type roof structure, being under-drawn with a false ceiling, air conditioning ducts, sprinkler installation and lighting cables being contained in the roof void.

In addition to spinning cotton yarns, rayon staple fibre has recently been introduced to meet the demands of the local market.

2-0 MACHINERY

a. Blowing Room

2 Raw Material Blenders

1 Waste Blender

1 High Speed Lattice

1 Hopper Feeder (Bale Opener)

1 Super Cleaner

1 SRRL Opener

1 Two-way Distributor

2 Cage section combined with :

2 Hopper Feeders

2 Scutchers - Kirschner Beaters

2 Auto Lap Doffers

Raw Material:- Cotton: American Texas Middling and Strict Low Middling 1 1/16", 1 3/32", 1 1/8" staple length.

Rayon Staple Fibre: 1 1/2" length, 1 1/2 denier, Japanese.

b. Carding

56 machines, all covered with metallic wire. The flats have a flexible wire, but of conventional form.

c. Draw Frames

5 frames, each 8 deliveries, set in two passages.

5 1/2" x 24" silver cans.

4 rollers over 4, graduate draft.

d. Ring Frames

38 machines, each 400 spindles, O.M. Super Draft System.

5 rollers over 5, with two zones of double apron drafting.

1 7/8" dia. ring, 7" lift. Motors 10 HP. 24 amp.

Spindle wharve 1 1/16 dia. Tin roller 10" dia.

		Twist Count
Counts	20s R	3.85
	20s Cotton	4.00
	30 "	4.00
	40 "	4.00

Note : It is considered that the Twist constant of 3.85 is too high for 1 1/2 inch staple rayon and it is suggested 3.2 would be sufficient, spinning tests should be made to find an acceptable count x strength figure at a lower constant.

e. Ring Twisters

22 machines, each 400 spindles.

2" dia.ring, 8" lift, 3" (77 mm) gauge.

Staff. 32 sections of 6 spindles, 2 sections 4 spindles.

Motor 10 HP. 1,420 rpm.

All machines stopped; no twisting taking place.

f. Winding

2 machines single thread winders, 100 drums per frame;

3 machines double thread winders, 100 drums per frame.

20s yarn: 4 operatives 100 spindles.

30s yarn: 3 operatives 100 spindles.

3-0 BUILDING

This is of sawtooth construction, having a false ceiling following the contour of the roof, each bay having a peak which is approximately 4 meters above floor level.

This ceiling is fitted with glass panels lying beneath the glass vertical section of the roof, all services being carried in the space of the roof void.

The floor is of concrete, but there are a number of areas where the surface is damaged due to the heavy usage and traffic in those areas i.e. Blowing Room, Bale Storage, etc.

4-0 LIGHTING

This is in the form of two tubes per unit, but it was noted that some areas are insufficiently illuminated, in particular the Carding and Draw Frame areas.

5-0 AIR CONDITIONING

The room conditions appear to be good; temperatures are reasonable, but tend to be in the high range 28° to 30°C. However, the humidity required can be obtained by the use of individually-controlled water sprays. A complaint was made that although general room conditions could be maintained, there were places between the frames where the humidity averaged only 45% R.H. This, however, is a general condition and frequently happens in mills due to the defusers being widely spaced and return air ducts not built around the frames. Trunking is contained in the roof void, with the exception of the large main distribution trunks.

6-0 PROBLEMS

The main problems is that of lapping on the third roller of the ring frame drafting system when working on Rayon staple fibre. Another problem is that of end breakage at the ring frames, whilst a further problem, which is partially tied up with the second one, is that of dirty conditions in the ring frame drafting zones due to an excess of short fibres.

7-0 RECOMMENDATIONS

A great deal of work was done to improve conditions during my visit. Some it was not possible to do because changes are to be made requiring draft wheels which are not available and which have to be made (in Surabaya).

e. **Blowing Room**

Blending - The practice to date has been to lay down mixings based on Staple Length and Grade. This, however, is not sufficient, and the recommendation is that blends of 30 bales or more be laid down and identified by MARK, i.e. 5 or 6 bales to each of 5 or 6 MARKS.

Note : This is the MARK given after ginning and which is stamped on as the material is baled; it is not the mark given after delivery.

These MARK (bales) will have been tested for micronaire; Grade and Staple Length will be tested and known, and probably Pressley fibre strength, as American cotton for Indonesia is pre-graded. There is, however, a very simple way available to the Mill Manager to control a "mixing" or "blending" of bales, and this is to run through the plant a representative sample of 100 kilos, drawn 10 kilos from 10 bales.

The blowing room Opening Plant is cleaned out of waste and droppings, then the 100 kilos test processed, making four laps. All the waste is gathered from the test run, and also the waste made at the Cards, and with the weight of the good laps and re-usable waste added, a clean Cotton Price can be calculated.

The four laps are run through the Cards (waste made to be gathered) and then 12 sample cans are put to the Draw Frames to be repeated at the second passage. From this 4 or 8 cans can be processed through the Ring Frames and a Count x Strength figure obtained. This count x Strength figure is then used to represent that MARK.

The Clean Cotton price will also represent the MARK.

If this test is conducted on all "MARKS"stocked in the godown, then it is simple for the General Manager or Spinning Manager to refer to an up-to-date list of stocks with each MARK allocated with it's Count x Strength figure (and later, when Costings are in use) and Clean Cotton price, to decide on a Mixing using average conditions of all MARKS in the godown.

An essential part of the above is that the cotton godown be kept in a tidy and clean condition and that bales are stacked in their MARKS, and not jumbled up with all bales mixed together, having used grade and staple length as criteria in making up the stacks.

The above system will enable complete control of the "mixings" to be in the Manager's hands. It will ensure a continuation of blend and thus mill running conditions.

Only approximately 10 to 15% of bales will change when an old MARK runs out and a new MARK is introduced. <u>This is essential when yarn woven into cloth is dyed in the piece</u>.

Other recommendations are:- To open the bales, i.e. remove tares and bands 24 hours before using, to allow natural expansion of the cotton. Use trucks of a handy size to patrol round the line or lines of bales, the operative taking pieces of about 3 kilogrammes weight from each bale in turn, feeding the mixture in the truck to the Blender lattice.

Do not pile the Blender lattices too high.

To reduce the speed of the Blender feed or creeper lattices.

To adjust the hopper of the Blender so that the material is not too high, and not to have a vast amount of cotton rolling over and over.

To remove the dust screens of the dust extraction ports in Blenders and Hopper Feeders. These are not necessary and have resulted in the dust accumulating into thick blankets, with the risk of this falling back into the good material.

Dust Settling Chambers should be frequently examined, say once per week, by a responsible member of the staff to see that no good fibre is being extracted.

The above also applies to under machine droppings.

b. Hopper Feeders and Scutchers

Again, removal of dust extraction screens from Hopper Feeders.

To improve the smoothness of the feed, the vertical lattice inside the Hopper Feed deliveries should be closed up to the shute plate. These vertical lattices should be repaired so that they can be correctly tensioned - they will help to give a smoother feed to the Scutcher Feed lattice.

It is recommended that the feed end of these Hopper Feeders be raised by inserting a 15-inch wide piece into the joint of the framing. This will give additional height to the delivery - then the above-mentioned vertical lattices can be removed and replaced with a vibrating perspex sheet, which can be set to the chute plate and feed a continuously even, regular sheet of material to the feed lattice of the Scutcher.

Such a conversion will give exceptionaly good regularity to the lap, 1.5% Co Ef of vanation is required to give an even silvor at Cards Draw frames and Rings.

The regulator links and the remaining parts of the regulator motion at the Scutcher should be dismantled every three months and all links and fulcrums cleaned, using graphite brushed on to the bearing places, as this acts as a dry lubricant.

Grid bars on all machines should likewise be cleaned, again using powdered graphite, for in this case it provides a slippery surface on the bars, preventing cotton wax and dust from adhering to them.

Stacking of laps should be in block form, building up the stack in one direction, and then removing at right angles to the stacking, so that laps made consecutively are not used consecutively; in this way the laps are averaged out and any variations in weight, due to some form of drafr, changes in humidity, etc., do not cause a run of light or heavy laps to the Cards.

c. **Waste** - Reworkable

Much lap irregularity is caused by the feeding of waste to the Blender; both the types and weights fed must be consistent. They will consist of :

I. lap waste (fairly compact but not as raw cotton)

II. Sliver waste (large volume but light in weight)

III. Pnuemafil waste (very large volume and very little weight).

The three should be blended together and fed at a consistent rate. It is suggested that if more than 8% is to be returned, a special waste mixing can be laid down, run through to Card sliver and this then be blended in one sliver to five raw cotton at the Draw frame.

<u>Note</u> : Rayon staple fibre waste should <u>not</u> be re-mixed with the cotton waste to be returned to the cotton mixing. If any is to be returned, it must be processed to yarn completely separate from the other productions.

d. C a r d i n g

The recommendations are for Flats to be re-set to 10 thousands for both Cotton and Rayon staple.

Grinding of metallic wire on Cylinder and Doffers to be done more lightly. They should be ground only when the points are showing signs of wear, or when damaged.

The method of detecting wear is to examine the wire using an illuminated magnifier. When grinding, the spark should be of medium intensity and have a light yellow colour. An intense white spark (as you were getting) indicates that the grinding is too heavy. A dull yellow or red spark of low intensity indicates that grinding is too light.

After a few minutes of grinding, it may be found that the stone requires re-adjustment. Care should be taken to see that the spark is correct, of medium intensity and a light yellow colour, as stated above. Constant examination should be to check when the wire is sharp and so not to overgrind.

By correct grinding the life of the clothing will be lengthened considerably.

Flats being of conventional flexible wire, a regular grinding programme should be followed, say every 10 working days, for a four-hour period of light grinding.

One period of grinding with the Long Dead roller can be followed by two periods with a Quick Traverse Roller.

Taker-in sections can be dismantled and re-set every 3 months.

Note : Taker-in wire cannot be sharpened and must be renewed. Rayon and other synthetic fibres use a Negative Rake wire.

Undercasing of cylinders should be taken out every six months, cleaned with powdered graphite and replaced.

As the waste from the Blowing Room is only in the region of 1.5% it is recommended that more short fibre be removed in the Card flat strip. To prevent the removal of long fibre by making a heavier strip, the flats should be speeded up to 4 or 5 inches per minute, which is double the present speed.

Rayon Staple fibre strip is not necessary and so the flat strip should be as light as is possible.

e. **Draw Frames**

It was noted that the silver was irregular and the recommendation is to change the drafting from Graduated to Two-zone. To do this the second and third rollers should be run at the same surface speed, giving no draft.

One third of the total draft will be put in at the back zone and the remainder in the front zone.

A recommendation is also made for new roller settings to be tried, and in this respect the following settings were suggested :

Between 1st and 2nd rollers		L + 3/16"
" 2nd and 3rd	"	L + 15/16"
" 3rd and 4th	"	L + 9/16"

from roller nip to roller nip.

Unfortunately, no work could be done in this area during my visit as the section was passed for production and also the settings should be tried along with the change to two-zone drafting.

f. Ring Frames

There is a complaint of laps forming on the 3rd bottom steel drafting roller when using the 1 1/2" staple Rayon fibre. As this roller is only 7/8" in diameter I think this situation can be expected, and as the top drafting rollers and apron rollers are set at fixed distances, with fixed weighting (approximately 5 kilogrammes) there appears to be very little which can be done to ease the situation. I have, however, suggested the following changes, but they cannot be effected until new draft wheels are made in Surabaya.

1. Move the 7/8" dia. 3rd bottom steel roller backwards closer to the nip of the back pair of draft aprons.
2. Change the draft between the above-mentioned 3rd roller and the front zone aprons from its present 1.73 down to 1.1.
3. Change the draft between the back pair of rollers and the back pair of drafting aprons from its present 1.5 to 2.0.
4. Adjust the front zone draft to give the total draft requirement.

On Cotton the back zone draft may be tried at 1.1 instead of the 2.0 as suggested for the Rayon. In this case the changes are suggested in order to effect an improvement in regularity.

The following table shows the draft distribution following the foregoing suggestions.

g. 20s Rayon: 20s Cotton

	Drafts Zone and Total Rayon Staple 20s Ne	Total	Cotton	Total
Back Draft Zone	2.0		1.1	
Between back aprons & 3rd roller	5.0	10.0	6.0	6.6
3rd roller to front zone aprons	1.1	11.0	1.1	7.26
Front zone aprons to front roller	10.9	12.0	19.0	138

h. 30s and 40s Cotton

	Drafts Zone and Total 30s Ne	Total	40s Ne	Total
Back Draft Zone	1.1		1.1	
Between back aprons & 3rd roller	7.1	7.8	7.1	7.8
3rd roller to front zone aprons	1.1	8.1	1.1	8.1
Front Zone aprons to front roller	25.3	207	24.8	200

The alternative to 1.1 is the use of 2.0 in the back zone for all the counts, but the main purpose is to keep the drafts low to prevent lapping on the 7/8" rollers behind the pairs of aprons. The official Japanese drafts for these two zones are 1.758 for the back zone and 1.585 for the 3rd roller to front pair of rollers. These cause lapping at the 3rd roller. The above table is the best suggestion I can give, but the whole situation requires experiment after change wheels are available.

A recommendation has been given for work to be done on Block Creeling on the Ring frames whereby a measured length is put into the Finisher Draw Frame Cans. These are then changed 40 cans each doff, meaning that one Draw Frame can holds 10 ring bobbins.

This system has many advantages in control and quality.

It is recommended that a permanent team be put on the job of centering ring spindles to the ring; also to see that the thread guide lappets are in correct alignment to give no yarn tension variations during spinning.

A full bobbin should be used as a guide for centering the spindle to ring.

On starting this work, two maintenance men may be necessary, but one man should be kept permanently on this job, which requires some degree of skill.

8-0 BALANCE OF PLANT

The balance of plant is good but there seems to be constant pressure to maintain production. However, this situation is only temporary and is tied up with extending their range of production into Rayon staple, which is giving three separate mixings to be run through the plant.

Lap weight 14 and 15 ozs. per yard.

a. Card Sliver

20s Rayon	55.6	grains per yd.	0.15 Hk.
Cotton 20s/30s	68.0	" " "	0.121 Hk.
Cotton 40s	49.5	" " "	0.169 Hk.

Two Cards run on waste to be mixed on one Draw Frame.

b. Draw Frame 1st passage (5 machines each 8 deliveries)

2 silver to 4 on 20s cotton counts.

			Total Draft
20s Rayon	53.7 grains per yd.	0.155 Hk.	6.2
20/30 Cotton	61.3 " " "	0.136 Hk.	6.7
40s Cotton	45.5 " " "	0.183 Hk.	6.5

Front roller diameter 1 1/8"; Speed 410 rpm.

c. Draw Frame 2nd passage (Silver to Yarn small cans)

			Total Draft
20s Rayon	50 grains per yd.	0.167 Hk.	6.5
20/30 Cotton	57.5 " " "	0.145 Hk.	6.4
40s Cotton	41.6 " " "	0.200 Hk.	6.6

Front roller diameter 1 1/8"; Speed 410 rpm.

d. Ring Frames - 38 frames, each 400 spindles. 15,200 total.

10 frames	20s Rayon	17.0 TPI	10,090 rpm.	spindle speed	120 Draft.
1 "	20s Cotton	17.9 TPI	10,760 rpm.	" "	138 "
16 "	30s "	22.0 TPI	10,880 rpm.	" "	207 "
11 "	40s "	25.0 TPI	10,818 rpm.	" "	200 "

e. Weight of Yarn Required

	Kgs/hour	Efficiency
20s Rayon	93.952	92%
20s Cotton	9.359	94%
30s "	86.893	95%
40 "	39.147	92%

The mill is not achieving these weights, but it is running at approximately 89% efficiency, inclusive of maintenance time.

It is claimed that the motor (10 h.p.) becomes overheated if the spindle speeds are raised above those now in use. However, much work remains to be done to improve the quality and regularity of the yarn before the speeds are increased.

A further point to be considered is that a higher speed will release an increase of waste in the draft zone. If, and when, this becomes the case, cleaning and maintenance of the Ring frame drafting system will have to become more frequent.

This system of drafting would be better if it could be restricted to the production of 40s counts from a clean cotton. The Rayon staple may prove a good alternative to the low cotton counts and the use of $1\frac{1}{4}$" staple will help to overcome lapping on the 7/8" dia. roller. Care must be taken in opening, the S.S.R.L. Beater being by-passed - this was discussed with the mill management staff.

There is a plan to convert the 22 Ring Twisters to Ring Spinning frames and for this purpose the frames are ideally suitable.

It will, however, be necessary to provide additional preparation machinery, and as the Superdraft system is no longer in favour, this additional machinery would consist of the conventional flyer frame preparation, i.e. Carding, two passages of Draw frame, one passage Speed frame, Ring frames (converted from Twisters).

The existing Cards could be converted to Semi-High Production and provide all the production required by the existing plant and the converted plant, especially if the conversion included the Varga front doffing arrabgement and Cross Rolls.

Further Draw frames would be required, but as these would be of a high production type, only a few deliveries would be necessary, using large diameter cans.

Two Flyer (Speed) frames would provide the required production. This system is more suitable for the coarse counts produced at this mill than the Super draft system.

There appear to be no plans for an extension in spinning other than the conversion of the twisting frames.

9-0 TRAINING

As this a small mill with a short process system, the difficulties of training and keeping labour up to a good standard of work should not be very great.

It is essential, however, that new entrants be trained correctly and that a specified programme of training be followed. If my suggestion of training establishments at mill of 30,000 spindles and over were to be followed, it could be a policy to send new entrants to Grati, along with the Lawang trainees.

The same would apply to any re-training, or training for up-grading operatives to Mandoer, Mechanic, etc.

During my visit time was spent with the staff during which, with the aid of Mr. Omo Gunakaryana (the Manager), technical and other problems of the mill were discussed, and other subjects, such as Drafting, Mixing and Blending of Cotton were lectured upon.

10-0 LABORATORY

1. Micronaire
2. Pressley Strength Tester
3. Saco Lowell Silver tester evenness
4. Twist tester
5. Shadowgraph
6. Silver Lap drum Balance
7. Motor-driven Wrap Reel.
8. Moisture Tester
9. Blackboard Wrap Reel
10. Saco Lowell Lap tester
11. Fibre Strength tester (Textest)
12. Uster Evenness tester, recorder and integrator
13. The Evenness testing equipment was out of action awaiting repair

The plant lacks a Baer sorter which would be a useful addition in raw material and waste tests.

11-0 APPRECIATION

I should like to express my appreciation of the help and assistance given to me by the staff, and in particular by Mr. Omo Gunakaryana, Mr. Sahril F. Walykrama, and Mr. Anak Agung Oka Wirawan, and also my counterpart, Mr. Toni Hartono.

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(SPECIAL FUND PROJECT/INS - 71/531)

04460

(10 of 17)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 10

THE REHABILITATION OF BEKASI SPINNING MILL

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

10

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"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

S.

EL-SAYED M. OWEISS

Project Manager.

Jakarta, November 20, 1972

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ABSTRACT AND INTRODUCTION

1. The field of this report is Bekasi spinning mill.

2. The main objectives of this report are :

   a. To rehabilitate and develop this factory by :

      (i). Detecting the technical problems which exist in this factory.

      (ii). Explaining the reasons of these problems.

      (iii). Giving recommendations on how to solve them.

      (iv). Demonstrating for the staff of this factory how to implement those recommendations.

      (v). Explaining the result of these recommendations.

   b. To cut down the cost of production.

3. The main problems are the followings :

   a. Power station.

      This unit is not running satisfactory. The reason in our opinion is that it is badly erected. It had stopped completely for about more than one month and it has just been repaired and put this week in running condition. It is necessary that a fitter from the machine maker to pay a visit and assist with the local staff in resetting these machines.

   b. Blowing lines in need of resetting.

   c. Maintenance is poor in carding, combing as in other processes. Therefore asking for assistance from other sister companies is necessary to put the machine in order besides to train the staff of this factory.

   d. Blending of cotton is incorrect. It must be systematic.

e. Knowledge of the staff is insufficient, so the training program is essential.

f. The drafting system in the speed frame is not satisfactory, therefore a work in this case is necessary.

g. Ring frames are not in good order. Many suggestions have been given regarding the rollers setting.

4. Conclusion.

a. To have a foreign assistance from the machine makers to check the erection and to make the necessary resetting in power station, blowing room, carding room is very essential until these basic sections reach a good standard of operation and efficiency.

b. The training program to upgrade the staff is necessary.

c. To have an adequate stock of the sparepart is very important.

d. R.P.M. in the ring frame is very low and can be improved after improving the preparation.

5. Appreciation.

Grateful thanks are due to the Directorate General of Textile, P.N. Industri Sandang HQs office, management and the staff of the factory, ITT and other individuals for providing informations and facilities to do this work.

6. In the enclosed report of Mr. Curran, the spinning technologist in our team of experts the details of the problems, reasons and recommendations are drawn.

TEXTILE SPINNING PLANT, PATAL BEKASI, DJAKARTA

September, 1972

Bandung, 4^{th} October 1972

ARTHUR E. CURRAN
Spinning Technologist

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

TEXTILE SPINNING PLANT, PATAL BEKASI, DJAKARTA

Submitted to Dr. Owaiss by Arthur E. Curran,
UNIDO Expert - Spinning

1-0 SUMMARY

During the three months, June, July and August, 1972, this plant has received regular visits, each being on average for three days.
The plant is one of Italian manufacture, all sections, including buildings and power plant, being supplied from Italy.
It is one of 30,000 Ring spinning spindles, details pf the machinery being as follows :-

2-0 MACHINERY

a. Blowing Room - Marzoli

1. One Opening plant, consisting of:-

3 Blenders, 48 inches wide

1 Waste Blender

1 High Speed Lattice

2 Step or Super Cleaners

1 Two-way Distributor

2 Hopper Feeders

2 Scutchers with Kirschner beaters, each having automatic lap doffers.

Waste section plant consists of a rotary dust cage and bags, and this is situated in the Blowing Room.

II. Types of Cotton used:-

American 42s Ne.	1 1/8	SLM Texan,	California	
	1 3/32 MLS	"	"	
32s Ne.	1 1/16 "	"	"	
	1 3/32 SLM	"	"	

III. Polyester fibre from Germany is being introduced into the plant. The first samples are being run at present.

b. Carding - Marzoli, 64 machines.

18 inch x 42 inch silver cans.

Metallic clothing on Cylinder, Doffer and Taker-in.

Flats, Eureka type on some Cards, other straight wire.

These Cards appear to have been built for semi high production, i.e. cylinder speed 220 rpm. Taker-in 658 rpm.

Hank Silver 0.145. Doffer 11.0 rpm.

c. Draw Frames - Marzoli.

I. CARDED SECTION - 14 machines, 7 set in two passages, each machine of two deliveries.
Silver cans 18 inch x 42 inches high.
Drafting system 4 over 5 rollers; third top roller resting on third and fourth bottom rollers. Total draft 8.0 hank 0.16. Fronth roller delivery 180 meters per min. 35 mm. diameter.

II. PRE-COMBING SECTION - 2 machines, single passage, each two deliveries.
Silver cans 18 inch x 42 inches high.

Drafting system 4 over 4 rollers.

Total draft 8.15. Hank 0.16.

Front roller delivery 180 meters per min. 35 mm. diameter.

III. SLIVER LAP FORMER - Marzoll, I machine.

48 slivers into I. Delivery 67 meters per min. 0.16 Hk. sliver; 0.0096 Hank No Lap.

(105 Dwts/yd) (178.5 grammes/meter).

IV. COMBERS - Marzoll, 4 machines each with two deliveries.

Sliver cans 18 inch x 42 inches high.

Hank sliver 0.16. Waste 16%. 48 meters per min.

d. Speed Frames - San Giorgio.

8 machines each 96 spindles.

Spindles speed 800 rpm. Bobbin size 14 inches lift.

Drafting system 3 over 3 rollers double apron top arm weighting.

Front roller diameter 32 mm. (1.26 ins.).

Flyers mounted above spindle and separate from the spindle, allows doffing to take place without the removal of the flyers.

Hank roving	32s Count	-	0.55 Hk. No.
	42s Count	-	0.87 Hk. No.
	42s Combed	-	1.04 Hk. No.

c. Ring Frames - San Giorgio

70 machines each 432 spindles.

48 mm. (1.89 Ins.) Ring dia., 9 Ins. lift, 76 mm. (3 inch) gauge.

Drafting system 3 over 3 rollers double apron.

Casa Blanca type cages, SKF top arm (PK211) weighting.

Rollers have needle bearings to all lines.

69 machines run, 1 stopped for erection parts.

Spindle speeds 32s Carded		10,500 rpm.
42s	"	11,500 "
42s Combed		9,800 "

Feature of these machines is the Tube roller beam; this being airtight, carries the broken end suction system.

f. Twisters - Marzoli..

36 machines each 432 spindles.

50 mm. (1.97 Ins) Ring dia., 9 inch lift, 76 mm. (3 inch) gauge.

Counts 42/2, T.P.I. 18.9. Spindle speed 10,600 rpm.

Feature of these machines is a tube roller beam; in this case the tube is only about 6 inches in diameter (about half the diameter of the tube roller beam on the Ring frames).

Only 10 of the 36 machines run regularly, but without changing the roller beam it is doubtful whether these machines could be converted to spinning machines.

Changing the roller beams, if this is possible, could be expensive.

However, the remaining machine particulars are ideal for conversion

Marzoli should be approached for conversion cost quotation.

g. Cone Winding - Savio.

10 machines.

Single end winding 4 machines 88 drums.

Double end winding 6 machines 96 drums.

Note : Single end winding can be performed on double end machines.

Winding speed 750 meters per min.

Half of one frame stopped for spares.

h. Reeling - Savio. 8 machines, each 50 ends. Double sided.

3-0 LABORATORY - Air conditioned

Saco Lowell Sliver Evenness Tester.

Saco Lowell Lap Tester.

Moisture Content Test Oven.

Shadowgraph.

Fine Balance.

6 Quadrant balances, roving, yarn count test.

1 " " , single thred strength test.

1 " " , hank strength test.

Roving Wrap Drum (hank testing)

Twist Tester.

Black Board Wrap Reel.

Sheffield Micronair Tester.

Uster Evenness Tester, Recorder and Integrator

2 Yarn Wrap reels.

Stroboscope.

Baer Sorter and Fibre Balance 100 milligramme.

4-0 BUILDING

It is a Modular type construction, walls are of brick with plaster finish. On the outside aluminium sheet has been used to give a distinctive appearance.

The building was erected without windows as it is fully air conditioned.

The ceiling is underdrawn, with all the service carried in the roof void.

Lighting by fluorescent tubes set in twin holders.

Floor is constructed of local tiles.

Return air conditioning ducts are built into the floor, whilst the delivery trunks are contained in the roof void, with the defusers protruding through the false ceiling.

There are no deviding walls between the different sections i.e. Cardroom processes and Spinning. The Blowing room is however contained separately, devided off by a double brick thick wall and steel door.

Sprinkler pipes are contained in the roof void with defusers protruding through the ceiling.

The buildings, floors and ceiling are all in good condition.

5-0 AIR CONDITIONING

Refrigerated chilled water system.

Conditions inside the mill with the plant running are good and these appears to be no difficulty in obtaining the required atmosphere conditions.

Unfortunately due to the constant trouble with diesel engine and power generators it is very seldom that the air conditioning plant is in operation.

6-0 POWER STATION

This consists of three Diesel Generating units of Italian manufacture. The three units was installed by local engineers and as the installation was not up to manufacturers, specification all three units have given trouble from time to time cumulating into all three units being stopped together, on one the crank case was cracked on another crankshaft worn, the third are minor faults which can be repaired as spares are available.

Generally two units can run however by the end of November it is expected the mill will be connected to the National grid power supply.

7-0 PROBLEMS

The major problem is the shortage of power, as one of the diesel generators is constantly giving trouble, and is therefore frequently out of action.

To obtain the maximum production under these circumtances, the preparation section of the plant is run with very coarse hanks. This then necessitates spinning frame drafts higher than those normally in use; in fact, too high to give a regular, even yarn.

Othe problems are:-

a. The lack of correct blending of cotton in the mixing section of the Blowing Room.

b. Incorrect adjustment of the Opening Plant.

c. The Carding Engine wire is in poor operating condition.

d. Too high Taker-in speeds.

e. Poor maintenance of the Carding Engines in general.

f. Irregularity in evenness of Sliver, Roving and Yarn.

g. Poor operation of Flyer frames, resulting in irregular roving and stretched roving.

h. Poor operation of Comber Section, resulting in irregular sliver.

i. Ring frames producing irregular yarn and having too many ends breaking down.

j. Lack of knowledge and experience amongst the staff.

k. Lack of training amongst the operatives.

8-0 PROGRESS MADE

a. With the shortage of power still appertaining, it is difficult to settle some of the problems, particularly these which entail loss of production. However, there is assurance that the plant will be connected to the National Grid system for electricity supply in October of this year, and as this is completed the mill processing plant will be placed on a calculated balance of production, section to section. This balance will then enable adjustment to be made to the drafting systems at the Ring frmaes so that the draft comes within the operating limits.

In doing this, regularity in evenness of the yarn will automatically be improved. Work has been going on to improve the running conditions in the Blowing Room.

The dust extraction units have, on my recommendation, been removed from the room occupied by the operatives to an outside passageway open to the air.

These units allow the very fine dust particles, which are injurious to the operatives' health, to escape.

b. Two Blending Bale Openers have been fitted with a direct feed system to the Hopper Feeder behind the Scutcher, as a means of short processing the Polyester fibre.

Blending of raw material has been improved but the system will not be satisfactorily improved until such time as it is possible to guarantee a consistent mix of bales, with continuity day after day.

Such a system can only be operated using the Ginning Marks on the bales, and before they can use these, the cotton bale warehouse will need to be reorganized, using the Marks as the criterion for the stacks.

At present all bales are mixed up, only being separated into Grade and Staple.

Waste droppings at the beaters have been checked and regulated.

Experiments have been conducted in an endeavour to improve the yard-by-yard regularity of the lap. At present this is in the region of 2.5% co-efficient of regularity. I want to bring it down to 1.5%.

c. The design of the feed from the Hopper Feeder behind the Scutcher is not condusive to giving a regular feed of low tolerance, so this may have to be altered, but before this I have requested that basic maintenace be given to the Scutcher lap regulating motion. On these machines it is a major operation to remove the pedal regulator motion, pedals and links.

The lap produced is unsatisfactory also because the material is not fully opened and cleaned. This is due to the lack of opening and cleaning points. There is only a Step (or Super) Cleaner and a Kirschner Beater in the Scutcher. The plant requires a Porcupine-type beater to give the additional beating and opening required. If the cotton was more open the lap regularity would be better, the Cards would have less work to do and the plant would be appreciably cleaner.

d. On the Carding Engines work is being done, and has been done, in regard to machine speeds. On these machines the cylinder runs at 220 rpm and the Taker-in was running at 658 rpm., whilst the production is that normally associated with conventional machine speeds.

As the condition of the wire is very poor, the web contained a lot of nep; short fibre was being made and whilst the cotton originally has a Presley strength of 90,000, this was dropping to 75,000 after carding.

e. Experiments have been conducted and are still continuing, with lower speeds (180 and 190 rpm) of the Cylinder and Taker-in, the latter at speeds of 420, 470 and 540 rpm. There is no doubt that the lower Taker-in speeds give an improved Pressley strength, and less nep in the web.

f. In addition to this work, it is necessary for the grinding of the wire to be improved. Unfortunately, the poor standard of grinding in the past has done much damage, and in reality all the wire should be replaced. Arrangements are in hand to replace wire on 25% of the Cards, and this programme of replacement should be continued over the next two or three years, whilst the policy should be to give more careful attention to the 75% remaining, until that also can be replaced.

g. A system of grinding has been suggested by me for all the mills. This involves examination of the wire through an illuminated magnifier.

Several of these have now been purchased and I intend to train the Maintenance Engineer on how to examine the wire and control the grinding operations.

h. At the present time there is no special work involved at the Draw Frames, as there is so much involved in other sections.

i. The Combing machines are running very badly, and assistance has been requested from Patal Bandjaran for their Combing expert to visit Bekasi to train the mechanic responsible for running the Combing machines. Once and expert is available, it should take him no more than two or three weeks to re-set the machines and have them in good running order, as there is nothing basically wrong with them.

j. Flyer frames have given a fair amount of difficulty; they are not the conventional type, but are the new model with non-removable flyers.

The mechanical sections also are of new design, really much too complicated for a young industry such as we have in Indonesia. The section of the gearing motion controlling the variation in surface speed of the bobbin has given quite a lot of trouble and it has been the practice for the roving tension to be controlled by the operative, rather than this being compensated mechanically.

We are confident that the trouble can be overcome, as a ratchet motion has been fitted which, in conjunction with brake settings, is capable of progressively controlling the changes in speed required by the bobbin to ensure correct roving tensions.

Increased weight has been put on the bobbins by an additional turn; of roving round the flyer presser arm. On test it was found possible to increase from 750 grammes to 1,120 grammes per bobbin, but due to the mechanical trouble with tensioning, the staff have not been able to ensure that the operatives maintain the extra turns on the flyer presser arm, this being a supervision problem.

Work is necessary on the drafting rollers, as tests have proved that better regularity can be obtained with new settings. Changes here, however, are awaiting action by the staff. It is not possible to push too many changes in a short period of time. Improvement in maintenance is also required at this point.

k. Roving guides and condensers are out of line; also a condenser is being used in the front zone, which is doing no good at all.

On the Ring frames, a number of suggestions have been made following tests on drafting. Here again, the work is quite slow, as resetting of rollers, etc. takes time and this work has to be done by an already-programmed maintenace crew.

Black boards are being fitted to the frames, behind the yarn, so that the contrast in colour will show up a broken end. (The roller stands are carried on a centre round pipe, so there is no roller beam; These when fitted are usually painted black, and are used as a background for contrasting the ends of yarn).

9-0 CONCLUSION

a. Close liaison will be continued with this mill and when there is sufficient power available to maintain full production it is expected that all the outstanding problems will be gradually overcome.

b. More training will be necessary for the operatives and means found to increase the knowledge of the staff.

c. During each visit, one whole morning is set apart for discussions with the staff, and encouragement is given for the staff to question any work done or recommended, so that each problem and its probable solutions can be understood by all concerned.

d. It will be noted that no progress has been made beyond the Ring frames as too much work is already apparent in the other sections of the mill. Actually I would prepare to work only in the Blowing room and on the Cards until these sections reached a good standard of operation and efficiency, but day to day conditions will not allow this, as an example, roving tensioning and the amount of bad work being made in this section forced me to give my attention to it and this to some extent caused the work in the Blowing room and especially on the Cards to be slowed down, for the staff have difficulty in keeping pace with my demands and recommendations.

10-0 APPRECIATION

I would like to express my appreciation of the work done by my Counterpart in Bekasi Ir. Sutarja and of the Manager Kol.Surjanakusuma, for his kind assistance, also to the following members of his staff. Messrs Ibrahim, Tarjat and Miname.

APPENDIX

The following hanks, twist per inch and drafts are in use, and it will be noted that they can go much coarser as yarn production is increased.

Present Spin Plan:

	Hank	Draft	TPI	Spindle Speed	Grammes per unit per hour	No. of machines or spindles	Kgs.per hour	Eff. %
CARDING :								
Carded	0.157	-	-	11 rpm. doffer	6.028	44	281.82	90
Combed	0.157	-	-	11 rpm.	6.028	6	36.17	90
DRAW FRAMES :								
Carded	0.16	8.15	-	180m/m	31.896	5(4.47)	255.50	80
Combed	0.16	8.15	-	180m/m	31.896	2(1.12)	35.81	80
Sliver Lap Former		178.5 grms per meter	-	67m/m	222.6	0.16 machines	35.63	90
Comber	0.16	-	-	-	8534	1.76 machines	29.93	80
POST COMBER :								
Draw frame	0.16	-	-	180m/m	31.896	0.46 machines	29.33	80
Speed frame	0.55	3.44	0.89	970 rpm.	891.73	0.98) 3.53)	249.11	50
" "	0.83	5.19	1.08	970 rpm.	486.95			
Combed	1.04	6.50	1.05	970 rpm.	399.73	0.75	28.60	50
RING FRAMES :	No							
Carded	32s 42s	58.18 50.60	23.2 25.9	10,500 11,500	11.649 7.862	15) 45)	228.33	85
Combed	42	40.33	20.1	9,800	7.862	8	27.17	75

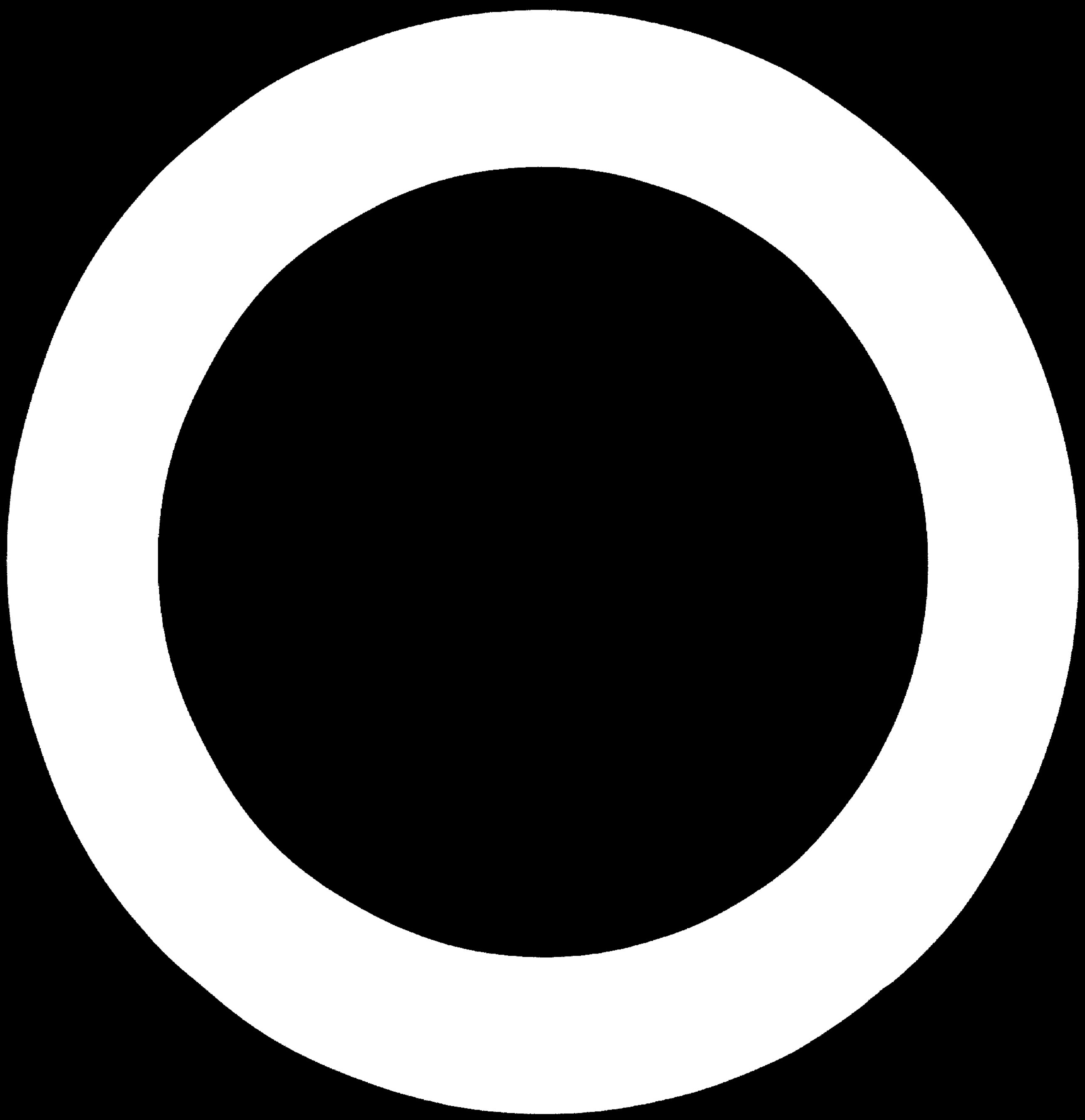
It will be noted that 50 cards are used instead of 59 : 5 Draw frames against 7 available.

On Speed frames the production is very low : a good reasonable efficiency would improve this.

Lap Former, Comber and Draw Frames of the section have quite a large amount of spare capacity. There must be a reason for this and it lies in the fact that the production is low. Increased efficiencies will utilise more of the plant.

Another factor to be highlighted is the drafts being used at the Ring Frames.

To give a good regular yarn with the best drafting conditions, the drafting system employed should use no more than 40 of a total draft; it will be noted that 32s Carded has a draft of 58 and the 42s a draft of 50, whilst the 42 Combed has a draft of 40.33 - here 36 would give better results.



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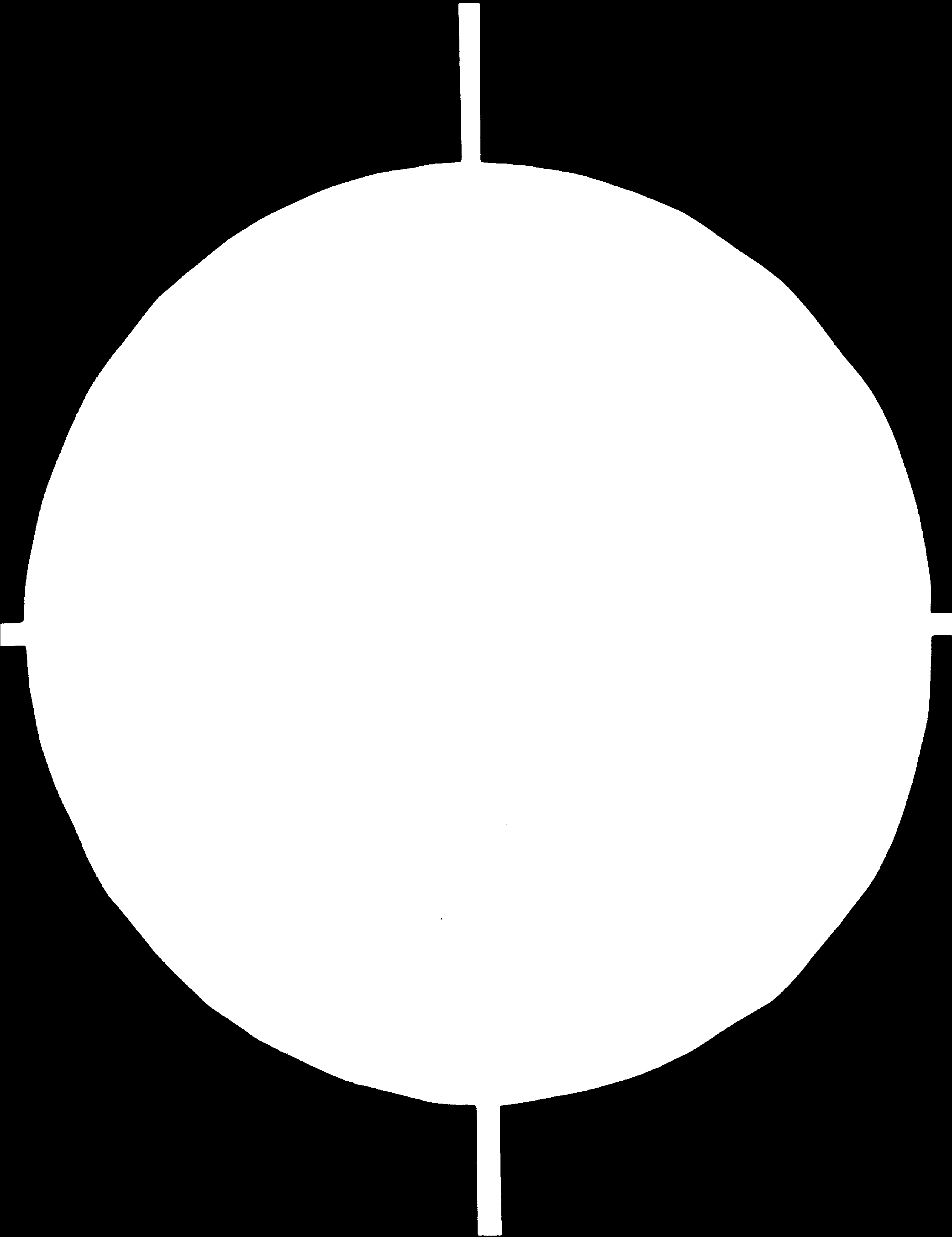

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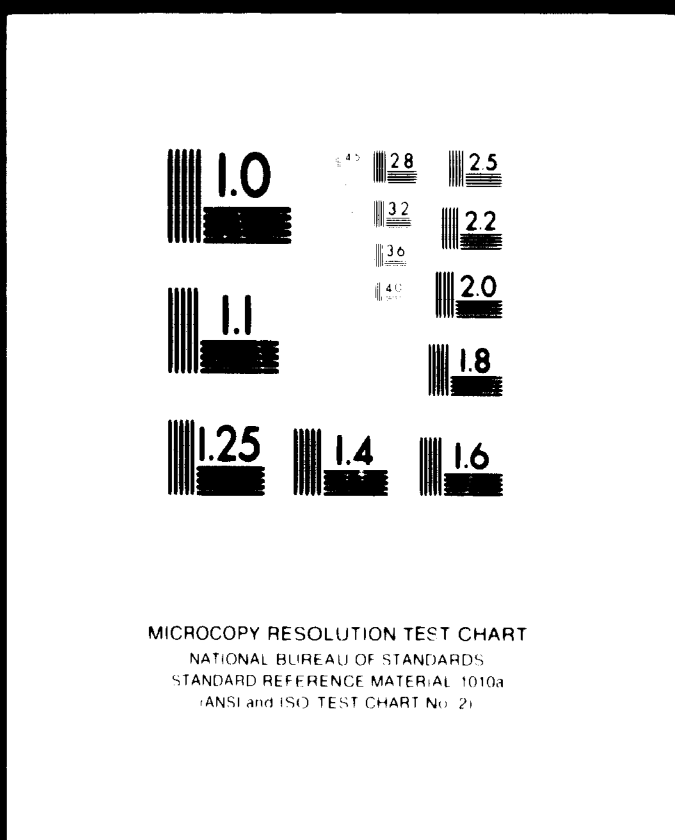
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NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

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SUGGESTED SPIN PLAN

To be used as full power is available, i.e. Natio

MACHINES	Hank Roving or Count	Ends into One	Draft	Front Roller or Spindle Speed	Twist Multi-plier	Turns per inch	% Waste Allowance	Weight in Process Per 8Hrs LBS
Finisher Scutchers	0.0016 12.9 ozs. per yd.			9.3 MTS/MIN			6 %	5817
Carding Engines Carded	0.157			27.25 MTS/MIN			5 %	4740
Carding Combed	0.157			27.25 MTS/MIN			5 %	800
1st Pas. Draw Frame Combed	0.16			180 MTS/MIN			2 %	784
2nd Pas. Draw Frame								
Lap Former	0.0096 178.5 GRMS/MT	48	2.9	67 MTS/MIN			0.5 %	780
Comber	0.16	4	66.7	48 MTS/MIN			16 %	674
Drawing Frames	0.16	8	8.0	180 MTS/MIN			2 %	662
Drawing Frames	0.16	8	8.15	180 MTS/MIN			2 %	4646
High Draft Speed Frame	1.1	1	6.88	800	1.05	1.1	1 %	4640
High Draft Speed Frame	1.1	1	6.88	800	1.05	11	1 %	659
Ring Spinning Frames Carded	32s	1	29	10,500	4.1	23.2	1 %	1534
Ring Spinning Frames Carded	42s	1	38.1	11.500	4.0	25.9	1 %	3013
Ring Spinning Frames								
Ring Spinning Frames Combed	42s	1		11,00	3.1	20.1	1/2 %	656
Ring Doubling Frames	42/2	2		10,600	4.11	18.9	1/2 %	651
Ring Doubling Frames								

SECTION 1

SUGGESTED SPIN PLAN

..l power is available, i.e. National Grid link up in October 1972.

..st ..ti- ..er	Turns per inch	% Waste Allowance	Weight in Process Per 8Hrs LBS	Production per Machine Delivery or Spdl. per 8Hrs LBS	Calculated Machine Efficiency %	Calculated Number of Machines Deliveries or Spindles	Extension in kilos 23.5 hours Production.
		6 %	5817	3262	90 %	1.78 Machines	7430
		5 %	4740	96.7	90 %	49 Cards	6324 Kgs.
		5 %	800	96.7	90 %	9 Cards (8.3)	1070 Kgs.
		2 %	784	557	80 %	1.4 Deliveries 1 frame of 2 deliveries	1050 Kgs.
		0.5 %	780	3918	90 %	0.2 Deliveries	1046 Kgs.
		16 %	674	150	80 %	5 Machines (4.5) each 2 Deliveries	902 Kgs.
		2 %	662	557	80	1 frame of 2 deliveries (1.2)	886 Kgs.
		2 %	4646	557	80	5 Frames (8.35) 2 Deliveries Total 10 Del.	6200 Kgs.
[illegible]	1.1	1 %	4640	7.65.	75	7 Frames each 96 Spindles Total 602	6140 Kgs.
.5	11	1 %	659	7.65.	75	1 Frame of 96 Spindles	882 Kgs.
[illegible]	23.2	1 %	1534	0.222	90	16 Frames each 432 Spindles Total 6912	2050 Kgs.
[illegible]	25.9	1 %	3013	0.155	92	45 Frames each 432 Spindles Total 19,440	4030 Kgs.
	20.1	1/2 %	656	0.19	92	8 Frames each 432 Spindles Total 3456	878 Kgs.
11	18.9	1/2 %	651	0.377	88	4 Frames each 432 Spindles Total 1728	870 Kgs.

SECTION 2

SPARE COPY HOLD

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(11 of 17)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 11

THE REHABILITATION OF SENAJAN SPINNING MILL

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

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ABSTRACT

1. The field of this report is Senajan Spinning Mill.
   a. Its location is Senajan, one of the districts of Jakarta, Indonesia.
   b. This factory is owned by the central government and administrated with other eight spinning factories by P.N. Industri Sandang.
   c. It produces cotton, man made fibre and blends of both.
2. Building.
   It is a saw tooth construction, having a false ceiling in the form of an apex. Floor, air conditioning and fire protection are all in a good condition.
3. Machines.
   The plant consists of 30.000 Ring spinning spindles supllied by The Toyoda Engineering Co., in Japan, and produced in 1962. So it can be considered new.
4. Problems are :
   a. Lack of spare parts.
   b. Great deal of short fibres in the drafting system at the ring frames increasing end breaks. This is due to many factors among them increase of beating points in the blowing line, using low grade of cotton, blending fibres with big difference in length, and or due to insufficient carding.
   c. No training program is available, so the staff is in need of up-grading.
5. Recommendations are :
   a. To use better grade of cotton
   b. To decrease the beating points by taking out from the blowing line some of the beating points.
   c. To adjust the card flats, to give heavier flat strip and to increase the flat speed in order to remove more short fibres.
   d. Training program is essential.

INTRODUCTION

1. The frame work of this program is to follow up the implementation of the advices given by ex Unido textile adviser on management.
2. To continue the rehabilitation and development to increase the productivity of both the machines and labour forces either in the quantity or in the quality of production.
3. To cut down the cost of production.
4. In the present investigation important advice has been given concerning the use of suitable raw material emphasizing that not only the price of the cotton is the limitting factor but also the characteristic and quality and its effect on the production has also to be taken into consideration.
5. Grate ful thanks are due to the Directorate General of Textile, P.N. Industri Sandang HQs office, management and the staff of the factory, I.T.T. and the other individuals for providing informations and facilities to do this work.

REPORT ON THE VISIT TO THE SPINNING MILL
PATAL SENAJAN, JAKARTA

July, 1972

ARTHUR E. CURRAN
UNIDO Expert

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

REPORT ON MY VISIT TO THE SPINNING MILL
PATAL SENAJAN, JAKARTA, JAVA

Submitted to Dr. Oweiss by A.E. Curran, UNIDO Spinning Expert

1-0 SUMMARY

This report is a result of observations made during a number of visits view June & July 1972.
The plant is manufactured and supplied by the Toyoda Engineering Co. of Japan date of manufacture 1962.
It is owned and managed by P.N. Industri Sandang a government agency having their head office in Jakarta.
The plant consists of 30,000 ring spinning spindles producing cotton yarns of 20s and 30s Ne Counts. Recently the management as introduced an acrylitic fibre which they are experimenting in 100% and blends with cotton.
Production conditions are very good but they have a problem of dirty spinning conditions at the ring frame, which is caused mainly by an excess of short fibre in the raw material, cotton.
The building, power, light, air conditioning and spindles system was all part of the Japanese suppliers contract.

2-0 MACHINERY AND PLANT

a. Blowing Room

This consist of two opening lines, each comprising :

4 Blenders

1 Waste Blender

3 individual and inter-connected Porpupine Beaters with cage suction, vertical.feeds and by-pass.

1 Two-way Distributor

2 Hopper Feeder with cage suction compartment

2 Scutchers, each having two beater sections

(a) three-bladed beater (Opener section)

(b) Kirschner beater (Finisher section)

2 Auto lap doffer sections.

On the line both the Opener section and Finisher section of one Scutcher are fitted with Kirschner beaters.

Although each scutcher is fitted with a scale, it is the practice to weigh all laps on one common lap scale.

Separate electric panels control each opening line and scutchers.

Raw material used :

American Cotton S.L.M. 1 1/16" staple.

Acrylic Fibre supplied from

2.0 denier.	100% yarns.		No blends or mixtures.
Lap Weights :	13.6 ozs. per yard		Cotton : 45 yard lap;
	12.0 ozs. per yard		Acrylic: 35 yard lap.

b. Carding

Toyoda 114 machine. Metallic clothing on all cylinders, doffers, takers-in; Straight flexible wire on flats (no knee).

14" dia. by 36" high Sliver cans : 27" dia. Doffer.

c. Draw Frames

Toyoda 20 machines, set 10 machines each in two passages, each machine having 4 deliveries.

14" dia. by 36" high Sliver cans : Drafting system 4 over 5 rollers, over centre coiling.

Front roller speed 900 rpm. : Front roller diameter 28.57 mm.

d. Speed Frames

Toyoda 16 machines each of 96 spindles. Bobbin size 12" lift by 5" diameter.

Drafting system 4 rollers over 4 double apron (Casa Blanca system).

2 lines of rollers, top arm weighting;

Spindle speed 750 rpm. Front roller diameter 1 1/8".

e. Ring Frames

Toyoda 75 machines, each with 400 spindles, 47 mm. (1 7/8") Ring dia.; 8" lift, 69 mm. (2 3/4") gauge.

Drafting system 3 over 3 roller, double apron, S.K.F. type; top arm pendulum weighting.

Spindle speeds 10,300 rpm. (20s Count Ne);
10,500 rpm. (30s Count Ne).

f. Cone Winding

Murata, Japan. 9 frames each with 110 drums, double sided split drum type winding.

700 yards per minute.

<u>NOTE</u> : This mill has no Doubling or Twisting plant.

3-0 LABORATORY Air conditioned.

1. Moisture Test Oven
2. Single Thread Strength Tester
3. Hank Strength Tester
4. Motor-driven Wrap Reel
5. Yarn Balance
6. Roving Wrap Drum
7. Yarn Twist Tester
8. Japanese-made Ulster Evenness Tester, integrater and
9. Recorder (not working)
10. Baer Sorter
11. Shirley Analyser
12. Saco-Lowell Lap Tester
13. Saco-Lowell Silver Evenness Tester
14. Black board Wrap Reel
15. Sheffiel Micronair
16. Pressley Fibre Strength Tester
17. Yarn Balance (Fine).

4-0 BUILDINGS

This is of a saw tooth construction, having a false ceiling in the form of an apex, one side of the apex being constructed of glass and being immediately below the glass lights in the vertical sections of the saw tooth construction of the roof.

Air ducting for the distribution system is constructed within the void behind the false ceiling, with the diffusers built flush into

the ceiling. The return air ducts are constructed into the floor. Lighting is good and adequate, fluorescent being placed up against the ceiling, but standing proud of the surface.
A sprinkler system is installed with the water piping within the void space and the sprinkler heads protruding through the ceiling. Additional water sprays are provided to assist in obtaining the correct humidity when atmospheric conditions make this necessary. The floor surface is of locally-made grey tiles in good condition, but a few in various places are cracked and require repacing.

5-0 PROBLEMS

The plant is running very well and their problems are not acute. They consist of :

1. Lack of spare parts.
2. Great deal of short fibre in the drafting system at the Ring Frames, causing end breaks, lapping and the spending of excess time in cleaning, i.e. 3 times per 8-hour shift.
   (NOTE : Once should be sufficient).

6-0 SOLUTION

To **problem 1**, better co-operation between stores ordering, Head Office ordering section, Finance, etc.
Problem 2 : Here it was obvious that the waste in the drafting system should have been removed at stages before spinning, i.e. Blowing room and Carding.
The opening plant appears to be adequate for dealing with any amount of short fibre in the raw cotton and, in fact, it was found that the Porcupine beaters were taking out a large amount of, both short and long fibre.

* Short fibre can be excessive in the raw material supplied; this can easily be checked by Baer sorter and Shirley Analyser, both of which instruments are in their Laboratory equipment.

Checking should take place from the bale, from the lap and from the Card and Draw Frame slivers, the object being to find out whether short fibre is being made in the processing. Each section can be traced through to find the source, and the necessary corrections in Beater or roller settings made.

However, short fibre is generally removed in the Card Flat strip, this being the main point of removal after the cotton has been opened up in passing through the Blowing Room plant.

On these Cards the short fibre removed was insufficient because the flat speed was only 2 inches per minute, and the front plate was set to give a very light strip.

7-0 RECOMMENDATIONS

It is recommended that tests be conducted as outlined above with the Baer Sorter and Shirley Analyser to

a. find the amount of short fibre in the raw material;

b. to find if any short fibre is being made in the plant by breaking long staple;

c. analyse waste at the Beaters to see whether short fibre is being removed, and that the proportion of long fibre is not too great;

d. at the Cards conduct tests to find the correct flat speed to give maximum removal of short fibre. Suggest run at 4 inches per minute as first test; if necessary go to 5 inches, or alternatively to 3.5 inches per minute.

e. conduct tests on front plate settings in conjunction with Flat speeds, to get maximum short fibre with the minimum of long fibre in the strip.

<u>NOTE</u> : A good flat strip is one in which the flat strip hanging in a curtain only just hold together, one strip to another, yet the individual strip must contain a maximum density of short fibre.

The most important point to follow up is the matter of the short fibre which is being deposited within the drafting system on the Ring frames, where a large deposit is building up at the tensioning point of the botton aprons and the back bottom stell roller.

The underclearers are not adequately keeping these two points clean, mainly because the excess of short fibre builds up rapidly, causing the underclearer to choke.
This makes the cleaning cycle by the operative too long, hence the underclearer stops.
Because of these conditions many underclearers are missing, and not in position, therefore the waste becomes free to build up on the bottom apron and underclearers.
This caused excess end breakage, and in the case of laps on the back bottom steel rollers a finer count because the effective roller diameter is increased by the thickness of the waste lap.

8-0 REASONS FOR THE SHORT FIBRE

The main reason is the amount of short fibre in the raw cotton, which varies between about 26% to 33 1/3%, being far too high to give the best results in spinning.
This situation is aided by the conditions in the Blowing Room, where 5 beaters are used in each line. These consist of a free-fed Porcupine placed in the feed end of the Blending Hopper Bale Openers; one free-standing Porcupine beater; one free-standing Kirschner beater; one three-bladed beater in the Scutcher, followed by a second Kirschner beater in the Scutcher.
A further free-standing Porcupine in the line is by-passed and not in use.
The effect of all these beaters is to string the fibre, and this is the state of the lap delivered to the Card, so it is quite certain that this stringy mass fed to the Taker-in will cause further short fibre to be made due to breakage of fibre at this point.

9-0 SUGGESTIONS with regard to the above short fibre.

Again, the principle must be to purchase a better grade of cotton. Now they are using Strict Low Middling Light spot. I feel quite sure that any saving made by purchasing this grade, will be lost by the loss in production.

The mill efficiency is 86%, when I feel sure it could be as high as 92 %.

The next point is to take out of use one or two the beaters - this point is tricky.

I would like to see the Porcupine cylinder incorporate with the Blenders taken out of use because this is not striking from rollers but the fibre is free when it drops into beater compartment. It is here that the first hint of stringy fibres is evident and once started, stringiness continues to build up.;

The next beater I should like to see out of the line is the free-standing Kirschner beater, but this cannot be taken out as it is the last beater feeding the two-way distributors.-On these cottons an Opening line does not require two Kirschner beaters.

A further suggestion I have made refers to the Blenders, of which the Hopper section, in my opinion, is overloaded.

I suggest that the cotton inside be reduced to 2/3 rds the volume.

I also suggest slowing down the bottom feed lattice, as with this relatively high speed and the large bulk of cotton, all the cotton in the hopper is turning over and over like a large barrel and therefore the cotton in the middle of this barrel, or turbulence, must remain in the hopper for hours, never leaving it until such time as the hopper is emptied at the end of a shift. Meanwhile, the newly-fed cotton on the outside of the turbulence will go forward almost immediately, but not without some degree of stringiness having been imparted to the cotton because of the twist action in turning over and over.

A slower lattice speed and 2/3 rds the volume of cotton, as suggested above, should clear this trouble.

The next point I wish to make is that the waste under each beater should be withdrawn and the percentage made at each calculated; also from each, a sample should be passed through the Shirley analyser, to see what effect each is having as regards waste extraction.

A point I should like to make is that these beaters will not particularly remove short fibre, but only sand, leaf and other heavy impurities, which will include large nep and knots of fibre. Short fibre, being light in weight, will carry on in the stream of cotton, unless it is so short as to be extracted as dust at the cages.

Our only opportunity, then, to remove this short fibre is at the flats of the Card. Here at this mill, the flats only travel 2 1/2 inches per minute. When 5 inches would be a better speed, Added to this, the top plates are set to give a very light flat, and so the opportunity to remove much of this short fibre is lost. A suggestion I make is to replace all the flat worm drives with a two-start worm rather than the single-start now in use; this would, of course, double the flat speed, and also double the amount of short fibre removed. It would also help to make a heavier flat strip.

However, the real answer to the problem is to buy a better grade of cotton and to use fewer beaters in the Blowing room.

The object of all the mills should be to do everything in their power to improve the efficiency and also to get running conditions to such a pitch of efficiency that the Ring frames can be speeded up to give maximum production consistent with reasonable end breakage. Anything that detracts from this should be changed and, again in this case, to a better grade of cotton, even to the extent of a shorter staple length cotton.

Arrangements have been made to re-visit this mill early in August.

NOTE : I am informed that these Ring frames are to be fitted with travelling cleaners; this will help the situation by giving cleaner conditions, but the real answer to the problem is as given above in the body of this report.

10-0 MAINTENANCE

This appears to be of a good standard. Further attention will be given to the systems in use at a later date.

11-0 ORGANIZATION OF DEPARTMENT

This could be improved. Such systems as Block crealing are not in use, although both Draw frames and Speed frames are fitted with length measuring motions. Instruction in methods will be given at a later date.

12-0 T R A I N I N G

There is no definite training programme in the plant. Emphasis should be placed on this at three levels - operative, mandoor and supervisory.

Without a high standard of training it is impossible for the staff to attain the high degree of efficiency which should be possible from this plant.

The mill has no special plant available for this purpose, tarining being by example and done on production machines.

13-0 BALANCE OF PLANT

This is good and there are no outstanding anomalies.

Higher Ring spindle speeds should be possible at a later date and the existing preparation machinery will be able to cope with the extra production required.

Counts spun	21s, 30s Ne single yarns. TPI 18.6 and 21.5 respectively.
Flyer Hanks	0.145 Ne. TPI 1.1. Spindle speed 750 rpm.
Draw Frame	0.145 Ne.
Carding	0.145 Ne.

Ring Frame efficiency is in the region of 88% with all the plant operative, and in production.

14-0 CONCLUSION

Some work must be done to eliminate the short fibre in the ring frames, and this can only be thoroughly achieved by checking each section to trace the source of the short fibre, whether this be in the bales or is being made by bad processing.

In the meantime, Flat speeds on the Cards must be increased to take out this short fibre and again tests conducted to find the most suitable speed.

Processing of Acrylic fibre is quite new and as yet none of the yarn mede has been sold, but I was assured that there is a market for this and, in fact, the American supplier is prepared to import yarn into America.

Contact with this mill will be continued as there are some technicalitied involved with the drafting systems where improvement of regularity may be made.

It is also the writer's opinion that three Porcupine Beaters in series as at this mill, is determental to processing, and a suggestion is made that one should be removed and transferred to the Patal Bekasi factory.

15-0 APPRECIATION

I should like to express my appreciation for the kind assistance given by the staff at Patal Senajan, thus making it possible to complete this survey.and particular to the Director Mr. Ismangoen and the Manager Mr. Daufril.

SPECIAL FUND

04470 INS/12-72

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME

(SPECIAL FUND PROJECT/INS - 71/531)

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INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 12

THE REHABILITATION OF DELIMATEX

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

EL-SAYED M. OWEISS

Project Manager.

Jakarta, November 20, 1972

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME (SPECIAL FUND PROJECT/INS - 71/531)

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S. [signature]

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Project Manager.

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ABSTRACT

Delimatex is a privately owned integrated weaving, dyeing, printing and finishing factory established in 1969. But early this year it has been leased to another private finishing firm called Margasandang for a fee. Delimatex is located in Bandung. It has been moved from the finishing of cotton materials to polyester cellulosic blend cloth. Since the contracting of the works to Margasandang, they are concentrating on the bleaching of polyester/cotton cloth for dyeing at the central works as well as on printing the orders allocated to them.

Building is concrete with corrugated iron roof. The floor is of concrete and there is adequate strip lighting. The water supply is from their wells without demineralization.

Machines: Nearly all are new and efficient for the work with the exception of the new flat screen printing machine which is very limited in production (7 metres/minute).

Production: Figures of production as obtained from the factory is good but in our opinion it is more than the potentiality of the facilities exist in the factory.

Problems: The main problems in this factory are :

1. This factory is working only 2 shifts instead of 3 shifts due to the lack of transport facilities for the worker.
2. The work flow is from wagon to wagon and there is no big batching arrangements.
3. There is no laboratory for colour tests or quality control.
4. Lack of singeing and mercerizing which are important to finish polyester/cotton.
5. The heat setting stenter is a bottleneck and limit the production.
6. Unadequate maintenance.
7. Lack of specific baking facilities.

Recommendation and trials to solve all the above mentioned problems have been given to them but it seems after the lease of the factory that neither the owners nor the tenant are keen in investing additional capital in new investment to improve the condition of work. Therefore it is necessary to reconsider this situation with the government resuming the possibility of replacing our assistance to another factory.

INTRODUCTION

Delimatex bleaching, dyeing, printing and finishing unit is one of the selected units by both the government and the project to be assisted regularly for rehabilitation & development in order to be as model for other similar units. It has been visited by our expert Mr. Bennett for several times during the period from January to August.
There is no previous investigation for this factory and the aim of the present one is firstly to make survey, numerating the problems, how it has been detected, what are the recommendation and what will be the result technically & economically. As mentioned in the "abstract", there are so many problems which have been found; Recommendations have been given, trials have been made to show the result of some of these recommendation, and discussion with the management have been held to make everything clear and understood by the management.
But the draw back which will limit the implementation of our recommendation is the lease of the factory to another producers.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing informations and facilities to do this work.

TECHNICAL REPORT ON DELIMATEX

Submitted to Dr. El-Sayed M. Oweiss

October, 1972

by JOHN E.H. BENNET

Bandung, 31th October 1972
TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

SUMMARY

a. This is a privately owned weaving, dyeing, and printing factory established in 1969 in an industrial estate about 15 kilometers from Bandung. Since the early part of this year it has been leased to the Margasandang Company of Bandung.
It now specialises in finishing polyester cellulosic blend fabric. The weaving department is not yet completed. The basic production is the preparation and blending of cloth to be dyed at the leasing company's main works and printing and finishing order allocated to them.

b. The buildings and the machinery are modern.

c. According to the management there are no problems but we would list them as follows :-

1. There are no singeing or mercerising machines which are considered essential in the processing of polyester cellulosic cloths.
2. The Kyoto heat setting stenter is the obvious bottleneck and a limit to the production for it is used for drying and heat setting, resination and baking.
3. The limited production of the Ichinose Flat Bed Screen Printing machine and the inadequate colour kitchen and screen engraving facilities.
4. The lack of Quality Control and Laboratory organisation.
5. In our opnion the scouring and bleaching done by jiggers is uneconomical.
6. Inadequate maintenance control and responsibility.
7. Lack of specific baking facilities together with the unused steamer and high pressure kiers.
8. Overmanning of the jiggers.
9. Industrial effect.

d. Our recommendations for dealing with these problems are as follows:-

1. It would seem to us good policy with the space available to purchase and install a singeing machine and a mercerising machine at Delimatex. There is a surplus new singering machine at Garut which may be bought more cheaply than a new one. A chainless type merceriser will cost approximately Rp. 40,000,000.
2. The Kyoto stenter is a very good machine but it is very occupied with three functions; heatsetting, resinating and baking. It should be possible for the unused steamer to be modified as a backing machine and we would recommend enquiries to the maker.
3. It must be pointed out that the productive capacity of a Rotary screen printing machine is much superior to that of the flat bed Ichinose as at present installed. The colour kitchen is very small and is inadequately drained and the screen making facilities cramped. With a little expenditure condition could be made more pleasant with an improvement in quality of work and morale.
4. Delimatex manages at the present time without a laboratory organization to supervise inspection and testing. We are told that the customers are satisfied. It may be that in the future as customers become more critical this state of affairs will not last and it would be advisable to build up the mucleus of a testing organisation now. An analytical chamist can always save his salary by checking strengths of dyes and chemicals and by research and development on new fibres and new finishes.
5. We would recommend that some semi-continuous batch method of bleaching such as a pad-roll machine with hydrogen peroxide. This suggestion would need to be evaluated carefully on a cost basis, but it should show definite economies and give a more consistent bleach than the current jig bleaching with hydrochlorite.
6. There should be in all dye and print works a mechanic with the definite responsibility for the maintenance and to work out if possible a preventive system. It is the duty of all managers

to ensure that the assets in their charge are preserved and maintained.

7. Our suggestion to relieve the stenter of the baking function is to examine if the unused steamer can be modified to bake. The unused kiers should be sold unless their future use can be forseen.
8. According to our advice the number of men on the jiggers has been reduced from one man one jig but the target of one man two jiggers is possible as is the usual practise in the developed countries.

In the report there is a description of the works trials carried out and the advice given on the preparation and bleaching of cloth, on printing problems and on the resin finishing of cloth.
There are appendices on machinery and a graph on the estimated capacity.

9. Effluent.

   The arrangements for the effluent are perfunctory, it simply flows away to a rice paddy drain and we understand that a local farmer is complaining. It is expected that as the industrial estate develops central organisations will deal with the industrial waste and effluent of this area.

REPORT SUBMITTED TO Dr. OWEISS ON DELIMATEX SEPTEMBER 7, 1972

1-0 INTRODUCTION

This report is the result of many visits to the factory during the course of 1972. Since the start of our interest the policy has been changed as will be seen in the report.

2-0 HISTORY

This is a privately owned weaving, dyeing, printing, and finishing factory established in 1969. Since January or the early part of this year it has been leased to Margasandang of Bandung, for a fee. It commenced working in 1971 and was obviously planned for cotton production as is indicated by the presence of kiers and hypochlorite bleaching tanks. It is now specialising in polyester cellulosic blend cloths and untilising to the full the heat setting capacity of the Kyoto stenter. There has been a definite change in policy since our first visits and with the contracting of the works to Margasandang they are concertrating on the bleaching of polyester cotton cloth for dyeing at the central works and printing the orders allocated to them.

3-0 BUILDINGS

It is a rectangular building of two bays devided by pillars with a corrugated iron roof. Approximate measurements situated about 15 kilometers from Bandung on what is now a developing industrial estate.

The site is level and is drained by a small stream. The process water is pumped from wells and the effluent drains to a small paddy outflow.

There is an administration block housed on a second story of the main building, and the design department occupies a separate cottage.

The Boiler house and electricity generators are in a separate building not far from the main block. The floors are of concrete and there is adequate strip lighting. About a third of the main building is occupied by about 150 second hand weaving looms, maker Suzuki Japan.

These are not yet in production.

4-0 STEAM AND POWER AND WATER SERVICES

There is occasionally a shortage of steam as when trials were done by us on the steamer. The water has not yet been tested. Electricity seems to be adequate. The water is obtained from their own wells. Effluent drain to rice paddy.

5-0 MACHINERY (See also appendix).

(i) Scouring

2 high Pressure kiers-maker Kyoto 1971 capacity 1000 kgs. with automatic pilers and external heaters with pump circulation. NOT USED.

(ii) Bleaching

2 concrete bleaching tanks capacity 1,000 kgs. with pump circulation plus rope washing machine. NOT USED.

(iii) Jiggers

8 jiggers, 3 with hoods 5 open.

Stainless steel fabrication stainless steel rollers, locally made in 1971. Width overall 165 cms. working width 140 cms. Capacity 100 kgs. of cloth. Speed 50 mpm.

These are a badly designed jig with very small top rollers which are prone to crease the cloth. Open pipe steam heatting without fixed thermometres and with inadequate water supply.

(iv) Drying

There is a combined washing and cylinder drying range comprising foulard and skying rollers, six washing compartments with hydraulic nips and expanders and sixteen drying cylinder.

Maker Kyoto Japan Year 1970.

Width overall 165 cms. working width 140 cms.

Speed maximum 45 mpm. Normal 35 mpm.

This is a very good machine well constructed of stainless steel.

(v) Printing

Flat bed automatic eight colour-hand fed with colour, with dryer.

Maker Ichinose, Japan.

Maximum width overall 165 cms. working width 140 cms.

Speed maximum 10 meters per minute normal 7 metres per minute.

This machine is an adequate printing machine but it has limited production capacity and unfortunately is not just wide enough for two passes of cloth. This is unfortunately for its width is not fully untilised and on enquiry it is impossible to modify.

(vi) Stenter

One stenter. Maker Kyoto Japan Year 1970.

Pin clip plus foulard with pneumatic loading and weft straghtening devices. Maximum width 165 cms. Working width 140 cms.

Speeds maximum 70 metres per minute,	Resinating	150°C	20 mpm.
normal 40 metres per minute,	Curing	190°C	30 mpm.
bake 60 metres per minute,	Heatsetting	190°C	40 mpm.

It has heat setting chambers oil fired and is a very good machine.

(vii) Calender

One 3 bowl two cotton, one steel. Maximum width overall 165 cms. working width 140 cms. Speed 60 metres per minute.

(viii) Steamer

Rapid Ager maker Kyoto Japan 1970.

Cloth capacity 150 metres. Width overall 165 cms.

Working width 140 cms.

Small pre-chamber for acid steaming. Stainless steel rollers with external bearings. Maximum temperature steam 103 Centigrade.

This is a good machine but is unused.

(ix) Make up and Inspection

3 plaiting machines. 1970 speed 750 metres per hour.

(x) Boiler

1 Sunray maker Japan 1969.

Maximum steam evaporation 4,000 kg. per hour.

Maximum working pressure 10 kg/cm.

(xi) Electricity

Three generators, Diesel Makers.

1. Rockford - out of order.
2. Meiden 150 KVA.
3. Mercedes Benz 80 KVA.

6-0 PRODUCTION

The production figures are not easy to obtain. We understand that they are processing circa 400,000 yards per month but the proportion printed and the proportion prepared for dyeing is not given.

We estimate that the maximum production seven days a week 350 days a year at 70% efficiency would be in the range of 3,256,000 metres per year. We should put the capacity of the present buildings to house plant capable of a limit of say 10,000,000 metres per year but this would need substantial expenditures on new machines for stentering and semi continuous bleaching.

It is according to our information impossible to work three shifts because of the lack of transport facilities for the workers.

7-0 PROCESSING ROUTINE

Cloth is received from the main factory for preparation for dyeing and returning to the parent factory of for printing and finishing at Delimatex itself. Some of the dyed goods from Margasandang is returned for resin finishing.

Cloth singed at the main factory is delivered to the grey room where it is marked and stamped.

1. It is then pre-heat set on the stenter.
2. The cloth is loaded on the jiggers with an average capacity of 100 kg. of fabric desized and scoured and bleached with calcium hypochlorite, washed off and further washed and impregnated with

an optical bleaching agent on the combined washing machine cylinder drying machine.

3. It is then dried and sent either to the main works for dyeing or printed on the flat bed Ichinose eight colour printing machine. The printing system is pigment dyestuff which is simple not requiring washing off and the final finishing treatment is to resinate and bake on the Kyoto stenter.
   Dyed material from the main works is returned for resination and backing.

4. The cloth is then either folded or plaited for measuring and make up. The inspection is cursory and standards are ignored. We are told that the customers are very satisfied with the production quality.

5. The kiers, calender, and steamer are so far unused.

8-0 WORK FLOW AND LAY OUT

This is a level situation and the processing is from wagon to wagon. There is no big batching arrangements and as is customary in Indonesia no batching to or from the jigs.

9-0 LABORATORY

There is no laboratory and the colour kitchen is very small and badly drained making for an untidy work place.

10-0 LABOUR FORCE

30 men on each two shifts of twelve hours.
They do not work additional shifts because of the difficulties of transport for the workers as many of them live far from the works.
10 administrative staff. Wages basic time plus allowances.
Manager Mr. Kim.

11-0 INSPECTION AND QUALITY CONTROL

There is little inspection done and according to Mr. Kim; the customers are satisfied with their production. There is no testing for resination standards or wash fastness or pilling or dimensional stability of the fabric delivered.

12-0 MARKETING

Head office responsibility. Main market Bandung.

13-0 PROBLEMS

According to the management there are no problems but we would list them as follows:-

1. There are no singeing or mercerising machines which are considered essential in the processing of polyester cellulosic cloths.
2. The Kyoto heat setting stenter is the obvious bottleneck and a limit to the production for it is used for drying and heat setting, resination and baking.
3. The limited production of the Ichinose Flat Bed Screen Printing machine and the inadequate colour kitchen and screen engraving facilities.
4. The lack of Quality and Laboratory organisation.
5. In our opinion the scouring and bleaching done by jiggers is uneconomical.
6. Inadequate maintenance control and responsibility.
7. Lack of specific baking facilities together with the unused steamer and high pressure kiers.
8. Overmanning of the jiggers.
9. Industrial effluent.

14-0 RECOMMENDATIONS

Our recommendations for dealing with these problems are as follows:-

1. It would seem to us good policy with the space available to purchase and install a singeing machine and a mercerising machine at Delimatex. There is a surplus machine at Garut which may be bought more cheaply than a new one.
   A chainless type merceriser will cost approximately Rp.40,000,000.-

2. The Kyoto stenter is a very good machine but it is very occupied with three functions; heat setting, resinating and baking. It should be possible for the unused steamer to be modified as a baking machine and we would recommend enquiries to the maker.

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4. Delimatex manages at the present time without a laboratory organisation to supervise inspection and testing. We are told that the customers are satisfied. It may be that in the future as customers become more critical this state of affairs will not last and it would be advisable to build up the nucleus of a testing organisation now. An analytical chemist can always save his salary by checking strengths of dyes and chemicals and by research and development on new fibres and new finishes.

5. We would recommend that some semi-continuous batch method of bleaching such as a pad-roll machine with hydrogen peroxide. This suggestion would need to be evaluated carefully on a cost basis, but it should show definite economies and give a more consistent bleach than the current jig bleaching with hypochlorite.

6. There should be in all dye and print works a mechanic with the definite responsibility for the maintenance and to work out if possible a preventive system. It is the duty of all managers to ensure that the assets in their charge are preserved and maintained.

7. Our suggestion to relieve the stenter of the baking function is to examine if the unused steamer can be modified to bake. The unused kiers should be sold unless their future use can be forseen.

8. According to our advice the number of men on the jiggers has been reduced from one man one jig but the target of one man two jiggers is possible as is the usual practise in the developed countries.

In the report there is a description of the works trials carried out and the advice given on the preparation and bleaching of cloth, on printing problems and the resin finishing of cloth.
There are appendices on machinery and a graph on the estimated capacity.

9. Effluent.
The arrangements for the effluent are perfunctory, it simply flows away to a rice paddy drain and we understand that a local farmer is complaining. It is expected that as the industrial estate develops central organisations will deal with the industrial waste and effluent of this area.

15-0 MANAGEMENT & STAFF

The staff are competent in printing. Mr. Kim seems a very bright and capable manager and should be encouraged.

16-0 INSTRUCTION AND TRIALS CARRIED OUT

a. Many discussions have been held with the manager Mr. Kim. Among the subjects covered are:-

1. The question of singeing polyester blend cloths and its influence on "pilling".

2. The use of the high pressure kiers in the scouring of cotton goods and the plant lay-out for washing machines and the bleaching with calcium hypochlorite.

3. We have discussed the jiggers and pointed out the deficiencies in their design; the very small top rollers which are prone to make creases; the inadequate water supply to the jiggers extending unnecessarily the time of filling; the important factor of cloth to liquor ratios and the need for these to be standardised in order to produce even batches; the filling and emptying of cloth on jiggers and the possibility of batching the cloth prior to filling on the jigger enabling the operation to be done by one man and not two as at present; the need for adequate temperature and the desirability of fixing thermometers to each jigger.
   On our advice Mr. Kim has reduced the number of workers on the jiggers from one man on jigger, to six men eight jiggers and is going to reduce this number still further.

4. We have discussed the washing and drying range and the possibility of using it for Indigosol dyeing and the use of sodium bicarbonate as an addition to a wash off section when bleaching is done with hydrogen peroxide.

5. We have recommended tests for the absorbency of cloth before printing and commented on the pigment dyes of different makers and their systems. The question of printing with reactive dyestuffs and disperse dyes has been explored as well as naphthol grounds for cotton prints.
   We have talked about the various thickeners and emulsifying agents for print pastes. The possibility of running two drafts of cloth on the machine has been examined but unfortunately the machine is just not wide enough.

6. We have given regard to the Kyoto stenter and explained the need to keep the bowls of the foulard in good condition stressing the importance of nip tests for levelness and the need to measure and be aware of the expression of the nip, in other words the "take up". We have emphasised the need to give the screens attention and to watch that they are kept clean and so preserve the heating and drying efficiency.

The whole crease resisting process has been explained together with the various tests for crease recovery, abrasion, strength, stability, resin content, and the tests for fixation.

7. We have given instructions on the care and maintenance of the calender and the principles of calendering.

8. The question of the use the steamer has been explored and its alternate uses. The first trial on running the steamer was done with our supervision.

9. Recipes have been given and explained for the hydrogen peroxide bleaching of cotton and polyester cellulosic blends. We have explained the need to know the size used in the preparation of any cloth in order best to remove it and instruction has been given on the essential means of testing to check that the cloth is size free.

10. Stock control has been discussed and recommendations made about the need to weigh chemicals accurately and the great influence of chemicals and dyes on the economics of the trading account.

11. The importance of having a suitable work's laboratory has been stressed and the importance of being able to do one's own matching and testing without having to resort always to the dyestuff maker.

12. We have discussed and explained semi-continuous and continuous methods of bleaching and recommended especially the pad roll hydrogen peroxide bleach for polyester cellulosics.

13. We have explained the importance of quality control in all aspects of finishing and the need to be ready for more and better standardisation when the market becomes more sophisticated.

b. **Trials.**

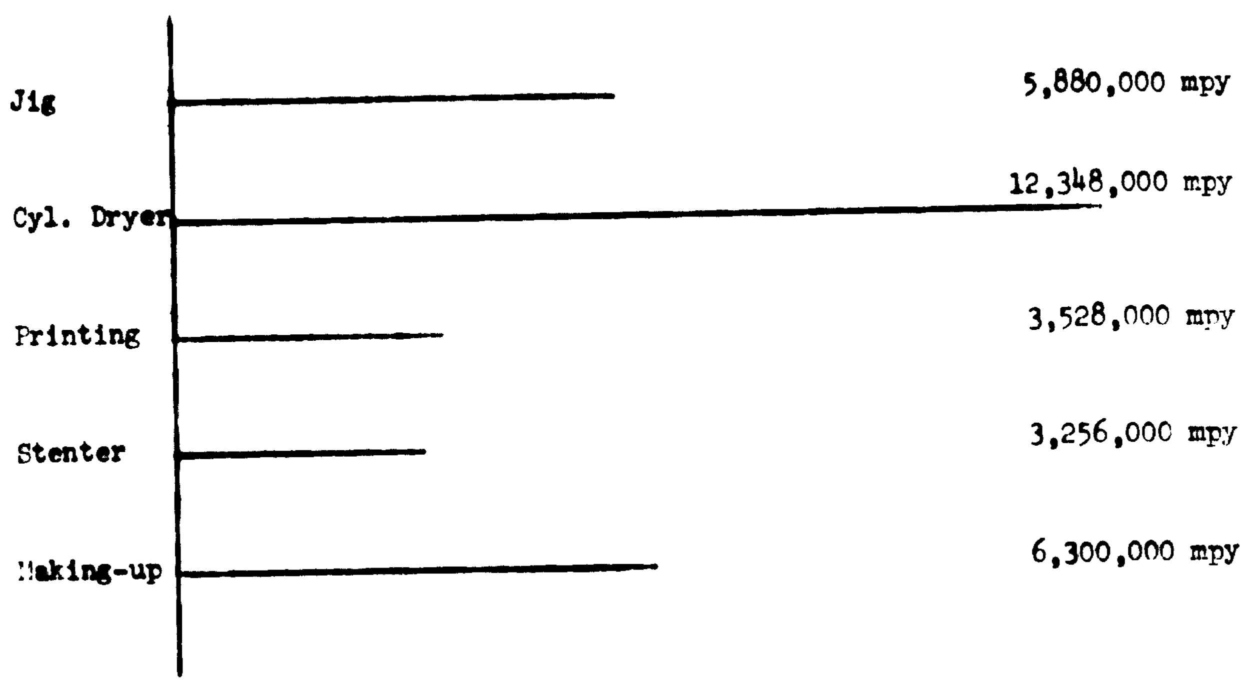
1. Bleaching trials using different recipes of hydrogen peroxide were demonstrated.

2. The starch iodide test for starch was introduced and shown to the technician in charge.

3. A first run on the steaming machine was organised and cloth padded on the jigger with hydrogen peroxide was steamed for five minutes in the steamer.
   The white produced was very satisfactory but the management decided that the quantity of steam required diminished the boiler supply to too great a degree and that they would prefer to carry on with the present method of bleaching with calcium hypochlorite on the jiggers.

APPENDIX I

The Capacity of Delimatex - working 24 hrs. a day
7 days a week, 350 days a year at 70% efficiency



APPENDIX II

M A C H I N E R Y

MACHINE	MAKER	TYPE	YEAR	CAPACITY	SPEED MAX. NORMAL	WIDTH OVERAL	WORKING WIDTH	COMMENT
Singer Nil								
Scouring								
Kiers 2	Kyoto	High Pressure	1971	1000 kgs.	Automatic Piler External Heaters			Good but not used
Bleaching								
Concrete Tanks 2	Local	Pump circulation		1000 kgs.				- " -
Washing Machine 1	"	Rope Washer						- " -
Jiggers 5	"	Open	1971	100 kgs.	50mpm.	165cms.	140cms.	Poor Design
Jiggers 3	"	Closed	1971	100 kgs.	50mpm.	165cms.	140cms.	- " -
Washing and Drying								
Combined Washing & 16 cylinder drier 1	Kyoto	6 Wash Comps.	1970		45mpm. 35mpm.	165cms.	140cms.	Good machine
Printing								
Flat Bed 1	Ichinose	8 colour	1970		10mpm. 7mpm.	165cms.	140cms.	Colour hand fed Good Machine but slow
Finishing								
Stenter 1 plus Two Bowl Foulard with pneumatic Loading	Kyoto	Pin Clip	1970		50mpm. 20mpm. Resinating 20mpm. Heat setting 40mpm. Baking 30mpm.	165cms.	140cms.	Temp. 220 C Very Good
Calender 1 pneumatic Loading	Kyoto	3 Bowl	1971		60mpm.	165cms.	140cms	Good machine
Steamer 1	Kyoto	Rapid Ager Roller	1970		70mpm. 30mpm.	165cms.	140cms.	150 metre Capacity. Good machine unused.
Make up								
Plaiters 2			1970		15mpm	90cms.		Good.
Boiler and Electricity								
Boiler 1	Sunrey		1969	Maximum Steam Evaporation 4,000Kg per hour Maximum Working Pressure 10 Kg/cm				
Generators 3	Rockford out of order Maiden Mercedez Bens			150 KVA 80 KVA				

APPENDIX III

ANSWER TO QUESTIONAIRE

Concordant with requestion from UNIDO Expert for answer some questions, therefore in the following we answer about our factory Delimatex Ltd. as follows:-

1. Until now we not production self, because our mill a finishing factory. The next time we have a planning for making a weaving production for Tetoron Rayon and Tetoron Cotton cloths from Suzuki machines made in Japan.
   Our finishing equally/month we received 31,888,500 Kg form our customer for Dyeing, Bleaching, Printing, Heatsetting etc. from some kind cloths.

2. Labour force the amount 83 man and 1 woman.
   Hours of work 8 hour every day.
   Type of shift system 2 (two) shifts for night and day, if we have busy the labours they must duty until finish, and we mean They have a axess work.
   Payment time or incentive is cash every week in Saturday for daily labours.

3. Rough organisation of works staff (7 men and 1 woman). They has finished study from: - One man a Sckolar for Faculteit of Economi
   - One man a Bachelor of Art for Public Relations, and the other abiturent of High School and they was the experience work.

   Training on our mill until now; not yet.

4. Production of bleached, dyed and printed styles;
   The bleaching process we have worked as follows:-
   Machine .... Jigger
   recipes .... Caustic Soda, Teepol and Soda Ash Caporit, Na Bezulfit

Dyeing

machine .... Jigger

recipes .... Caustic Soda, Soda Ash and Teepol

colour .... to depend on the customer what they like.

5. Types of finish - from three style types of finish we have only Resin.

6. Desizing, Scouring and Mercerizing until now we have not.
   The methods it we to ask recipes to the representative I.C.I. and CIBA.

7. Dyeing process is Direct.
   The Jigger machines we have 8 machines for bleaching and dyeing, its all made in Indonesia.

8. Printing - Type of machine is Screen
   Method is Direct Printing.

9. Finishing process is Resin finishing
   Curing
   Calender and
   Cylinder Drying Machine.

10. Making up and Inspection is Crease and plait.

11.

12. Laboratory and Dyeing Offices; We still need some equipments for above.

13. Quality control - Not yet.

14. Transport and lay out of factory; We think very well, because our mill is strategis between two cities (Bandung and Madjalaya) that is the Industry City.

15. Steam power we take from the Boiler machine made in Japan, and water we take from the soil with Pump system and water tourent.

16. Internal Administration method; We have some parts of duty in the organization work of staff that is Administration of staff, Public Relations, Personalia, Book Keeping, Managerial and Administration of factory.

17. Costing and Storage; For costing the same with public marketing, and we have not the Storage because its cloths we received from our customers for make on the process finishing (makloon).

18. Technical training of staff; Not yet.

19. The other problems; We need working capital for productiviteit continuous in our mill.

Proposal : We hope UNIDO to prepare a course or trainings for labours especially for skilled man, managerial skill and Technical skill.

APPENDIX IV

STOCK POSITION 31-12-1971

POSISI STOCK BAHAN LANGSUNG PER 31-12-1971

No.	Djenis Barang	Banjaknja	Harga Satuan	Djumlah Harga
(1)	(2)	(3)	(4)	(5)
1.	Luminious Green GZ	50 Kg.	Rp. 2.282,--	Rp. 11.414,--
2.	" Blue RLC	150 kg.	" 960,--	" 144.000,--
3.	" Orange GZ	25 kg.	" 2.093,--	" 52.325,--
4.	Caustic Soda	50 kg.	" 30,--	" 1.500,--
5.	Unica Resin 560 FB	50 kg.	" 340,--	" 17.000,--
6.	" MB	70 kg.	" 530,--	" 37.100,--
7.	Luminious Orange FKS	25 kg.	" 1.440,--	" 36.000,--
8.	Savamine OC	25 kg.	" 450,--	" 1.125,--
9.	Liofix CHN	180 kg.	" 675,--	" 121.500,--
10.	Reducer Conc 500	100 kg.	" 600,--	" 60.000,--
11.	Amoniax	10 kg.	" 130,--	" 1.300,--
12.	Asetic Acid	60 kg.	" 145,--	" 8.700,--
13.	Calsaline oil	85 kg.	" 425,--	" 36.125,--
14.	Tapioca	1.500 kg.	" 30,--	" 45.000,--
15.	Perborat	145 kg.	" 160,--	" 23.200,--
16.	Soda Ash	415 kg.	" 46,--	" 19.090,--
17.	Soda Kue	15 kg.	" 56,--	" 840,--
18.	P.V.A. Kuraraj	180 kg.	" 600,--	" 108.000,--
19.	Amonium CL	15 kg.	" 150,--	" 2.250,--
20.	U r e a	65 kg.	" 28,--	" 1.820,--
21.	Hydrosulfite	8 kg.	" 320,--	" 2.560,--
22.	Lak merah	5 kg.	" 1.233,21	" 6.166,05
23.	Disf F Conc	15 kg.	" 500,--	" 7.500,--
24.	" R Rubine BT	15 kg.	" 5.500,--	" 82.500,--
25.	" T 5 G Yellow	21 kg.	" 4.550,--	" 95.550,--

(1)	(2)	(3)		(4)		(5)
26.	Disf B Orange	16 kg.	Rp.	1.700,--	Rp.	27.200,--
27.	" Fast Yellow T 4 R	14,5 kg.	"	3.025,--	"	43.862,50
28.	Caledon Orange 3 G	9 kg.	"	6.800,--	"	61.200,--
29.	" Blue XRC	9,5 kg.	"	3.500,--	"	33.250,--
30.	" Grey M	24,5 kg.	"	4.125,--	"	101.062,50
31.	" Olive D Grains	23 kg.	"	3.800,--	"	87.400,--
32.	" " B "	21 kg.	"	4.125,--	"	86.625,--
33.	Dierek Kongarot	10 kg.	"	900,--	"	9.000,--
34.	Direct Grains B	25 kg.	"	1.250,--	"	31.350,--
35.	Direct Salopenhil Yellow FL	10 kg.	"	1.200,--	"	12.000,--
36.	Direct Orange S	20 kg.	"	1.600,--	"	32.000,--
37.	Cibaron Blue F3 CA	20 kg.	"	6.080,--	"	121.600,--
38.	" Black FBC	7 kg.	"	3.520,--	"	24.640,--
39.	" Brown 4 Gr-A	12,5 kg.	"	4.130,--	"	51.625,--
40.	Crysophenin Yellow G	3,5 kg.	"	1.000,--	"	3.500,--
41.	Ultra White BC Conc	30 kg.	"	1.200,--	"	36.000,--
42.	Manutex	15 kg.	"	1.750,--	"	26.250,--
43.	Caledon Brown G	3 kg.	"	4.015,--	"	12.045,--
44.	Terazil Yellow Brown 2 R	20 kg.	"	3.560,--	"	71.200,--
45.	" Navy Blue SGL	12,5 kg.	"	3.480,--	"	43.500,--
46.	" Yellow GWL	10 kg.	"	1.880,--	"	18.800,--
47.	Blancopor BA	4 kg.	"	1.450,--	"	5.800,--
48.	Cuprofix Tuquise Blue FBL	7 kg.	"	1.300,--	"	9.100,--
49.	Uvitex CID 550	2 kg.	"	3.500,--	"	7.000,--
50.	Tumescal OPE	25 kg.	"	775,--	"	19.575,--
				DJUMLAH	Rp.	1.965.398,05

Bandung, 31 Desember 1971.

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UNITED NATIONS DEVELOPMENT PROGRAMME (SPECIAL FUND PROJECT/INS - 71/531)

04460 (13 of 17)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 13

THE REHABILITATION OF P.T. KAMADJAJATEX WEAVING MILL

PANDAAN - EAST JAVA

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

Jakarta, November 20, 1972

EL-SAYED M. OWEISS

Project Manager.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
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ABSTRACT

Kamajayatex is an integrated factory weaving & finishing. It is located in a small town called Pandaan about 45 Km south of Surabaya, the capital of East Java.

Building is old with very high roof without air conditioning and other modern equipments therefore it is not suitable for weaving.

Machines : The weaving shed is equipped with 291 semi-automatic old looms related to 1934 & 1940 with the exception of 46 Suzuki looms which had been manufactured in 1967. There are another 200 Toyoda-Automatic cop change looms under erection.

The following report is a survey made by our weaving expert Mr. Hoshiyama during his visit with his counterpart Mr. Malikus during August 9 & 10, 1972.

The pattern of the production is T-cloth Shirting, twill & the national dress Sarong. The technical problems which have been detected are numerous i.e. low quality of yarns bought from different suppliers, the necessity of modernization for some cone winder, bad storage of the raw-yarns, bad hand knotting in cone winding and warping, small size of the pirn bobbins, uneconomical change system in creel, unsuitable sizing recipe, and the obsolescence of most of the present looms. The result of these problems is a very low efficiency varies between 45% - 70% according to the conditions of the looms.

In the report of Mr. Hoshiyama there are recommendations to remove most of these problems which in his opinion can raise the efficiency up to 70% - 90% instead of 45% - 70%. We are going after this survey to demonstrate and follow up the implementation of these recommendations.

INTRODUCTION

Kamajayatex weaving shed is one of the factories which receives our regular assistant for rehabilitation & development with the aim of cutting down the cost of production.

It is intended after the implementation of our assistance that this factory becomes as a model to the others for the purpose of improvement. It has been visited, during this period once before by the Project Manager but the report of Mr. Hoshiyama is the only survey drawn on this factory.

The unsuitable present building will contribute a handicap.

It is possible, after the completion of erecting the new machines, for the preparation and the new looms that the conditions of work even for the present old machinery will be remarkably better.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing informations and facilities to do this work.

Technical Report

R e h a b i l i t a t i o n   o f

P.T. KAMADJAJATEX WEAVING MILL, PANDAAN - EAST JAVA

November, 1972

T. Hoshiyama

Tamotsu Hoshiyama

Weaving Technologist

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

1. INTRODUCTION

This is a summary of my survey, discussion, demonstration and recommendation etc. during my first visit to the mill along with Mr. Malikus Sudiptyo, my counterpart (August 9 & 10, 1972).

2. GENERAL DESCRIPTION OF MILL

2-1 Site & Building

It is situated in Pandaan, about 45 Km South of Surabaya, East Java and has weaving mill and finishing plant.
The building was build originally for a sugar refinery, it has high roofs unsuitable for weaving and no air conditioner.

2-2 Short History and Management

1934 changed the former sugar refinery to a private weaving mill owned by a Dutch family.

1958 Transfered to the Government of Indonesia, Bappit.

1960 Transfered to the Government P.N. Busana Yasa.

1964 Transfered to the Provincial Government Pinda Sandang.

1971 Transfered to P.T. Kamadjajatex.

The head office is in Surabaya and now Mr. R. Soerjadi Soerjopranoto is President Director, Mr. Sulaeman Mill Manager and Mr. Soejono Chief of Weaving Section.

2-3 Number of Loom

(1)	Gustav Thiele (1934), Germany, 1x6, Upper picking, 36" R/s	187
(2)	Suzuki (1940), Japan, 1x1 & 1x4, 64" R/s	39
(3)	Suzuki (1967), Japan, 1x1 & 1x4, 64" R/s	46
(4)	Others 36 – 52" R/s	19
	Total	291

2-4 Cloth Kind Produced At Present

(1) Sarong $\frac{42^{s}/2 \text{ x } 40^{s}}{64(\text{Reed No.}) \text{ x } 70}$ x 29" (After finished, 28")

(Pre-dyed yarn)

(2) Shirting, T-cloth

$$\frac{30^s \times 30^s}{60(\text{Reed No.}) \times 60} \times 41'' \quad \text{(After finished, 38'')}$$

(3) Shirting, T-cloth

$$\frac{30^s \times 30^s}{60(\text{Reed No.}) \times 70} \times 41'' \quad \text{(After finished, 38'')}$$

(4) Twill $\frac{20^s \times 20^s}{56(\text{Reed No.}) \times 48} \times 33''$ (After finished, 28")

2-5 Supply of Raw Yarn

By P.N. Sandang (Grati Mill etc.), Pinda Sandang (Tjilatjap Mill etc.) and sometimes local markets, all of them are in the state of paper cone.

2-6 Weaving Production

Total about 4,000,000 m annually, four groups and three shifts operation system.

2-7 Marketing Condition

So far there exists no difficulty in marketing, espesially the demand for sarong is strong.

2-8 Extension Programme of Weaving Mill

Already 200 Toyoda Automatic Looms 65" R/s (Type CH 8 - Cop Change & GM 2 - 1 x 4, each 100 looms) have arrived from Japan, they are going to be installed soon.

3. RAW YARN

Now their raw yarns are supplied by many spinning mills, naturally the quality of yarn is widely fluctuated according to these various mills. They need to select the best quality mill and try to get the yarn constantly from this mill as much as possible, because the quality of yarn and its stability are the key-points for raising weaving productivity.

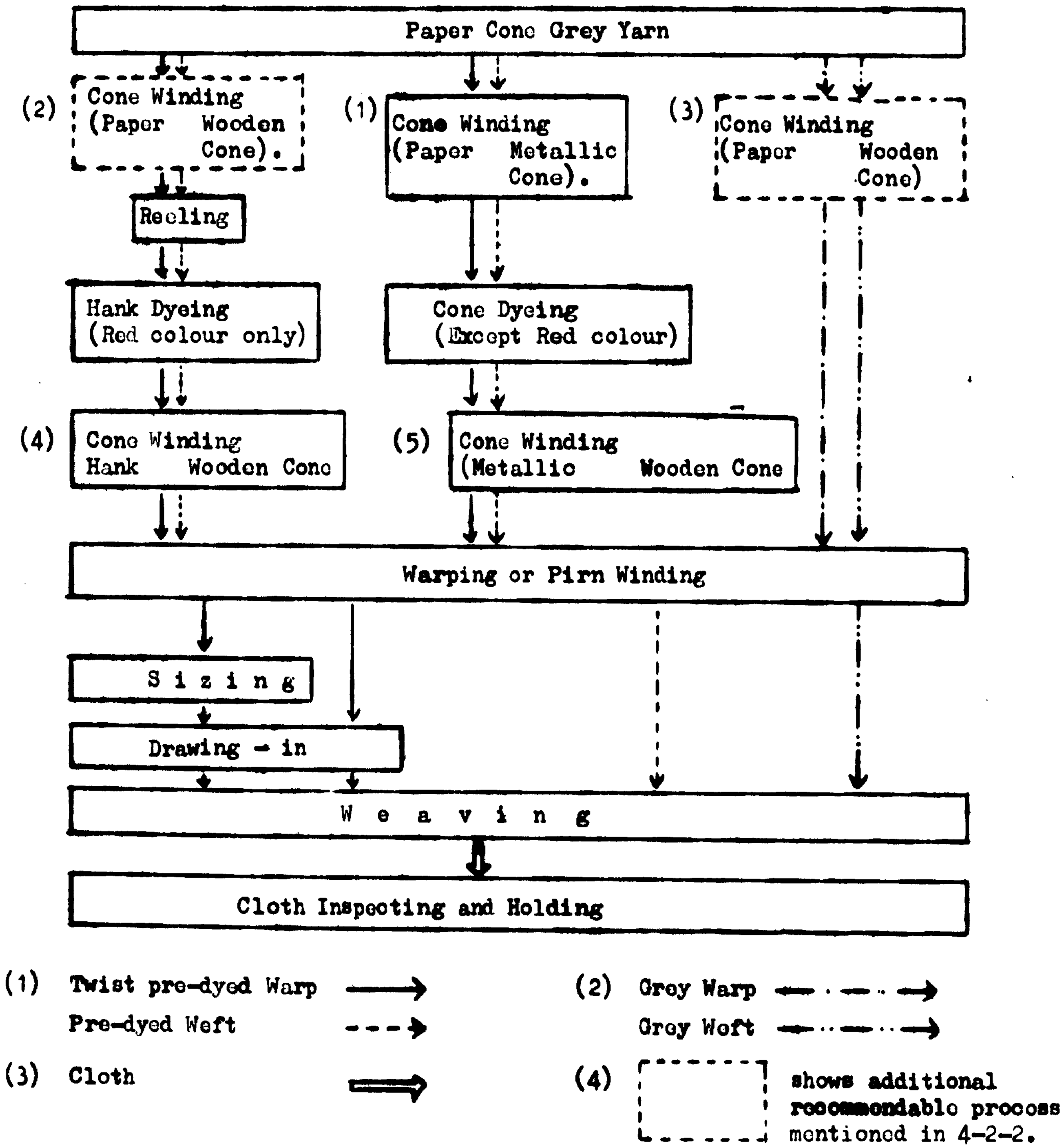
4. FLOW OF PROCESS

4-1 Process Chart

Now they are weaving two categories of cloth —— one is pre-dyed yarn checks sarong (twisted and unsized warp) and the other is grey plain and twill weave.

Only the red yarn for this Sarong is dyed in hank and all the rest in cone.

These processes are analyzed as follows :



4-2 Problems in this Process Flow

4-2-1 Yarn Dyeing

To economize the production cost in preparatory process and also to improve the cone quality which is one of the key-points for raising weaving efficiency, cone dyeing is much better than hank-dyeing, because both the hank-reeling from paper cone and the cone-winding from dyed hank are much more troublesome and inefficient due to the low reeling speed and the entangled yarn in the reel etc.

For this reason, they need to try to dye the red yarn also in cone-dyeing as much as possible.

But, as to dyeing itself, this cone-dyeing is more difficult than hank-one in its colour uniformity, and they should improve the dyeing process at present.

4-2-2 Rewinding of Paper Cone

Now the paper cone is directly put on the warper's creel and pirn winder for grey cloth without rewinding to wooden cone. Generally, in the spinning mills the yarn should be cleaned through the yarn cleaner (blade/saw teeth type) and be properly tied by knotting device in the final cone winding process, so far as I know many spinning mills in Indonesia, however, don't take care so much of this problem that in paper cone there still remain many slubs and foreign matters, the knotting portions are very irregular, and also during transportation many paper cone are crushed and deformed due to both the careless packing and the rough treatment —— all of them finally reduce the weaving productivity very much.

Anyway, all of the paper cone yarns should be rewound their own mill to wooden or metallic cones in the right manner mentioned in chapter 5, —— even the raw yarn both for grey cloth and before reeling for hank-dyeing as shown in in 4-1 Process Chart.

5. CONE WINDING

5-1 Machine and No. of Drum

(1)	Franz Muller's R.T. Coner	60 d x 2 m/c = 120 d
(2)	Franz Muller's Q.T. Coner	100 d x 3 m/c = 320 d
(3)	Richard Schwanert's Q.T. Coner	80 d x 4 m/c = 320 d
	Richard Schwanert's Q.T. Coner	60 d x 1 m/c = 60 d
(4)	Murata's No. 60 (1964) R.T. Coner	20d x 2 m/c = 40 d
	Total	= 840 d

Stop motions are disappeared in (2) and (3), and slit gauges absent in (1) and (3).

Only new Murata's No. 60 coners are new and in good condition.

5-2 Handling and Storage of Cone

All of paper, wooden and metallic cones should be handled more carefully, the rough surface-rubbing causes the naps of yarn and winding-layer out etc.

They should completely be covered with plastic cloth when storaged on the floor or in the box, now much dust are found on the cone surface which increase the yarn breakage in the process.

5-3 Operator's Action and Necessity of Knotting Device

They are now knotting the yarn by their own fingers and cutting the yarn end by their own nails, for this reason the knotted portions are not properly tied and also the out-ends are very irregular --- some of them are loosened, and too long cut-ends are entangled by the other yarn especially during weaving and they stop the looms to reduce the weaving efficiency.

Universal knotter shown by me in their mill needs to be bought and used immediately by all operators. The Knotter of this type is very cheap, not complicated in maintenance, very easy for training of operator how to use it, and very sufficient for cotton yarn.

Boyce's or Todo's weaver's knotter is, of course, better than the above mentioned universal knotter, because by this knotter they can get "weaver's knot" which is the best for weaving, but this is very expensive (about 20 times) and the maintenance is not so easy.

Anyway, use of knotter is one of the most important problems in preparatory section for raising weaving productivity. Sufficient tension should be given to the yarn by operator's hand when he contacts the cone on the rotating drum, otherwise the slackening of yarn will be caused and wound-in inside the cone, this troubles always in the next warping or pirn winding process..

5-4 Yarn Cleaner (Slit Gauge or Slub Catcher)

As mentioned already in 4-2-2, every yarn should once be passed through this yarn cleaner when rewound from paper cone to wooden or metallic one. The purpose is to cut and remove both the irregular knotted portions caused by spinning mills and the slubs remained in the yarn.

But the yarn already once rewound through this yarn cleaner should not be again rewound through it, it is unnecessary and rather harmful for yarn quality because the nap of yarn is increased by passing it more than once. That is, in "Process Chart" in 4-1, cone winder of (1), (2) and (3) should be equipped with these yarn cleaners, but (4), (5) and that for rewinding small cones remained in the warper's creel (mentioned in 7-3 and 7-4) should not have these yarn cleaners.

The gauge (clearance) of this clearer needs to be adjusted according to the yarn count, yarn quality and winding speed etc. For their cotton carded yarn 20s, 30s, 40s, 42s and 42s/2, the following gauges are advisable (about 2.5 times of yarn diameter for blade-type clearer).

Yarn Count	Yarn Diameter 1/100 mm	Gauge (1/100 mm)	
		Blade Type	Saw-Tooth Type
20s & 42s/2	22	55	65
30s	18	45	55
40s & 42s	15	38	45

They need to separate their all cone winders to two categories as mentioned above —— one for (1), (2) and (3), the other for (4), (5) and small cone rewinding, and the former should always have yarn cleaners and their gauge need to be adjusted according to the change of yarn, the latter should always have no yarn clearer at all.

5-5 Yarn Tension

Every cone of one kind yarn should be wound up uniformly under the same tension at each drum in order to improve the productivity and quality of weaving, and it is very important especially in the metallic cone for cone dyeing to avoid the colour difference.

The weight kind and number of tension washer, the bending angle of yarn at yarn guide, and yarn speed etc. should be checked and adjusted in the same manner.

6. PIRN WINDING

6-1 Machine and No. of Spindle

(1)	Murata's Type No. 100	4 spl x 8 m/c	=	32 spl.
(2)	Kovopol	4 spl x 8 m/c	=	32 spl.
(3)	Scharer	10 spl x 8 m/c	=	80 spl.
		T o t a l	=	144 spl.

6-2 Handling of Cone Operator's Action, Necessity of Knotting Device and Yarn Tension

The same advices as already given in 5-2, 5-3 and 5-5 should be followed.

6-3 Unit Yarn Length of Pirn

The yarn length of one pirn is, of course, the longer the better for raising the weaving efficiency especially in the case of ordinary and unautomatic shuttle/cop-change loom as theirs.

In spite of this importance of pirn yarn length, it is almost always neglected in every mill, it is, however, one of the key-points for improving weaving productivity, they have to try their best for increasing this yarn length.

To do this, they need to increase the outer diameter of pirn under the same and maximum but not-too-high yarn tension in this pirn winding process.
But before doing this, they should maintain all of their shuttle tongue (spindle) especially in the point of its direction and fixedness, otherwise the volume increased pirns will be contacted with the inner surface of shuttle.

7. WARPING

7-1 Machine

Sectional warper with 500 cone creel 4 m/c.

7-2 Putting Method of Paper Cone in Creel

As already mentioned, paper cone from spinning mill should not be used directly in the warping without rewound to wooden cone.
But when emergently necessary, at first an empty wooden bobbin should be put on the peg in the creel, and then the paper cone is put on it.
Now all of their paper cones are put on the pegs directly, their center lines don't coinside with the porcelain yarn guide, which cause unsymmetric unwinding-baloning during warping, then contact of yarn to the cone edge and finally many yarn breakages.

7-3 Cone Change System in Creel

They have to change all cones at once, and should not change them one by one when exhausted.
As they change them one by one now, they need to stop the warper so frequently about every 200 yds., change the cone and tie the yarn.
It causes not only the drop of warping productivity but also the degradation of weaving efficiency and cloth quality due to the inferior beams having many irregular knotted portions.
In a certain Indonesian mill, for example, formerly they changed cones one by one, the warping production per one shift was only one beam, but now they change all cones at once and they are producing three beams per one shift and naturally the beam quality has been much improved, which has raised their weaving efficiency so much.

Anyway, this is one of the key-points for improving weaving productivity.

For this reason, they should doff all of the cones for warp at the same yarn length, as much as possible this yarn length should be (one warper's beam yarn length) x (an integral number) + (about 1,000 - 2,000 yds).

For this also, they should wind all cones under the same yarn tension in order to give them the same hardness, because they can know the yarn length of cone only indirectly by its outer diameter. Otherwise, some of them will be too short and should be changed when exhausted in the middle of one beam warping, and the others are too long and should be rewound at long distance in the cone winding.

7-4 Rewinding of Small Cone Remained in Creel and Its Usage to Weft

This remained small cone, of which yarn length is equivqlent to about 1,000 - 2,000 yds in 7-3, needs to be rewound to full cone in winding process without passing through yarn cleaner as already mentioned in 5-4.

This rewound cone should be used as weft yarn as much as possible when both the warp and the weft is the same yarn (for instance, their warp 30s for shirting can be used as its weft 30s and twill warp 20s also as its weft 20s).

Because the demanded quality for warp is much more severe than that for weft, the rewound cone which has many knotted portions and naps should not be used to the warp if possible.

7-4 Operator's Action

A spring type scissors should be given to them.

When they start to warp a beam, they need to be more careful of giving sufficient tension by their hands to the yarn which is broken and tied by them.

8. S I Z I N G

8-1 Machine

(1) Hot Air Sizer (unknown Maker) —— (Obsolete) One

Immersion Roll — One

Squeezing Roll — Two pairs

Cavity Box with Gear Pump

(2) "West Point" 5-cylinder Sizer —— (under Installation) One

Immersion Roll — Two

Squeezing Roll, Rubber Coating (low hardness) — Two pairs

Moisture Monitor

(3) Wooden Mixing Cistern — Two

(4) "West Point" Jet Cooker —— (under Installation)

8-2 Size Recipe

8-2-1 Their Size Recipe

Material	30 s		20 s	
	Quantity	Ratio	Quantity	Ratio
Water	600 l	-	600 l	-
Tapioca (Adhesive Agent)	85 kg	(for water) 14.2%	75 kg	(for water) 12.5%
Cerimol —— "Chiba" (Adhesive Agent)	2.8 l	(for water) 4.7%	2.8 l	(for water) 4.7%
Finishing oil (Softening agent)	1.6 l	(for Starch) 1.9%	1.6 l	(for Starch) 2.1%
Salt (Hygrometric Agent)	1.5 kg	(for Starch) 1.8%	1.5 kg	(for Starch) 2.0%
T o t a l	690.9 kg	-	680.9 kg	-

8-2-2 Problems in Their Size Recipe

(1) They use salt for moisture-absorbtion agent, indeed it is very cheap and has hygrometric ability, but all iron parts of size mixing equipment, sizing machine, loom and its accessories are rusted by this salt, and, so far as I know, no weaving mill in the world uses salt for warp sizing material,

I don't know what the content of their "Finishing oil" is, generally speaking, however, oil and fat has hygrometric ability, I think they need not mix special agent for moisture-absorbtion, and they had better replace this "Finishing oil" by Animal (Buffalo) Fat 8 kg. or, if available, Maconol B-19 (Matsumoto Yushi Mfg. Co. Japan).

(2) For shirting 30s and Twill 20s, they need not change the quantity of Tapioca. For both of them, sizing materials can be mixed in the same weight, and only the water should be changed —— for shirting 30s 600 l, and for Twill 20s 700 l.

8-3 Size Mixing and Sizing Processes

Sizing machine was stopped and I could not survey these processes. Next time I will give them my suggestion especially for promoting the penetration ability of size liquid into the yarn by boiling it more longer than at higher temperature in the mixing cistern and both size and cavity boxes.

9. DRAWING - IN

Ten drawing-in stands are equipped, where one pair operators draw beams. No special problem was seen.

10. W E A V I N G

10-1 Efficiency and Weaver's Action

Now one weaver has 4-6 looms, and the efficiency is only 45-50% for Thiele Looms and 70% for Old and New Suzuki.
The condition of warp beam and weft pirn is not so bad that they can raise the weaving efficiency up to 70% and 90% for each loom group only by training weavers in the right way.
If they measure and analyse the weaver's work factor at present, they will definitely be surprised by the fact that how much hours of weavers are spent to open the defective cloth especially in checked sarong and to tie many samshed yarns, and that weavers don't concentrate their energy on their own essential job —— to repair the irregular yarn of beam, to watch the weaving cloth condition, to tie the broken yarn and to change the exhausted cop etc.
According to the individual weaver's production record, they need to train and urge them one by one for raising efficiency.

10-2 Necessity of Specialist for Defective cloth Opening and Smash Knotter

As already mentioned above, this specialist should be appointed in order to release the weavers from these jobs and to let them concentrate directly to raise weaving efficiency.

At the same time, they had better increase the number of sarong looms per one weaver up to six looms the same as shirting and Twill but you need to transfer all of the excellent weavers to Sarong and inferior ones to Shirting and Twill.

10-3 Mechanical Condition of Loom

Their Thiele and Old Suzuki Looms are obsolete, but they can and should maintain them much better than now, we can find in every loom many looseness and absence of bolt and they cause, for example, swing of slay-sword, rocking-shaft, crank-shaft, tappet-shaft and transverse-rail etc. —— all of them are very harmful and shorten the life of loom terribly.

Adjustment of picking motion should also be done more carefully, now many picking-back of shuttle inside shuttle box are found, this causes much consumption of picking spare parts. As I demonstrated on the spot, especially the check-strap should be adjusted in the proper and balanced strength.

10-4 Specialization of Mechanics

As already explained minutely in your mill, all mechanics should be specialized for every device of loom. However, of course, every mechanic needs to understand even the other mechanics job, because every motion and device of loom is so organically related that one adjustment and maintenance should usually be accompanied by the others.

11. CLOTH INSPECTING

The importance of this process exists in the feed-back of information about the preparatory and weaving processes into themselves, the data on cloth quality should be recorded and utilized for improving all processes.

12. CONCLUSION

Weaving is a labor intensive industry and it is much different from an equipment one like chemical plant, for this reason each operator's action has always great influence upon the quality and efficiency of production, and they can improve them by training operators and process control without spending extra money so much.

Their most urgent problem at present is to train the weavers, and the second is to improve preparatory section especially cone winding and warping process.

So far only once I have visited this mill for the initial survey to give them the first recommendation as above mentioned, for this reason this mill has not been improved yet so much.

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(SPECIAL FUND PROJECT/INS - 71/531)

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INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 14

THE REHABILITATION OF P.T. KANTJIL MAS WEAVING MILL
BANGIL - EAST JAVA

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

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S. [signature]

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ABSTRACT

Kantjil Mas is a private owned weaving factory situated in Bangil, South of Surabaya, the capital of East Java province.

Building : It was formerly equiped with sugar refinery machinery. So the roof is high and no air conditioning. Therefore it is not very suitable for weaving industry.

Machines : It has 205 looms of which 170 looms are new. It is also equiped with all machines required for preparation.

Problems and recommendations :

1. It is not running regularly, only about 60% of the looms run continuously for two shifts, due to shortage of raw materials.
2. The cost of production is high due to the low productivity.
3. In cone pirn winding and warping the operators use their hands to repair the yarns break-down although they have about 50 pieces of knotters.
4. The length of pirn is small and can be increased.
5. The change of cone and the warping creel is expensive due to the big decrease in productivity. So it is recommended to change all the cones at once, and the remained small ones have to be rewinded or to be used in supplying the pirn winder.
6. Sizing recipe as well as mixing process have to be changed to give better results in weaving.
7. There is no drying control on the sizing machine, so it is necessary to be equipped with any kind of electronic control.
8. Weaving efficiency during the visit of our expert with his counterpart was 60% and the workload which is 2 looms/operator both are low and a good program of in plant training can only increase the efficiency of these looms to at least 80% and to double the workload/operator.
9. The beam flange space must be adjusted to be 1½" bigger from every side. That is not less than 3" compared with the reed used space on the loom.

10. All the looms must be equipped with the weft-fork as a factor of improving the productivity.

Conclusion : It is recommended to resume working 24 hours a day, 7 days a week as some other Indonesian weaving sheds in order to benefit from the surplus of labour force in the factory at present and to cut-down tremendously the cost of production.

INTRODUCTION

The report drawn by our weaving expert is a survey, studying the conditions of this weaving shed, numerating the problems, mentioning the solutions and giving the recommendations.

From this survey we generally put our plan for implementation.

This is the first visit to this factory which have been selected by the government and ourselves to be assisted regularly and to be at the end as model to the others.

The survey had been carried on the 11th & 12th August 1972.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing informations and facilities to do this work.

Technical Report

R e h a b i l i t a t i o n o f

P.T. KANTJIL MAS WEAVING MILL, BANGIL - EAST JAVA

November, 1972

Tamotsu Yoshiyama

Weaving Technologist

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

1. INTRODUCTION

I visited their mill on August 11 & 12, 1972 for the first time along with Mr. Malikoes Soediptyo, my counterpart.
The following is a summary of my survey, discussion, demonstration & recommendation etc. during this visit.

2. GENERAL DESCRIPTION OF MILL

2-1 Location & Building

This mill is situated in Bangil, about 46 Km South of Surabaya, East Java.
Formerly it was a sugar refinery, its building has high roof unsuitable for weaving and no air conditioner.

2-2 Short History

1937 The former sugar refinery was changed to a weaving mill by a German family.

1940 Taken over by Dutch Government.

1941 Transfered to an Indonesian private company.

Now 'Dasaad Musin Concern' is its owner, the head office is in Jakarta.
Mr. Lahallo is Mill Manager and Mr. Sugijanto Production Manager.

2-3 Number of Loom

J. Güscken (Germany) with Dobby, 1 x 4	56" R/s	50
J. Güscken	52" R/s	50
J. Güscken with Drill Motion	52" R/s	30
J. Güscken with Dobby	52" R/s	20
Roscher with Drill Motion, Upper Picking	39" R/s	20
J. Güscken with Jacquard, for Towel	90" R/s	10
J. Guscken with Dobby, for Towel	90" R/s	10
Roscher with Dobby, 1x6, Upper Picking	63" R/s	10
Kovo (Czechoslovakia)	52" R/s	5
	Total	205

All J. Guscken's looms were made in 1965, and the others in 1937.

2-4 Cloth Kind Produced at Present

(1) Net $\dfrac{20^s \times 20^s}{(48 \times 3) \times 35} \times 56''$

(2) Net $\dfrac{30^s \times 30^s}{(48 \times 3) \times 35} \times 48''$

(3) Flannel $\dfrac{20^s \times 12^s}{(50 \times 2) \times 48} \times 36''$

(4) Cambric $\dfrac{30^s \times 30^s}{(64 \times 2) \times 60} \times 36''$

N.B. (A x B) in denominator shows (Reed Count x No. of yarns per one dent).

2-5 Supply of Raw Yarn

In paper cone by P.N. Sandang & Pinda Sandang Spinning Mills, Inbritex.

In hank by Pakistan etc.

The supply is recently very insufficient for short of raw cotton, and it is also very expensive, about 60% of total looms only can now be operated every month.

When weaving production is increased, the raw yarn becomes short and should be bought from the market about Rp. 3.000/bale more expensively.

2-6 Weaving Production

Total 125,000m/month approximately, two-shift operation.

2-7 Marketing Condition

Due to the expensiveness of raw yarn and cheapness of produced cloth on the contrary, marketing condition is now very difficult.

For instance, in 1968 30^s yarn was Rp.65,000/bale and Cambric was Rp.3,000/36,5 m, but they are now Rp.106,000 (63% up) and Rp.3,200 (6.7% up only) respectively.

Formerly the production was delivered to Police Office etc. and demand was stable, but now it is impossible.

Recently an order was issued for 100,000 m/month 30^s grey cloth for Batik, but they could not receive it due to the unavailability of yarn.

The former 3-shift operation has been changed to 2-shift, and the surplus workers' wages are now raising production cost very much.

3. RAW YARN

The biggest factor for weaving efficiency is the quality and its stability of raw yarn, for this reason they need always to test the various yarns carefully supplied by many spinning mills, to select the best one and then to be supplied only by this best spinning mill as much as possible.

This policy is also the best stimulation to spinning mills and it is very necessary for improving them.

4. CONE WINDING

4-1 Machine & No. of Drum

Frans Müller Rt Coner (New) $120^d \times 4$ m/c $= 480^d$

4-2 Operator's Action & Necessity of Knotting Device

They are now knotting yarn by their own fingers and cutting the yarn end by their own nails, for these reasons the knotted portion is not properly tied and the cut-end is very irregular --- some of them are loosened and the too long cut-end is entangled by the other yarn especially in the weaving and they stop looms to reduce weaving efficiency and quality.

They have now about 50 pieces of Knotter made in England but keep them idle --- they have to utilize them, because use of Knotter is one of the key-points for raising weaving productivity.

Sufficient yarn tension should be given by operator's hands when he contacts the cone on the winding drum, otherwise the slackening of yarn is caused and wound-in inside the cone as found now so many cases in their mill --- this troubles always in the next warping or pirn winding, degrades the beam & pirn quality and finally reduces weaving efficiency & quality.

4-3 Yarn Cleaner (Slit Gauge or Slub Catcher)

They are now rewinding paper cones for warp yarn supplied by spinning mills to wooden cone, but not for weft yarn --- this rewinding is very necessary and one of the key-points for getting good quality beams and pirn they need to rewind paper cones for weft also, because many spinning mills, cone winding processes are not well controlled for producing good quality cones. But, in this rewinding process of paper cone, they should pass all of the yarn through yarn cleaner in order to remove all knotted portions & slubs etc., and to knot them again in the right manner.

At present in their mill, some of them are passed through yarn cleaner, but the others are not.

The following gauges (clearance) are advisable for their cotton carded yarn (about 2.5 times of yarn diameter for blade-type cleaner).

Yarn Count	Y a r n Diameter (1/100 mm.)	Gauge (1/100 mm.)
12^s	28	70
20^s	22	55
30^s	18	45

4-4 Winding Yarn Tension

Every yarn of one kind should be wound up uniformly under the same tension at each drum in order to improve the warp beam. The kind, weight & number of tension washer, the bending angle of yarn at yarn guide and yarn speed etc. should be checked & adjusted in the same manner. Their cone at present is generally too soft, this winding tension needs to be increased.

5. PIRN WINDING

5-1 Machine & No. of Spindle

Hacoba Automatic Pirn Winder (New) $4^{spl} \times 45$ m/c = 180^{spl}

5-2 Operator's Action, Necessity of Knotting Device and Yarn Tension

The same advices already given for cone winding in 4-2 & 4-4 should be followed.

5-3 Unit Yarn Length of Pirn

The yarn length of one pirn is, of course, the longer the better for raising the weaving efficiency especially in the case of ordinary and unautomatic shuttle/cop-change loom as theirs.
In spite of this importance of pirn yarn length, it is almost always neglected in every mill, it is, however one of the key-points for improving weaving productivity, they have to try your best for increasing this yarn length.
To do this, they need to increase the outer diameter of pirn under the same and maximum but not-too-high yarn tension in this pirn winding process.
But before doing this, they should maintain all of your shuttle tongue (spindle) especially in the point of its direction and fixedness, otherwise the volume-increased pirn will be contacted with the inner surface of shuttle.

6. W A R P I N G

6-1 Machine

(1)	Schlafhorst's Beam Warper with 540 ch. Creel Obsolete, without stop motion but 350 yds/m	One
(2)	Sucker's Sectional Warper (Old)	One
(3)	Hacoba's Sectional Warper (New)	Two

6-2 Condition of Warper's Beam Yarn Sheet Seen in Backside of Sizing Machine

By this appearance, they can always understand the situation of warping process as well as cone winding. Production manager should at least once a day observe it along with his staffs and, if necessary, show the defects in the yarn sheet to the operators of the both processes and train them. Now many irregularly knotted yarn ends, broken yarns, fly-wastes and slubs etc. are found there in your mill.

6-3 Cone Change System in Creel

They have to change all cones at once, and should not change them one by one when exhausted.

As they change them one by one how, they need to stop the warper so frequently about every 200 yds, change the cone and tie the yarn. It causes not only the drop of warping productivity but also the degradation of weaving efficiency and cloth quality due to the inferior beams having many irregular knotted portions.

In a certain Indonesian mill, for example, formerly they changed cones one by one, the warping production per one shift was only one beam, but now they change all cones at once and they are producing three beams per one shift and naturally the beam quality has been much improved, which has raised their weaving efficiency so much.

Anyway, this is one of the key-points for improving productivity. For this reason, they should doff all of the cones for warp at the same yarn length, as much as possible this yarn length should be {(one warper's beam yarn length) x (an integral number)}+ (about 1,000 - 2,000 yds).

For this also, they should wind all cones under the same yarn tension in order to give them the same hardness, because they can know the yarn length of cone only indirectly by its outer diameter. Otherwise, some of them will be too short and should be changed when exhausted in the middle of one beam warping, and the others are too long and should be rewound at long distance in the cone winding.

6-4 Rewinding of Small Cone Remained in Creel and Its Usage to Weft

This remained small cone, of which yarn length is equivalent to about 1,000 -- 2,000 yds, in 6-3, needs to be rewound to full cone in winding process without passing through yarn cleaner as already mentioned in 4-3.

This rewound cone should be used as weft yarn as much as possible when both the warp and the weft is the same yarn (for instance, their warp 20 s for Net & Flannel can be used as weft 20 s for Net, and Warp 30 S for Net and Cambric also as weft 30 S for their weft).

Because the demanded quality for warp is much more severe than that for weft, the rewound cone which has many knotted portions and naps should not be again used for the warp if possible.

6-5 Operator's Action

A Spring type scissors should be given to them.
When they start to warp a beam, they need to be more careful of giving sufficient tension by their hands to the yarn which has been broken and tied by them.

7. S I Z I N G

7-1 Machine & Mixing Equipment

(1) Suckers Hot Air Sizer — One
Obsolete, without cavity box, two pairs of squeezing roll.

(2) Small Clay Pan with Agitator — One

7-2 Size Recipe

M A T E R I A L	Quantity	Ratio
Water	350 l.	-
Tapioca (Adhesive Agent)	35 kg.	(for water) 10%
Tylose CR 700 N (Adhesive Agent)	2.5 kg.	(for water) 0.72%
Kaoline (Anti Friction & Weighting Agent)	4 kg.	(for starch) 11.4%
Textile Finish Oil (Softening Agent)	2 l.	(for starch) 5.7%
Sapamine OC (Softening Agent)	1 l.	(for starch) 2.9%
Teepol (Wetting Agent)	1 l.	(for starch) 2.9%
Copper Sulphate (Anticeptic Agent)	0.5 l.	(for starch) 1.4%
T o t a l	396 kg.	-

For anti-friction agent, 4 Kg of Kaoline (11.4% against Starch ! Usually it should be 2 -- 3% only) is unnecessary, because the other two softening agents have sufficient smoothness, and as Kaoline lacks adhesiveness the sized fiber-waste is increased especially.

7-3 Size Mixing Process

This time I had no chance to see this process, next time I will do it and give them necessary advice.
They told me that they boil the mixture only one hour in a mixing cistern, it is very insufficient for promoting the penetration ability of Tapioca into yarn body especially for your sizing machine which has no cavity box, it should be boiled at least two hours at boiling temperature (about 95°C).

7-4 Sizing Process

7-4-1 Boiling in Size Box

Size liquid should always be boiled at 94-95°C continuously, because generally natural starch needs to be pasted & gelatinized for having stick-ability and its viscosity needs to be lower for promoting penetration-ability.
Their temperature of size liquid inside size box is only 56°C and the viscosity measured by Visco-cup, of which drawing was given to themin their mill, is 30 sec. (it should be down to 15 -- 20 sec.). This is the main reason for their so much sized fiber-waste under looms --- it has ¾" fiber length. Because their sizing is done only over the yarn surface and not inside the yarn body, it is very easily stripped down from the surface by shedding and beating motion.

7-4-2 Immersion of Yarn

For avoiding the direct touch of Yarn to the immersion roll in the air, and for promoting penetration above mentioned, they should put down this immersion roll more deeply. Also it is necessary for avoiding insufficient take-up % of size after following my advice given in 7-3 & 7-4-1, because at lower viscosity the take-up % is lower than at higher viscosity.

7-4-3 Squeezing of Sized Yarn

For promoting the penetration, the squeesing pressure should be increased, but, of course, over-pressure causes the insufficiency of take-up %, so this pressure needs to be adjusted considering both the density & viscosity of size liquid and the sized fly-waste in weaving.

Their squeezing rolls' cotton cloth is very dirty with much cotton waste, nep and foreign matter etc., which is degrading the squeesing effect so much. This cover-cloth should be changed every shift at least, be kept inside clean water and washed.

7-4-4 Drying of Sized Yarn

When overdried, even the water which is the content of cotton fiber itself is so extracted that the fiber loses its elasticity and humidity absorption speed becomes very low in weaving room, also starch size is completely dried up and becomes fragile. This overdrying is now one of the reasons of much sized fly-waste in your weaving, they need to be careful of overdrying as well as short-drying.

8. DRAWING - IN

Mis-drawing should be checked and repaired more carefully.

9. WEAVING

9-1 Efficiency & Weaver's Action

The weaving efficiency is now 60% and number of looms per one weaver is only two.
Considering the condition of warp beam and weft pirn, this efficiency under this loom number per one weaver should be at least 80%.
They can see many weavers doing nothing and sitting down on wooden boxes idly ! They should be trained one by one to watch and repair the irregular yarn of beam before the yarn is broken -- the weaver's standing position should be more in the backside of loom for this reason.

The most foolish action of weaver is only waiting for the yarn breakage and then knotting the yarn. Weavers have to always watch the defective yarns of beam & its irregular shedding and to repair them before their breakage & loom stoppage.

9-2 Necessity of Specialist for Detective Cloth Opening & Smash Knotting and Increase of Loom Numer per One Weaver

For letting weavers concentrate their energy on raising efficiency only, speciallists for opening defective cloth and for knotting smashed yarn need to be appointed. At the same time they can and should increase the loom number per one weaver from two at present to four.

Now many weavers open cloths and knott smashed yarn without paying attention on the other working and stopping looms.

9-3 Reed Mark and Height of Back-Rest

Reed mark of grey cloth is almost disappeared when passed through finishing plant, but that of grey cloth which is to be sold directly to the market should not be caused in weaving.

Generally, when both upper and lower shedding angles are the same, the warp breakage is minimum but the reed mark is maximum, on the contrary, when these two angles are different, the warp breakage is increased but the reed mark is decreased.

If they have claims for this reed mark from the market, they need to raise the back rest $\frac{1}{2}$" for 10 looms at first trial and then extend it more.

9-4 Beam Flange Space

For plain weave, this beam flange space should be about 3 inches wider than that of drawing-in on reed in order to decrease the selvedge yarn breakage.

Theirs of J.Güsken loom Cambric is 44$\frac{1}{2}$" in drawing-in and 46" in flange -- the difference is only 1$\frac{1}{2}$", the latter should be extended up to 48".

9-5 Weft Fork

This should be equipped on all looms, it is a fundamental device for loom to raise productivity & quality and to increase the number of loom per one weaver.

Even they new J.Güscken looms have now no weft forks, these should immediately be put on the looms.

10. CLOTH INSPECTING

The importance of this process exists in the feed-back of information about the preparatory and weaving processes into themselves, the data on cloth quality should be recorded and utilized for improving all processes.

11. CONCLUSION

Due to the expensive yarn and cheap cloth, they are facing how big difficulty, this is, however, not only for them but also for every weaving mill in Indonesia at present. In the end, only the mills who can produce the best quality cloth at the lowest cost can survive well, for this reason they need to improve their various processes and train their workers following my advices above given in order to raise the efficiency and upgrade the quality.

The three-shift operation should be resumed at four group system to reduce their production cost by utilising their surplus labor forces whom they cannot dismiss now, and the raw yarn should be got more sufficiently.

According to their calculation, by three-shift operation total production will be up about 40% but total cost only about 20%, i.e. the unit cost will be down 20%.

If they cannot resume this three-shift operation on all looms and also cannot rationalize the worker, they will soon have to close their mill completely.

The bad circulation of revolving capital absence, low operation ratio, high cost and low profit should be cut immediately, otherwise like many weaving mills in the past theirs also will go bankrupt at last.

So far only once I have visited this mill for the initial survey to give them the first recommendation as above mentioned, for this reason this mill has not been improved yet so much.

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THE REHABILITATION OF ASRATEX WEAVING MILL PADANG - CENTRAL SUMATRA

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EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

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INDONESIA

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EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

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ABSTRACT

Asratex is a small weaving shed of 78 automatic shuttle change looms and a small bleaching range, located in Padang the capital of Central Sumatera province.

Beside the looms, this factory has the preparation (warping, sizing, drawing in, pirn winding) facilities for weaving.

The building is a concrete one with zink roof and open air ventilation window at the top side, lighting is suitable.

The machines are mostly new Chinese ones installed in 1964 by Chinese fitters.

The pattern of production is cotton shirting, T-cloth of 20'S yarns.

Before the assistance of our weaving expert the efficiency was only about 60% and according to a letter from the owner of the factory there is now about 25% increase in the efficiency besides improvement in the quality, due to the implementation of the advices given by our expert.

Even with this improvement the factory productivity is still far beyond the potentiality of the machines, so to continue our assistant for this factory is essential.

The most important problems in this factory are :

1. The knowledge of the worker and supervisors is short, so training program is necessary.
2. Increase of weft pirn yarn length has been adopted.
3. The smashed beams & defective cloth opening has to be repaired by a specialized operator and not by the weaver, in order that the latter gives more attention to the good running of the loom.
4. The change of cones on the warping creel has to be carried on for all the cones.
5. Cones must be of nearly the same length.
6. The size recipe has to be changed and to adopt the recipe given by us.
7. Regular resetting of the loom is very important such as adjustment of pick motion, and automatic shuttle change motion.

INTRODUCTION

The frame work of this report is to continue our rehabilitation for Asratex. weaving factory as it is one of our weaving regular assisted units. Our weaving technologist Mr. Hoshiyama has visited the factory twice on April and September 1972. The duration of the two visits were 6 days. This factory has been closed for some time due to commercial problems but restarted again its production. The owner of this factory is jealous to improve his factory where there are many technical problems as explained in our expert following report.

The object of our assistance to this factory is to improve the productivity and to cut-down the cost of production. A significant progress has been realized but additional assistance with following up program is required.

This investigation of this factory after reopening has shown that there are so many problems can easily be solved and give satisfactory result as shown in details in the report.

The productivity before our assistance was very low, it has been clearly improved but still below the good level which can be attained by this factory with both our assistance and the good activity of the owner.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing informations and facilities to do this work.

REPORT ON VISIT TO ASIATEX WEAVING MILL
PADANG - CENTRAL SUMATRA

November, 1972

Tamotsu Hoshiyama
Weaving Technologist
TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

1. INTRODUCTION

This is a summary of my survey, discussion, advice, demonstration, measure and implementation for rehabilitation and developing this weaving mill till now.

2. DATE & PERIOD OF MY FIEL OPERATION

April	10 & 11, 1972	2 days
September	26 - 29, 1972	4 days
	Total	6 days (Excluding the days for travel).

3. GENERAL DESCRIPTION OF MILL

3-1 Type of Mill

This is a small mill consisting of 78 looms weaving and some bleaching plant.

3-2 Location, Site & Building

It is situated in Padang, Central Sumatra and about several kilometers distant from the western coast of Sumatra Island. It has sufficient space for mill extension in future. The building is a concrete one with zinc roof and open air ventilation window at the top side, the floor is boarded with wood plate. Air conditioner is not equipped.

3-3 Machinery for Process

3-3-1 Cone Winder

(1) Chinese-Made Rote Coner

100 drum x 1 set = 100 d

(2) Chinese-Made QT Type Winder

100 drum x 1 set = 100 d

3-3-2 Pirn Winder

(1) Murata's Type No.100

4 spl x 5 set = 20 spl.

(2) Chinese-Made Macoba Type

4 spl x 15 set = 60 spl.

3-3-3 **Warper**

One Chinese-Made Ordinary Type Drum-Driven Warper with 630 Cones Magazine Creel. Schlafhorst Type Stop Motion.

3-3-4 **Size Mixing Equipment**

Two Small Mixing Cisterns with Frame Agitator (Upstairs).

3-3-5 **S i z e r**

One Chinese-Made Ordinary Type Hot-Air Sizer.
Cavity Box, Skelton Type Immersion Roll, 2 pairs Squeezing Roll with Flannel (Dead Weight Pressure, Unadjustable).

3-3-6 **Drawing-in Stand**

Simplest Wooden Frame 14 set.

3-3-7 **Loom**

Chinese-Made 63" R/s Shuttle Change Automatic Loom with 4-line WSM.

with 16 Healds Dobby Motion	50 set
without Dobby Motion	27 set
T o t a l	78 set

Installed 1964 by Chinese Technicians.
All mechanisms are just the same as Toyoda's G Type Loom.
All of the shuttle change motions are now broken and non-automated.

3-4 **Raw Yarn**

They buy of the raw yarn from outside in paper cone --- Patal Spinning Mill - Palembang, American Product etc.

3-5 **Weaving Production**

3-5-1 **Cloth Kind Produced**

(1) Cotton Shirting, T-Cloth $\frac{20^s \times 20^2}{65 \times 54}$ x 36" (2,344 ends)

(2) Cotton Shirting, T-Cloth $\frac{20^s \times 20^s}{65 \times 54}$ x 54" (3,660 ends).

According to the market situation, these kinds of cloth are very frequently changed each other.

3-5-2 Weaving Efficiency

When I visited this mill in April 1972 for the fisrt time, the weaving efficiency was only 59%, and one weaver operated only 3 - 4 looms.

3-6 Operation System

Now it is 3-shifts and 3-groups system --- one day 22.5 hours and one week 6 days working.

4. PROBLEM AND RECOMMENDATION

In this mill I can find so many problems to be solved for improving the productivity, quality and cost, and some of them are very important and urgent but the others are not so urgent.

The order of urgency at present is as follows :

(1) Training of Weaver
(2) Increase of Weft Pirn Yarn Length
(3) Specialization of Smash Knotting and Defective Cloth Opening
(4) Rationalization of Cone change system in Warping
(5) Maintenance of Loom Warp Stop Motion
(6) Rationalization of Weaver's Beam Flange Space
(7) Rationalization of Size Recipe, Mixing Process and Sizing Process
(8) Adjustment of Heald Frame Hanging and Temple Box Position
(9) Rationalization of Drawing-in System
(10) Maintenance and Adjustment of Loom Picking Motion
(11) Maintenance and Adjustment of Automatic Shuttle Change Motion

In the following chapters these problems will be explained.

4-1 Training of Weaver and Specialization of Smash Knotting and Defective Cloth Opening

4-1-1 Training of weaver

Their production is now 20s Shirting T-Cloth --- very coarse and easy one for weaving, and the number of looms per one weaver is only 3 - 4, the weaving efficiency, however, is 70 - 80% only.

Considering the condition of warp beam (their 20s yarn is now American made and it has very superior quality) and weft pirn, this efficiency can and should immediately be raised up to 85 - 90% under the present condition.
Now we can see many weavers only standing up and waiting for the yarn breakage very uselessly in front of looms.
The most important job of a weaver is to let his looms not stop by repairing and arranging irregular warp, and the most nonsense activity is to wait only for the yarn breakage and loom stoppage and then to knot the broken yarn.
Weavers have to always go around their looms to watch the yarn sheet of beam and shedding condition in order to remove and arrange the defective and irregular portions before they are broken and the looms are stopped.
For this reason, a weaver's standing position should be more in the backside of loom than in the frontside.
Their weaver's should immediately and continuously be trained in this way, after that their weaving efficiency and quality will definitely be raised so much even without the other action at all.

4-1-2 Specialization of Smash Knotting and Defective Cloth Opening

Weaver's should concentrate their attention and energy only upon the increase of their weaving efficiency and quality. But now we, however, can see that all of these smash yarns (due to, for instance, shuttle's irregular flying, etc.) are knotted by weaver and defective cloth on the loom are opened by them.
During these times, weavers cannot watch the condition of beam and shedding, and then naturally many looms will be stopped and efficiency will be reduced in vain.
These jobs should be done by specialists only.

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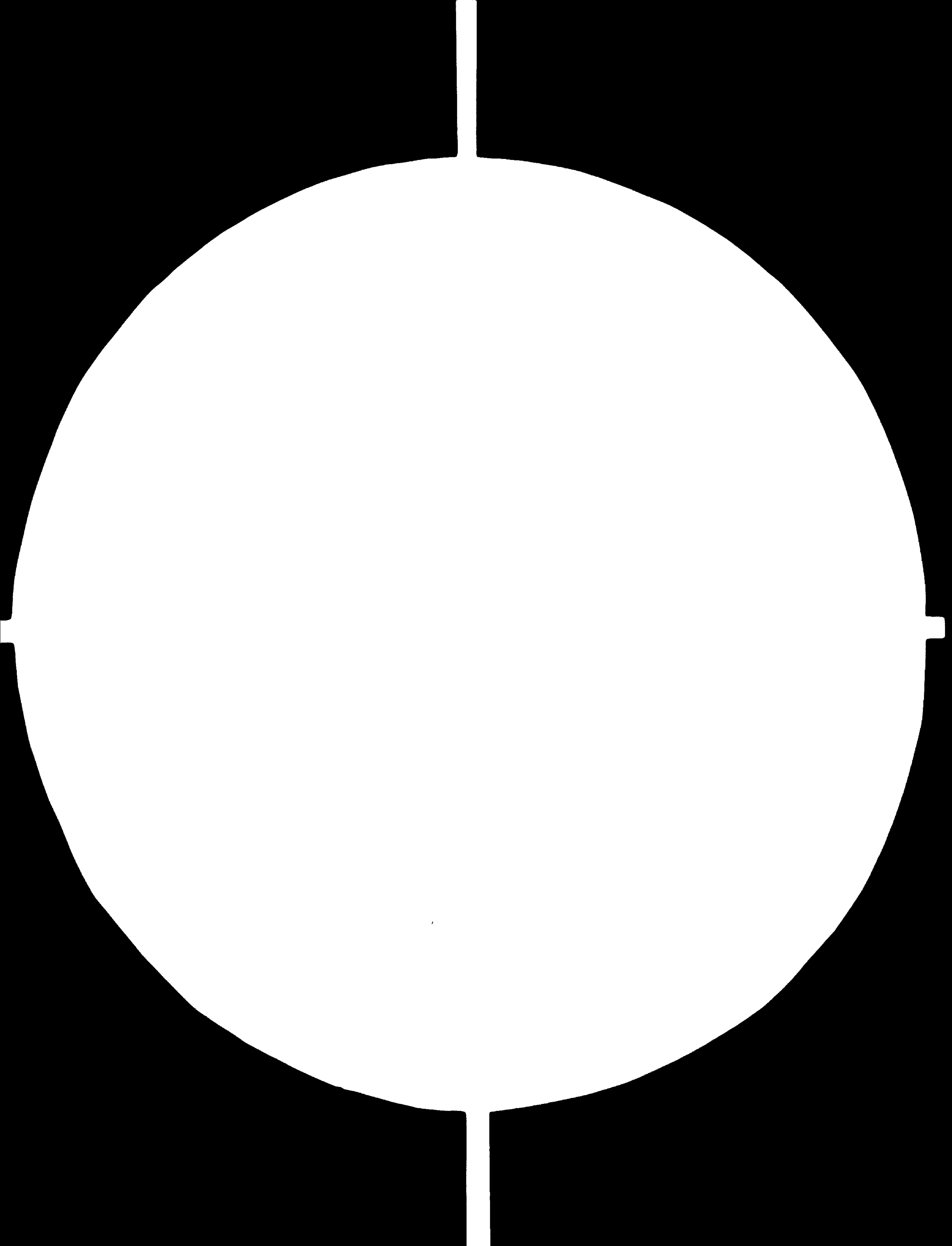

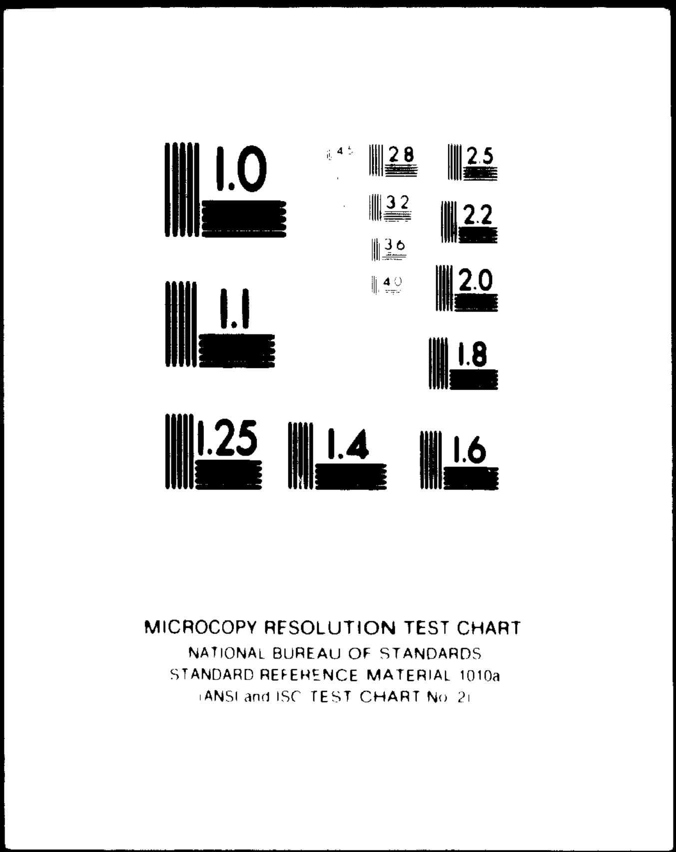
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STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

4-2 Increase of Weft Pirn Yarn Length

The yarn length of one pirn is, of course, the longer the better for raising the weaving efficiency especially in the case of non-automatic shuttle/cop change loom as theirs.

In spite of this importance, it is almost always neglected in every mill of Indonesia, it is, however, one of the key-points for improving weaving productivity.

To do this, they need to increase the other diameter of pirn up to 30 m/m for their shuttle by using wooden diameter gauge shown by me and already made by their carpenter.

At the same time, they should maintain all of their shuttle tongues (spindle) especially in the points of its direction and fixedness, otherwise the volume-increased pirns will be contacted with the inner surface of shuttle and the weft yarn will be broken.

The yarn tension in pirn winding should be increased more then now under the same quantity, because their weft is 20s and course, it is not so weak and the increase of yarn tension is, of course, useful for the increase of yarn length of one pirn.

Before this increase their pirn was exhausted only after 5 minutes, but now it continues about 9 minutes --- 80% has been increased.

It means that during 8 hours a weaver operating 4 looms should have changed his weft pirn $\frac{8 \times 4 \times 60}{5} \times 0.75 = 288$ times previously but now he needs to change only $\frac{8 \times 4 \times 60}{9} \times 0.75 = 160$ times, -- 128 times decreased, it means, of course, that the looms stoppage due to the exhaustion of pirn per 4 looms for 8 hours has been decreased 128 times, the necessity of bobbin cleaning and change of empty bobbin in pirn winding has been decreased in the same number. --- all of them are very useful for their mill, but this big improvement has not cost them any money at all.

4-3 Rationalization of Cone Change System in Warping

To get superior quality beam is the key-point for improving weaving productivity, quality and cost, and not to stop warping machine by yarn breakage during operation is the key-point for getting superior quality beam.

As they change of the cones in the creel one by one now, they need to stop the warper so frequently about every 200 yds., change the cone and tie the yarn.

It causes not only the drop of warping productivity but also the degradation of weaving efficiency and cloth quality due to the inferior beams having many irregular knotted portions.

They have to change all cones at once, and should not change them one by one when exhausted.

In a certain Indonesian mill, for example, formerly they changed cones one by one, the warping production per one shift was only one beam, but now they change all cones at once and they are producing three beams per one shift and naturally the beam quality has been much improved, which has raised their weaving efficiency so much.

Anyway, this is one of the key-points for improving productivity.

4-4 Maintenance of Loom W.S.M.

Now they have received the spare parts of WSM from the maker, they need to put on them properly as soon as possible, also one special mechanic should be appointed only for the maintenance and arrangement of this WSM for all of their 78 looms. He should always inspect the motion of WSM one by one and adjust it.

4-5 Rationalization of Weave's Beam Flange Space

For plain weave, this beam flange space should be about 3 inches wider than that of drawing-in on reed in order to decrease the selvedge yarn breakage.

At present, there is 5" wider for the narrow cloth and 13 1/2" wider for the wide cloth.

Especially the latter one should immediately be made narrower to only 3" wider than drawing-in space.

4-6 Rationalization of Size Recipe, Mixing & Sizing Processes

Their sized yarn at present is only coated on the surface, and the size liquid is not well penetrated inside the yarn.

For this reason, the sized fibers are much stripped down both in the sizing and weaving process, and the anti-abrasion ability is very inferior in comparison of high taking-up size percentage.

4-6-1 Size Recipe

Their cloth production is coarse 20s shirting now, so they can simplify and economise the size recipe like the other weaving mills in Indonesia.

The following one is advisable for them at present.

Material	Quantity	Ratio
Water	400 l	-
Tapioca (Adhesive Agent)	60 kg.	(For Water) 15%
Teepol (Wetting Agent)	0.4 l	(For Tapioca) 0.67%
Animal Fat (Softening Agent)	5.5 kg.	(For Tapioca) 9.2%
Copper Sulphate (Anticeptic Agent)	0.1 kg.	(For Tapioca) 0.17%
Total	466.0 kg.	-

(1) This 60 kg. Tapioca should be decreased down to 50 kg. if they get over-sized yarn.

(2) Generally, every kind of sizing material should be inspected very carefully when purchased, because even though the name is just the same, but the real content and characteristic is sometimes very different. For example, Tapioca is very different according to its kind, production area and harvest time, etc., and Animal Fat is also in the same case.

4-6-2 Mixing Process

For the above mentioned recipe, the next process should be followed.

(1) Mixing cistern is completely cleaned with hot water.

(2) 400 l water is poured into the cistern.

(3) Agitation is started.

(4) 0.4 l Teepol is poured into the cistern.

(5) 0.1 kg. well crushed Copper Sulphate particle is thrown into the cistern.

(6) After 10 minutes agitation, 60 kg. Tapioca is thrown into the cistern as slowly as possible so that undissolved lumps may not be caused.

(7) After 30 minutes agitation, steaming is started up to boiling.

(8) Steaming is stopped.

(9) When the liquid temperature comes down to about 80°C well crushed 5.5 kg. Animal Fat. (When it contains much dirty foreign matter, it can be melted and filtered at about 40°C beforehand).

(10) After 10 minutes agitation, steaming is started up to boiling and it is continued until the viscosity measured by "Visco-Cup" reaches down about 15 - 20 sec. (about 1.5 hours).

4-6-3 Sizing Process

(1) **Supply of Size Liquid**

In order to get the stability of sizing, which is the essence for improving weaving efficiency, the supply of size liquid into the size box should be done constantly and continuously so that the quality and liquid level of size may be constant. For this reason, size liquid should be supplied into a cavity box through pipe which is always opened just enough for size consumption, both overflow from the size box to the cavity box and circulation by a geared pump between these two boxes are also essential.

(2) **Boiling of Size Liquid**

For getting low and constant viscosity of Tapioca starch liquid and for melting away cotton wax over cotton fiber surface, the size liquid should always be boiled at 94 - 95°C continuously both in size and cavity boxes, it is essential for penetrated and stable sizing.

(3) **Depth of Immersion Roller in Size Box**

This should be adjusted according to the necessary take-up size percentage and the properties of size liquid, the immersion roller has to be put in the depth so that the initial contact of yarn to this immersion roller may be done not in the air but in the liquid for avoiding heat-dry contact which causes the degradation of yarn.

(4) **Pressure of Squeezing Roller**

This pressure of squeezing roller should be regulated according to the size liquid condition, yarn count, number of yarn and expected taking-up percentage of size, etc. For example, their narrow cloth's number of 20's yarn is 2,344, but their wide cloth has 3,660 20's yarn at present, in comparison of the former, for the latter the squeezing pressure should be increased, otherwise the squeezing effect per one yarn of wide cloth will be about 60% lower than that of the narrow cloth and the taking-up percentage will be much increased.

Unfortunately their sizing machine has no pressure regulator for the squeezing rollers, they need to make it by themselves as I showed them in their mill --- spring or dead weight system.

(5) **Temperature Inside Dry Chamber**

Generally, the water content of size yarn after dried should be 6 - 7%, when it is under this value the sized yarn is over-dried and the water which is the component of cotton fiber itself is extracted --- the fiber loses its elasticity and the humidity absorption speed in the weaving process becomes too low, and also the starch size film is completely dries up and becomes fragile.

They need to be careful of this over-drying as well as short-drying.

(6) **Yarn Tension**

Over-tension of yarn during sizing process causes the decrease of yarn elongation too much and it increases the weaving yarn breakage.

Short-tension, however, causes the difficulty of yarn devide at deviding rod and front comb, and also it causes too soft beam which is unfit for weaving.

For cotton yarn, the draft of yarn during sizing should be controlled about 1%.

The thickness and number of cloth wound on the wood roller in the front of sizing machine should be checked for this tension control.

(7) **Pressure of Steam from Boiler**

This should always be controlled constantly, otherwise every stability of sizing process cannot be maintained and eventually the sized beam quality will be fluct ated so widely --- it causes weaving efficiency degradation.

For this reason, the control of boiler should be done very carefully, it is one of the key-points for rehabilitating the sizing process.

4-7 Adjustment of Heald Frame Hanging and Temple Box Position

4-7-1 Heald Frame Hanging

Now we can find many heald frames unsuitably hanged --- too high, too low or unparalleled to the wood thrush plate on the slay.

At the time of maximum shedding, all of the lower warps should be on paper thickness up from the wood thrush plate surface, otherwise especially the selvedge yarn will be broken so frequently.

4-7-2 Temple Box Position

Also this temple box position has big influence upon the selvedge yarn breakage. The bottom surface should be 4 mm above the wood thrush plate and 2 mm back from the reed at the time of front center.

Now there can be seen so many temple boxes positioned unsuitably.

4-8 Rationalization of Drawing-in System

To avoid the mis-drawing by drawer and weaver, and to decrease the yarn breakage, the dropper also should be draw-in in the order of 1-3-2-4, just the same as the heald-drawing.

This is the simplest way for operator and weaver, and each yarn length between heald and dropper is the same for all yarns, which contributes the yarn tension unformity and decrease the yarn breakage.

4-9 Maintenance & Adjustment of Loom Picking Motion

The most important motion of loom is this picking one, its unfit maintenance and adjustment causes much consumption of picking spare parts --- check-strap, picker, stick and shuttle etc. --- as well reduced weaving productivity and quality.

Especially the motion of check-strap should more carefully be controlled, now many over-rigidly or unbalancedly adjusted ones are found in their looms.

4-10 Maintenance & Adjustment of Automatic Shuttle Change Motion

Very recently they received the spare parts of shuttle change motion from the maker, which should immediately be put on all of their 78 looms using prescribed gauges very carefully.

The exhaustion of weft on the pirn should be detected not by a weft fork but by a weft fealer, otherwise every change portion on the cloth will have "double-pick" defect.

Every three months this shuttle change motion should be overhauled and adjusted, for this reason one special mechanic needs to be a appointed only for this job and he is to be skillful very sufficiently.

It is the key-point of maintaining the effect of automatic looms for a long time, otherwise like before all of the change motion will be broken very soon.

5. PROGRESS MADE

During my last four-day visit to the mill, according to a letter from the mill owner dated 23 October 1972, they could increase their weaving production 25% followed my various suggestions faithfully --- the previous weekly one was about 4,000 meters only but now it is more than 5,000 meters.

The effect of improved warp beams, pirns and machinery maintenance will enable them to improve their productivity, quality and cost much more in the near future.

6. PROGRAMME FOR FUTURE

The rehabilitation programme in this mill was actually started in my last visit time September 1972 --- it has begun only its first step. More instructions will be given to them for completing their first step and then second & third one in the near future.

7. CONCLUSION

This mill is situated in Central Sumatra and they have no convenience for getting technical information and advice, their staffs are also not graduates from technical school. They are very keen on improving their mill and anxious for technical guidance from our UNIDO programme, and actually they have already followed my various suggestions and have succeeded in achieving the beginning of their first step.

We can expect their furthermore improvement in the near future giving them the next recommendation.

STANDARD TITLE

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME (SPECIAL FUND PROJECT/INS - 71/531)

04460

(16 of 17)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 16

THE REHABILITATION OF INFITEX

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

Jakarta, November 20, 1972

EL-SAYED M. OWEISS

Project Manager.

11

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME (SPECIAL FUND PROJECT/INS - 71/531)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

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Jakarta, November 20, 1972

S. O.

EL-SAYED M. GHEISS
Project Manager.

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ABSTRACT

Infitex is a small old established weaving and finishing plant belonging to Pinda Sandang, the provincial government organization of Central Java. It's location at Tjeper, a village near Solo in Central Java.

The factory has at present some old semi automatic looms with 150 additional new cop change looms are under erection and a small bleaching and finishing old unit.

According to the management information there will be a program for extension in the finishing department to meet the additional production of the 150 new automactic looms and to the anticipated increase in quantities to be finished on commision base.

The estimation of the management is that the capacity required to meet this increase in Batik production and the quantities to be finished on commision base will be 800,000 metres/month and all will be polyester/cotton and they have asked our finishing expert to assist them in planning the extension to attain this target.

The report of Mr. Bennett which is enclosed contains a three phase plan of expansion for flexibility and for the spreading of the financial burden.

The first phase the report plans a production of about 450,000 metres/month or about 5½ millions metres/year. In this phase the financial burden is estimated at 85 millions rupiah (one US$ = 415 rupiah).

In the second phase it plans the same quantity of production as phase 1, but to shift to more dyeing capacity and the additional financial burden is estimated at 50 millions rupiah.

But the third and the final phase, to attain the target of 8 millions metres/year needs additional facilities, the equipment required for simple efficient laboratory and a training program for the staff and operators.

The report includes indication to the importance necessity of maintenance, the water supply and the quality control.

INTRODUCTION

The scope of the report is a survey on the extension of Infitex by which the units are to be capable of bleaching, dyeing and finishing of about 800,000 metres/month of cloth material polyester/cotton.

This factory is one of the units selected to receive our assistance for rehabilitation & development of the existing units plus studies to extension as requested by the management of the factory.

Mr. Bennett has studied this case with the management and drawn his enclosed report. The study has been carried out during the period from May to October.

He has shown the importance of a good selection for the facilities required given some indications to the systems and kind of machines which show high efficiency in the now-a-day practical life. The report did not miss to mention that the implementation of these proposals as it has been planned by our expert depends to a great extent on the availability of capitals obtained from grants.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing informations and facilities to do this work.

TECHNICAL REPORT ON INFITEX

Submitted to Dr. El-Sayed M. Oweiss

November, 1972

John E.H. Bennett
Finishing Technologist

TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONEISA, UNIDO

SUMMARY

1. This is a small, old established weaving and finishing plant at Tjeper a village close to Solo. It was opened in 1958 with 7? looms and small finishing capacity.
The buildings are modern and occupy a level site near to the main road to Jogjakarta.
It is a producing unit factory of Pinda Sandang and has been chosen for an expansion programme. 150 new Japanese cop change looms 52" are in the course of erection, which according to estimates will ultimately produce around 400,000 meters per month of cotton or polyester cotton cloth, expansion is also planned in the finishing department which has been virtually unused and two new jiggers have been installed.

2. With the development of the weaving sector and the move in the area to a demand for polyester cotton fabrics which is estimated by the manager to reach figures of 400,000 per month together with the present polyester cotton bleached production of 100,000 yds per month, the various factors are detailed for policy decision, are enumerated resulting in the main and key problem.

3. How far to develop the finishing productive capacity of Infitex and to what extent into polyester blend bleaching and dyeing and finishing problems.

4. Depending on how this vital and important question is answered follow the consequent minor problems of

   4.1 The selection and purchase of the new machinery required
   4.2 The training and recruitment of suitable staff and workers
   4.3 The provision of laboratory facilities
   4.4 Maintenance
   4.5 Quality control
   4.6 Water supply and quality
   4.7 The examination of the steam and power facilities
   4.8 Building capability
   4.9 Organisation overhaul.

Before we recommend how these problems should be tackled we enumerate the factors which we consider relevant to the main policy decision on which our plan depends.

These are :

1. Infitex is in the centre of a batik producing area which is becoming more and more interested in polyester cotton contructions. This is confirmed by the present production of the factory of 100,000 yds of bleached resinated polyester cotton per month.

2. We think it reasonable that this demand will continue and increase for polyester cotton fabrics have desirable qualities of handle, of lustre in appearance of lightness of weight and are strong with good crease resisting properties and are well advertised in the world press.

3. The new Japanese looms will have a potential production of circa 400,000 meters per month of polyester fabric and the manager estimates that a similar quality will be available from the local weavers.

4. Based on these estimated which can be confirmed by the Head office we would suggest that Infitex is established as a bleaching and dyeing unit with a capability of 800,000 m per month.
Assuming that this proposition is accepted as feasible we suggest a three phase plan of expansion which will be fairly expensive and will depend upon the policy decided and the finance available.
The plan is divided into three phases for reasons of flexibility and for the spreading of the financial burden.

Phase 1. To develop the capacity to a target figure of 5,500,000 mpy requiring an overall machine speed of 15 mpm as compared with the present figure of less than 5 mpm.
We assume that the production will consist mainly of bleached polyester cloth with dyeing trials continueing on the new jiggers.
New machinery required :

2 locally made jiggers
1 four or five chamber Heat Setting Stenter
1 Merceriser
Laboratory Equipment
Total cost approximate Rp. 85,000,000.--

Phase 2. The target production to remain the same but the polyester dyeing facility increased in accordance with market experience by the purchase of two Beam Dyeing machines with batching arrangement, and a Baking machine cum flue dryer.
Machinery recommended :
2 Beam Dyeing Machines plus batcher
1 Baking Machine plus ancillaries
Total cost approximate Rp. 50,000,000.--

Phase 3. In this phase which may be short or long depending on experience the plant is developed to the potential target of 8,000,000 mpyear with an average machine speed of 25 mpm. In this phase building extensions will probably be required together with additional steam and power services.
Additional machines required :

Cylinder Dryer
Semi-Continuous Bleaching range
Washing machine open width
Additional Mercerising Capacity
Sanforise or Everset compressive shrinking machine
Probably an additional Boiler
Total Cost Approximate Rp. 150,000,000,--

Should this plan be accepted in principle the other problems will fall into place. The selection and purchase of the new machinery is a most important matter depending on grants or finance available.
The recruitment and training of staff and workers can commence immediately. A simple laboratory can and we recommed that it be established.

The chief engineer can consider the setting up of a planned maintenance or preventive maintenance system and a responsible mechanic should be detailed to the finishing department.

The water supply and quality should be tested and appraised as soon as possible. The steam and electricity supplies should be checked against the plan to equalise supply and demand.

A survey should be made of the buildings and space available with a view to calculating if any extension will be necessary.

A study of the organisation and documentation necessary for the programme should be commenced with especial note being given to store control and costing.

This report gives a brief survey of the courses open to Infitex and a suggested plan. There are appendices on the machinery and instructions given and estimated approximate costs.

TECHNICAL REPORT ON INFITEX
Submitted to Dr. El-Sayed M. Oweiss, by John E.H. Bennett
November 1972

INTRODUCTION

This small factory was first visited on May 10th in company with Dr. Oweiss and Mr. Santosa when the new manager had beed in charge for only two months. Since that time my counterpart Mr. Rutjito and I have visited twice in September and October of this year and we have been surprised to see what progress has been made. There is now an expansion programme which is in the course of being implemented, and 150 new Japanese Sakamoto 52" cop change looms are about to be installed together with two new jiggers and a scutcher and we are told that the purpose is to weave and finish polyester cotton fabrics.

HISTORY

This is an old established weaving and finishing factory covering the needs of the local weavers of batik cloth in the famous batik producing area of Solo. Infitex means Induk Finishing Tekstil or Textile Finishing Centre and the present manager is Mr. Achmad Mathrab. It is owned by the local Provincial Government Pinda Sandang of which the Managing Director is Mr. Matohir. The Head Office is in Semarang.
Infitex is situated at Tjeper, a village close to Solo, about 40 Kilometers from Jogjakarta to which it is connected by a main road.
On our first visit it contained only 71 old looms and some cotton finishing machinery which was unused apart from the stenter. With the acquisition of the new looms the buildings have been extended.

BUILDING

It is a modern building erected on a level site. An extension has been added for the new weaving department. There is modern strip lighting and high roofs with concrete floors in the finishing department.
They seem rather short of space and it is not an ideal lay-out for the work flow and the machinery.

STEAM PRODUCTION

There is one boiler which we have not yet examined.

WATER SUPPLY

This is obtained from two wells. No analysis of the water has been made so far.

EFFLUENT

This has not yet been studied but we understand it goes to a drain.

MACHINERY

See appendix for further details.

The machines are a mixture of old and modern, mostly old and was originally planned for a small cotton piece goods and yarn production.

1. <u>Singer</u>

   This is an old machine running satisfactorily. Made by Wakayama Japan. Two burner gas flame. Normal speed 70 mpm. Width 165 cm.

2. <u>K i e r</u>

   There is one small kier made by Kerag, capacity 400 kgs. with washing and hot water tanks. It dates from 1958 and is in fair condition although it has not been used for some time.

3. <u>W i n c h</u>

   An old machine of similar date. Unused.

4. <u>Jigger</u>

   There are three open atmospheric jiggers, two made by Benninger and one by Kyoto. They probably date from the opening of the factory. They are automatic and in fair condition.
   Two new underwater jiggers have been recently installed.
   The approximate capacity of all these jiggers is 100 kgs. per jigger.

5. <u>Yarn Dyeing Machine</u>

Maker Hisaki. This machine is little used. Capacity 100 kg. Year 1962.

6. <u>Cylinder Drying Machine</u>

This is a modern machine of eight stainless steel cylinders speed up 15 mpm. Year 1972.
It has been placed in tandem with the stenter drying machine.

7. <u>Stenter</u>

One machine made by Dornier Hanbolt. Year 1957, width 165 cms.
Two chambers, pin clip chail with overfeed.
Maximum Temperature 150°C plaiting exit end. Plus two bowl foulard with feed tank and dyeing through, pneumatic loading.
About 15 years old. Drying speed 10 mpm.
This is a very good machine with limited capacity. It is used for a partial heat setting operation and drying and resinating thereby reducing its overall speed to less than 5 mpm. The maximum temperature possible is too low for proper heat setting and in our opinion it would be unwise to modify it for this purpose on the following grounds :

(a) It would be expensive
(b) The capacity would be small
(c) Modern synthethic fibres require modern machines to process them satisfactorily for it is essential to have a perfect balance of heat distribution and this is unusual with an old machine.

8. <u>Calender</u>

There is one modern calender, maker Maag. It is a three bowl, one steel, two cotton, width 150 cms with pneumatic loading.
This is a good machine speed 60 mpm.

9. <u>Scutcher</u>

Recently installed. Maker Kyoto.

10. Making Up and Inspection Machines

Inspection machine. Maker Kyoto New.

Folding Machine. Maker Maag. New.

PRODUCTION AND CAPACITY

At the moment they are bleaching around 100,000 yards of polyester cotton per month. This cloth is produced by the local factories and according to the manager this will increase to about 400,000 yards per month in the future. Some of their own production is sold in the grey and some is bleached. They also finish bleached cloth from the local weavers.

The present estimated capacity 24 hrs per day, 350 days per year at 70% efficiency.

Singer speed 70 mpm	24,696,000 mpy
Kier 400 kg capacity	1,960,000 mpy
Jiggers 5 at 100 kgs capacity 3 rounds 24 hrs.	3,675,000 mpy
Cylinder Dryer 8 cylinders Speed 15 mpm	5,292,000 mpy
Stenter Speed 10 mpm Two runs dry and resinate 5 mpm.	1,764,000 mpy
Calender Speed 60 mpm	21,068,000 mpy

Winch machine and yarn dyeing machine unestimated but will have no significant effect on the total production.

From these figures it can be clearly seen that the limiting factor is the stenter production and as its temperature is too low for heat setting this is the bottleneck.

PROCESSING ROUTINE

The cotton goods are singed, scoured and bleached on the jiggers with caustic soda and hydrogen peroxide, blued and dried on the stenter, calendered inspected and dispatched.

The polyester cotton blends are singed, partially heat set on the stenter, jigger scoured desised and bleached and then are dried and resinated and baked on the stenter with a Japanese resin Sumitex M3 a melamine formaldehyde type resin, 15% strength using the recommended Sumitex catalyst.

The goods are then inspected and made-up. The present production is mainly bleaching but dyeing trials have been carried out on the open jiggers of the polyester cotton cloth so far without success although the results are promising except for some creasing.
The management hope that the two underwater jiggers just installed will enable them to dye these blends satisfactorily but we are very doubtful that they will make much improvement.
The expedient of partially heat setting on the Dornier stenter is a praiseworthy attempt to overcome machine deficiencies but as this means two or there extended passages along the stenter its already low production is further diminished. According to the manager the customers are well satisfied with the result.

LABORATORY

There is at present no facilities or personnal for laboratory testing.

QUALITY CONTROL

There is no quality control as such. The goods are inspected without detailed examination.

MATERIAL HANDLING

The normal way is from batch to batch or wagon to wagon to batch and vice versa. There is no big batching or palletisation.

WORK FLOW

The floors are level and in a fair state of repair. The flow is in the form of a rather cramped "U". There is little free space available and if machines are added much thought will be required and the possibility of further extensions considered.

STAF AND ORGANISATION

Mr. Mathrab is qualified in dyeing and finishing and is obviously keen, intelligent, and ambitious to make progress with the polyester blends. He should be supported.
On expansion more technicians will be needed and will have to be found recruited and trained.

The workers are fairly experienced. The wage system is normal for Indonesia being paid a basic time rate plus the usual allowances for rice etc.
There are about three hundred employees all told in the weaving winding and ancillary departments working three shifts of four teams. We have not yet examined the method of documentation, or production control, or stores and costing but we should imagine that it needs improvement.

MAINTENANCE

There is no system of "preventive maintenance as such and no mechanic detailed for the finishing department.

MARKETING

On our first visit to the factory in May of this year with Dr. Oweiss and Mr. Santosa, the present manager had only recently been appointed to the position. He said then that business was bad and he attributed it to the lack of purchasing power of the population. We questioned him at length about the reasons for poor trade. Was it due to price, quality, imports, marketing or the change in fashion because of the shift from the traditional batik to Western cloths ?
We pointed out that his stock was very high, namely 600,000 meters and yet they were proceeding to re-equip the factory with 150 modern Japanese looms. The finishing department at that time was virtually unused apart from the stenter which was employed in finishing bleached material for the local Batik manufacturies. Mr. Mathrab found difficulty in replying to this examination except to return to his theory of lack of purchasing power. He was not clear about the Marketing function but he told us that they had two customers in Solo and one in Jogjakarta whom he visited rarely.
It was suggested that the G.N.P. was increasing according to statistics and that the textile business in Bandung was expanding. We recommended that he study the market more closely, visit his customers for their estimated business, and be prepared to switch if possible to cloths which were in demand. We encouraged him to consult with his Managing Director and the people responsible for the marketing function.

On our next visit in September, the position and outlook had changed enormously and completely. The stocks had been liquidated and the demand for polyester cotton cloth had advanced considerably.
The present production of demand is according to Mr. Mathrab most encouraging and satisfactory and he estimates that future demand for polyester cotton cloth will reach 800,000 meters per month in the near future. For this reason he is anxious to develop to the fullest extent the capacity of Infitex. He foresees no marketing problem only the problem of production especially in the synthetic blend field.

PROBLEMS

1. The main and key problems is how far to develop the finishing productive capacity of Infitex and to what extent and how far to develop the production of polyester cotton bleaching and dyeing.

   Depending on how this vital question is answered will follow the consequent problems such as :
2. The selection and purchase of the new macginery required.
3. The training and recruitment of suitable staff and workers.
4. The provision of laboratory facilities.
5. Maintenance.
6. Quality Control.
7. Water supply and quality.
8. Examination of the steam and power facilities.
9. Building capability.
10. Organisation overhaul.

RECOMMENDATIONS

We do not know the policy of Pinda Sandang for Infitex will be but we would respectfully draw their attention to the following factors which in our opinion are worthy of notice.

1. Infitex is in the centre of a batik producing area which is becoming more and more interested in the use of polyester cotton cloth. This is clear from the present production of the factory which is around 100,000 yards per month and is being bleached and finished

to the satisfaction of the customers.

2. We think it is reasonable to assume that this demand will continue into the future for polyester cotton fabrics have very desirable qualities of handle, being lustrous inappearance, light of weight, strong with good crease resisting properties, and extensively a advertised in the world press.
3. The new Japanese looms are going to be able to produce good quality polyester fabric to around a figure of 400,000 meters per month and Mr. Mathrab estimates that there will be a similer demand from the local printers.
4. Based on these estimates which the head Office can easily confirm it would suggest that Infitex is established as a bleaching and dyeing unit with a capability of around 8,000,000 meters per year. Working this figure out at 70% efficiency the overall target for each machine or process would need to be around 23 mpm which compares with the present figure of less than 5 mpm.
   This will entail considerable expansion and expense for polyester cloths require heat setting to develop their stability to laundering and they are usually treated with a rosin to enhance the crease resisting of the cotton or rayon component. Resination of course implies curing or baking in addition.
5. In our opinion it would therefore be necessary to have a heat setting stenter and in order to have an overall production speed of 23 mpm it would be necessary to have a machine of four or five heating chambers with suitable pins for heat setting. To modify the present stenter would be in our opinion inadvisable except as a very temporary expendient for it is bad policy to try to process modern fibres with inappropriate machines.
6. Bleaching of the synthetics can be continued on the present jiggers but if it were decided to extend there are other cheaper and better methods such as semi continuous bleaching ranges for periode or sodium chlorite bleaching.
7. We are not convinced that the new underwater jiggers will not be the answer to the dyeing problems with these blends and for small

batch dyeing of woven cloth it has been usual to go in for beam dyeing machines capable of the high temperatures necessary to dye the polyester economically and successfully.

8. It is usually the practice to mercerise these polyester materials and so some form of mercerisation or causticisation would be needed.
9. A Baking machine would reduce the demands on the stenter and so this would be required.

If on balancing these factors after paying due regard to the expense and the policy of the company it is decided to go ahead with the development of Infitex as a self contained bleaching and dyeing unit with a polyester cellulosic capability we would recommend the following programme. We divide the programme into three phases in order to give flexibility to the plan and to spread out the expenditure.

SUGGESTED PLAN

PHASE 1

To develop the capacity to a target figure of 5,500,000 meters per year requiring and overall speed of approximately 15 mpm. We assume that the bulk of the production will be bleached white comprising cotton and polyester cotton goods. Trial dyeings will continue on the open jiggers. The goods will be resinated where necessary.

The following machines will be required :

One four or five chamber Heat Setting stenter with suitable pinning arrangement, cooling device, weft aligment mechanism, and alternative

" big batching "	Approximate cost	Rp. 50,000,000.--
Two jiggers locally made to specification for additional bleaching		
	Approximate cost	Rp. 5,000,000.--
Mercerising machine either batch or continuous		
	Approximate cost	Rp. 20,000,000.--
Laboratory equipment	Approximate cost	Rp. 10,000,000.--
T o t a l		Rp. 85,000,000.--

It is assumed that the present unexamined Boiler and Power plant will cope.

ESTIMATED PRODUCTION

24 hrs. per day 350 days per year 70% efficiency

Singer 70 mpm	24,696,000 mpy
Jiggers 7 100 kg. cap. each	5,145,000 mpy
Kier 400 kg. cap.	1,960,000 mpy
Cylinder Drier 15 mpm	5,292,000 mpy
Stenter Dornier Haubolt 10 mpm	3,528,000 mpy
Calender 60 mpm	21,068,000 mpy
Proposed Stenter 60 mpm 3 runs Drying Heat Setting, Resin overal 20 mpm	7,056,000 mpy
Mercerisor 10 mpm	3,528,000 mpy
Inspection and Making-up to fulfuil target.	

Depending on experience and marketing forecast to develop the dyeing capacity by the addition of Beam Dyeing Machines in

PHASE 2

The target figure of 5,500,000 will stil be maintained with greater dyeing capacity.

Beam Dyeing Machines 2 plus		
Batching Machine	approximate cost	Rp. 20,000,000.--
Baking machine cum Flue Dryer		
25 mpm	approximate cost	Rp. 20,000,000,--
Ancillaries		Rp. 10,000,000,--
T o t a l		Rp. 50,000,000.--

PHASE 3

In this phase which may be short or long a further appreciation of the potential business to be obtained will be assessed and the plant developed to a potential target of 8,000,000 meters per year with an average machine production of 25 mpm.

Considerable building extension may be required together with adequate service facilities.

The addition of plant then to be considered :

Cylinder Drier 65 mpm	Approximate cost	Rp.	12,000,000.—
Semi-Continuous Bleaching Range 20 mpm	" "	Rp.	30,000,000.—
Washing machine 60 mpm	" "	Rp.	20,000,000.—
Additional Mercerising capacity	" "	Rp.	30,000,000.—
Sanforiser or Everset Machine	" "	Rp.	25,000,000.—
Ancillaries	" "	Rp.	33,000,000.—
Total		Rp.	150,000,000.—

Production Estimated Phase 3

24 hrs per day 350 days per year 70% efficiency

Singer 70 mpm	24,696,000.mpy
Kier 400 kg	1,960,000 mpy
Jigger 7 100 kgs each jigger	5,145,000 mpy
Beam Dyeing 2	2,940,000 mpy
Cylinder Dryer 65 mpm overall speed 22 mpm	7,761,600 mpy
Stenter Dornier Haubolt 10 mpm	3,528,000 mpy
Calender 60 mpm	21,068,000 mpy
New stenter 60 mpm overall 20 mpm	7,056,000 mpy
Mercerìser 20 mpm	7,056,000 mpy
Bleaching range 40 mpm overall speed 2 runs 20 mpm	7,056,000.mpy
Washing machine 60 mpm	7,056,000 mpy
Baker/Flue Dryer 25 mpm	8,820,000 mpy
Sanforiser/Everset 50 mpm	17,640,000 mpy

Inspection and making up machines to deal with production as necessary.

This plan is very flexible and can be adjusted as the factors change or opportunities appear.

Should it be decided to follow the policy outlined the remaining problems will fall into place.

The selection and purchase of the new additional machinery required is a most important matter depending on grants or finance available.

Tenders should be demanded from the major textile engineers and trials carried out where possible.

The recruitment and training of suitable staff can be carried out from the start of the plan as also can the establishment of even the most simple laboratory facilities.

MAINTENANCE

A mechanic should be detailed to each department and the chief engineer should work out a system of preventive maintenance. The importance of this function should be brought to the notice of the various managers.

QUALITY CONTROL

The setting up of laboratory facilities will be a start nad if an analytical chemist is recruited be could test the various chemicals and monitor processes with a view to standardising the quality.

The water supply should be tested as soon as possible. Polyester blend dyeing needs softened water.

The steam and power supplies should also be checked with the suggested plan in order to equalise the production with the probable demand.

A survey should be made of the buildings and space available with the proposed expansion in mind. It may be that in the third phase some extensions will be necessary.

A study of the organisation and documentation necessary for the programme should be commenced with especial note being given to the need for stores control and costing.

This report gives a brief survey of the courses open to Infitex. It has been worked out without the very detailed study necessary but it should give a framework within which a policy and a plan can be integrated.

The estimated cost are very approximated.

My thanks are due to Mr. Matohir and Mr. Mathrab for their cooperation and also to my counterpart Mr. Rutjito for his collaberation.

DISCUSSIONS AND ADVICE GIVEN TO THE MANAGEMENT OF INFITEX

1. We have discussed the problems of marketing and what a manager can do himself such as constant visiting of customers soliciting their forecasts and collecting market intelligence.

2. The processing routine of polyester cotton cloths has been covered in several talks. The question of "pilling" of cellulosic blends has been discussed and the prevention of this fault by careful singeing procedure emphasised.

3. The technique of "heat setting" of polyester fabrics has been explained and the need for a specially designed pin to keep the cloth from the hot clip so as to prevent clip marking caused by temperature differentials.

4. The effect of setting on cloth stability and crease recovery properties has been explained.

5. The crease resisting of polyester fabrics has been covered with descriptions of the various resins, the effect on strength, the necessary tests required and the need for strict laboratory control. Amongst the test discussed were those of crease recovery, abrasion, strength, resin content.

6. Thermosol dyeing techniques have been explained and high temperature dyeing of small batched by beam and jet machines. Pamphlets on beam dyeing machines have been left with the manager.

7. Bleaching recipes have been given and the bleaching with Sodium Chlorite mentioned. Semi-continuous and continuous bleaching machines have been covered.

8. Jigger processing has been explained and the present jiggers criticised and compared with high temperature machines. We have examined the trials on polyester dyeings which they have carried out and made suggestions for further trials.

9. Staffing problems and manning requirements have been referred to examination.

10. The calendering process has been explained and instruction given in the care and maintenance of calender bowls.

11. Compressive shrinkage and its effect on finish has been covered in our talks and the manager has been given notes on compressive shrinking.

12. The importance of having a Laboratory and a competent chemist has been emphasised and notes on the basic laboratory equipment have been handed to the manager.

13. The important question of the supply and quality of the water has been impressed on the manager.

Appendix

MACHINERY AS AT PRESENT IN INFITEX

Machine	Type	Year	Capacity	Speed	Width	Condition
Singer (Wakayama)two	berner	old		70 mpm	165 cms	Fairly Good
Kier	Pressure	old	400 kg			Unused but fair
Winch		old	100 kg			Poor
Jiggers Kyoto, Benninger	3 open automatic	old	100 kg		140 cms	Fair
Kyoto	2 under water	1972	100 kg		140 cms	Very Good
Yarn Dyeing Hisaki		old				
Cylinder Dryer Kyoto	8 stainless steel	1972				Very good
Stenter Dornier Haubolt	2 chambers	old			150 cms	Satisfactory
Scutcher Kyoto		1972				Very good
Calender Maag	3 bowl 2 cotton 1 steel			60 mpm		Very good
Inspection machine	Kyoto					
Folding Machine Maag						

Boiler 1 uninspected.

Appendix

MACHINERY

Machinery required to fulfil suggested Plan **Phase 1**

Stenter Heat Setting 5 chamber

Jiggers locally made 2

Merceriser batch of chainless 1

Laboratory Equipment

Ancillary inspection and making up machines.

Phase 2

2 Beam Dyeing Machines plus batching machine

1 Baker cum Hot Flue

Phase 3

1 Semi-continuous bleaching range

1 Washing machine

Additional mercerising capacity

1 Sanforise or Everset type compressive machine

1 Additional cylinder drying capacity

Plus ancillary equipment such as rollers trucks batching stands inspection and making-up machines.

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNITED NATIONS DEVELOPMENT PROGRAMME
(SPECIAL FUND PROJECT/INS - 71/531)

04460
(1 of 17)

INDONESIA

TEXTILE INDUSTRY REHABILITATION AND DEVELOPMENT PROGRAMME

Technical Report

No. 17

THE WEAVING OF TEXIN TEGAL

(following up)

"This report is presented to the Government of Indonesia without prior approval of either the UNIDO or the United Nations Development Programme and therefore does not necessarily represent the views of either organization".

EL-SAYED M. OWEISS
Project Manager.

Jakarta, November 20, 1972

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ABSTRACT and INTRODUCTION

Texin factory has already been reported twice before showing the description, the history, the problems and the recommendation.
This report is a statistical one to show the improvement in weaving during the short part of life of our project in a factory equipped mostly with old looms and some of them are obsolete. It is the largest weaving shed in all Indonesia as there are 1254 looms. Out of this number, there are only 120 new automatic Japanese shuttle change looms and the remains are power old looms. With the increased of 135% in the new automatic looms they reach to nearly the efficiency as it is in the developed countries.
The increase in the old power loom which is comparatively small but it is big if we take in consideration the conditions of both the looms and labour forces. In this stage and this factory the in plant training with an efficient maintenance program we hope that we can push this factory with another step in the improvement direction.
The following is the report of Mr. Hoshiyama our weaving technologist in which be explained in detailed figures the zones of improvement.

Grateful thanks are due to the Directorate General of Textile, management and the staff of the factory, I.T.T. and other individuals for providing informations and facilities to do this work.

STATISTICAL REPORT ON THE WEAVING OF TEXIN - TEGAL
(following up)

November, 1972

Tamotsu Yoshiyama
Weaving Technologist
TEXTILE INDUSTRY REHABILITATION
& DEVELOPMENT PROGRAMME
IN INDONESIA, UNIDO

1. INTRODUCTION

This is a statistical report following " Technical Report - Rehabilitation of Texin Weaving Mill May 5, 1972 "

2. DATE & PERIOD OF FIEL OPERATION

December	23, 1971	1 day
January	17 - 21, 1972	5 days
March	1 - 5, 1972	5 days
April	30 & May 1, 1972	2 days
July	11, 12 & 14, 1972	3 days
September	11, 1972	1 day
Total		17 days (Excluding the da s for travel)

3. MY ACTIVITY

Before I wrote the above mentioned technical report, I visited this mill total 13 days to survey the technical situation and given the necessary guidance as described in it. After that I went there two times mainly to inspect their real situation of following my various suggestions already given previously and to give new advices on the polyester - Cotton Weaving.

4. PROGRESS MADE

4-1 Daily Cloth Production in Yard & Pick

The average daily cloth production length and picks from July 1971 to October 1972 are monthly shown in the next table. Specification of cloth was so frequently changed due to marketing condition that weaving picks as well as cloth length should be also calculated for grasping the transition of production. Namely, in comparison with the production of the last one year (1971) before my field operation, the latest four months average production cloth length (July - October 1972), was increased 91% in Toyoda 56" R/s Automatic Loom, 6% in Susuki & Texin 50" R/s Ordinary Loom, 76% in Susuki 70" R/s Ordinary Loom and 18% in total.

The weaving picks were similarly increased 135% in Toyoda 56" R/s, 9% in Susuki & Texin 50" R/s, 97% in Susuki 70" and 27% in total.

No. of looms · 120 904 230

Year	Month	Toyoda 56" R/s Automatic Loom (165 rpm)				Suzuki & Texin 50" R/s Ordinary Loom (159 rpm)				Suzuki 70" R/s Ordinary Loom (120 rpm)				Total			
		Yds/Day	Ratio	1,000 picks/day	Ratio	Yds/day	Ratio	1,000 picks/day	Ratio	Yds/day	Ratio	1,000 picks/day	Ratio	Yds/day	Ratio	1,000 picks/day	Ratio
1971	July	3,562		8,997		41,376		89,700		5,317		9,954		50,255		108,651	
	Augustus	3,327		8,387		36,538		79,798		2,321		4,501		42,186		92,686	
	September	4,159		10,481		39,125		85,436		2,261		4,833		45,545		100,800	
	October	4,532	-	11,418	-	35,356	-	77,212	-	2,036	-	4,399	-	41,924	-	93,029	-
	November	4,216		10,938		31,710		69,593		1,795		3,599		37,721		84,130	
	December	4,435		11,178		33,836		73,774		2,311		4,882		40,632		89,854	
	(July–December) Average	4,035	100	10,233	100	36,332	100	79,252	100	2,674	100	5,370	100	43,045	100	94,855	100
1972	January	5,010		12,625		31,892		79,040		2,283		5,541		39,185		97,206	
	February	6,091		15,351		35,419		82,900		2,228		5,298		43,738		105,549	
	March	7,109	-	19,576	-	38,660	-	86,448	-	2,953	-	7,298	-	48,722	-	113,322	-
	April	7,682		19,304		38,739		88,272		3,987		8,799		50,408		116,375	
	May	7,818		18,083		38,128		86,500		4,416		9,197		50,362		113,785	
	June	7,204		20,113		39,369		84,266		4,575		9,457		51,148		113,836	
	(January–June) Average	6,819	169	17,510	171	37,035	102	84,571	107	3,407	127	7,598	142	47,261	110	109,679	116
1972	July	6,960		21,422		35,704		79,751		4,397		9,356		47,061		110,529	
	Augustus	8,020	-	24,345	-	39,144	-	88,259	-	4,617	-	10,689	-	51,781	-	123,293	-
	September	8,021		25,119		37,913		85,308		5,001		11,332		50,935		121,759	
	October	7,948		25,193		40,643		91,155		4,793		10,530		53,384		126,878	
	(July–October) Average	7,737	191	24,020	235	38,351	106	86,118	109	4,702	176	10,477	197	50,790	118	120,615	127

4-2 Daily Cloth Production in Picks/Loom and Efficiency

Sometimes they stop a number of looms due to the marketing condition, for this reason the number of working looms is so fluctuated that we need to calculate the production picks per one working loom per one day as follows.

Unfortunately as the number of stopped looms for Susuki 70" R/s loom was not recorded in the past, picks/Loom/day could be calculated only for Toyoda 56" R/s and Susuki & Texin 50" R/s looms.

Namely, picks/Loom/day was increased 135% in Toyoda 56" R/s Loom and 10% in Susuki & Texin 50" R/s Loom.

The main reason for this very sharp increase of Toyoda Automatic 56" R/s Loom during only 9 months is their misunderstanding and the lack of technological knowledge on so - called automatic loom they believed the possibility of its superior productivity simply because it is very up-to-date and automatic, did not take technical actions especially necessary for automatic looms, left them as they were, and only had been waiting for natural increase of their productivity in vain since the beginning of their full operation in July 1971 —— these were the real situations when I visited this mill at first in December 1971 and January 1972.

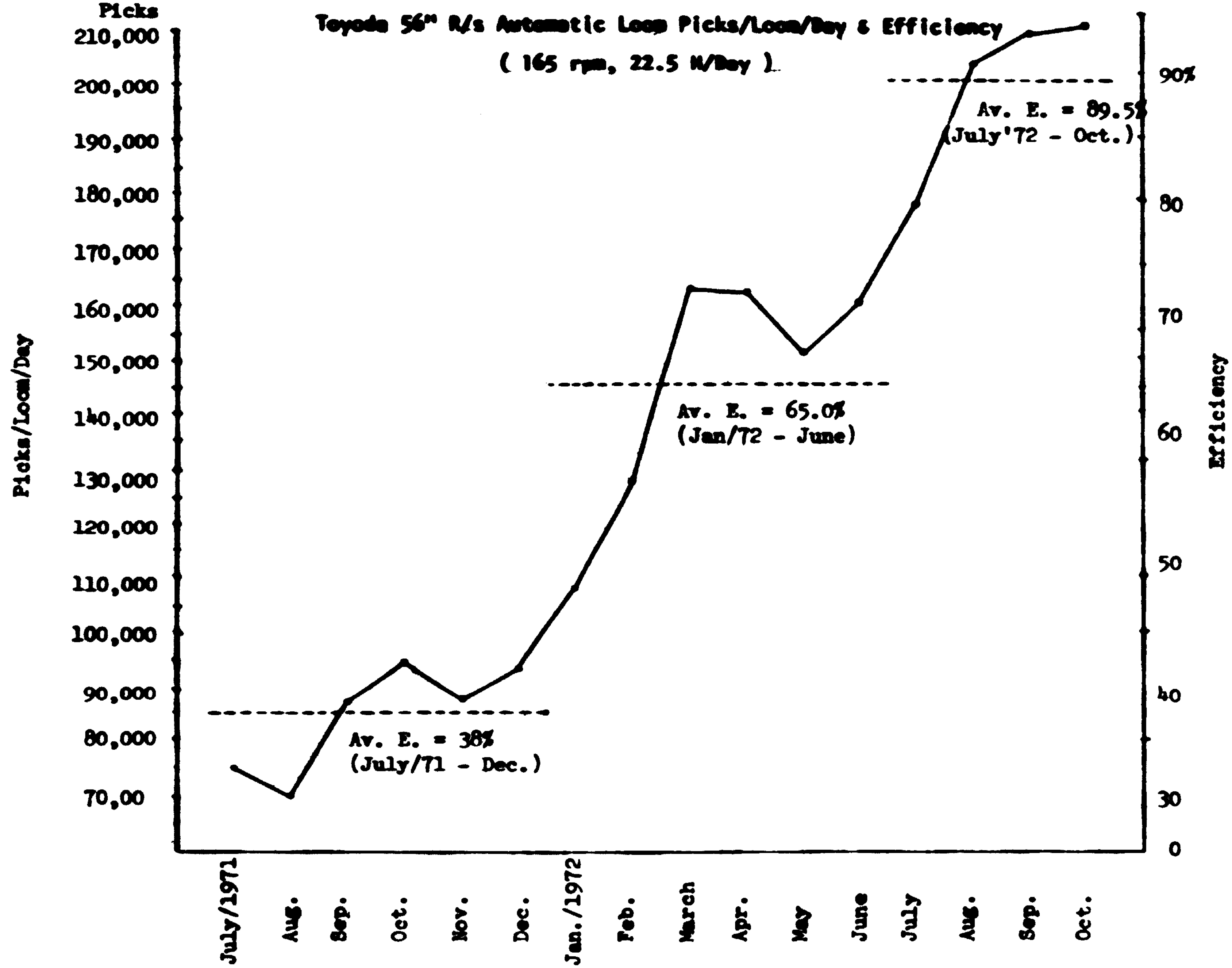
Then I gave them many suggestions as already mentioned in the previous technical report and they followed them so willingly and faithfully that they have attained this brilliant result.

As to Susuki & Texin 50" R/s Ordinary Loom, due to the quality improvement of warp beam and weft pirn, its productivity was 10% increased, however, the difficulty of training weavers based on their averagely old ages is still preventing them from raising more efficiency.

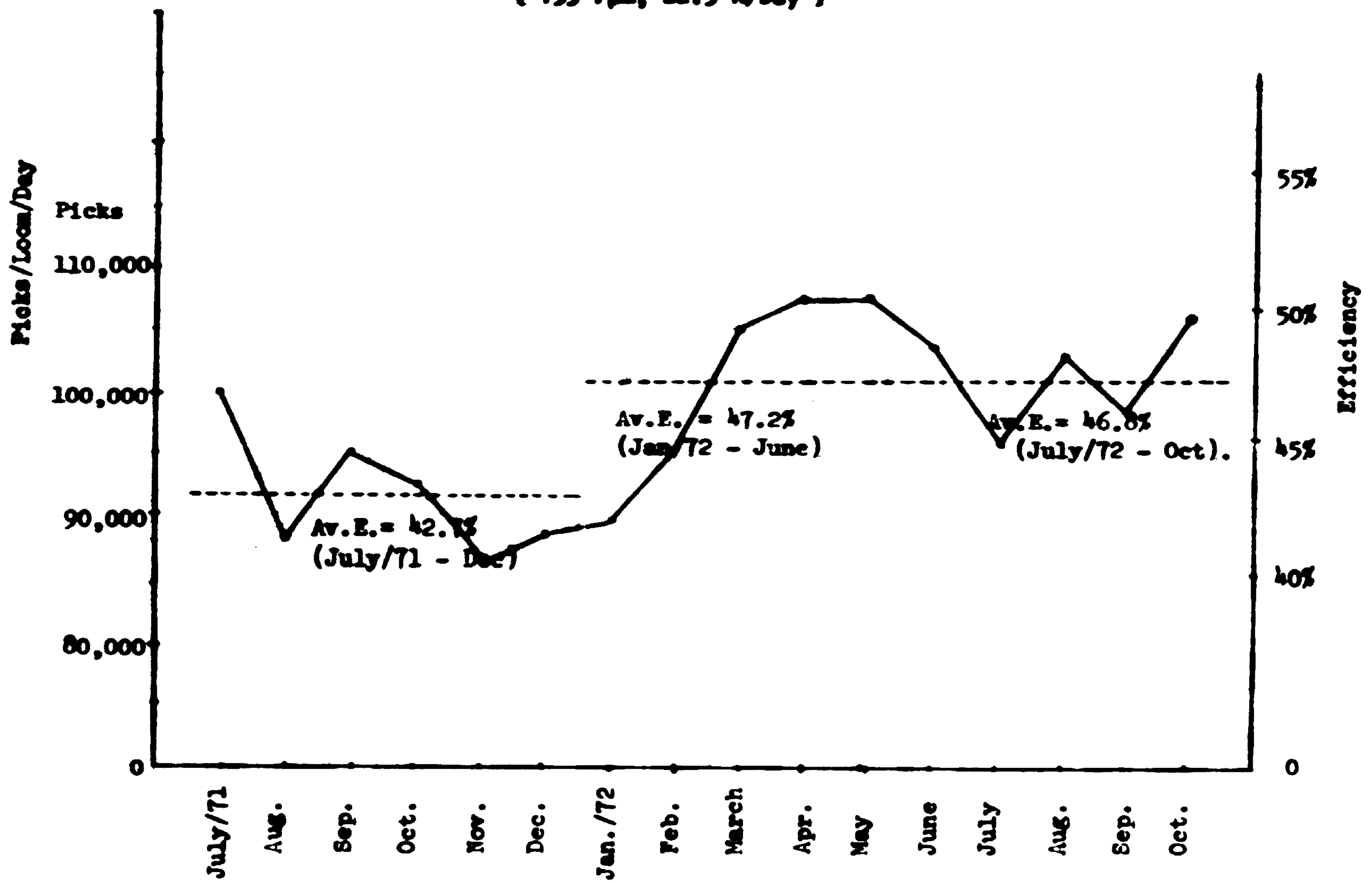
4-3 Cloth Quality and Production Cost

Because of the inseparability of weaving productivity, cloth quality and its cost —— this is a speciality of weaving technology —— these cloth quality and production cost must have been also improved, the data for these points, however, I have not received yet and cannot show here, to my regret.

Year	Month	120 Looms Toyoda 56" R/s Automatic Loom (165 rpm) Picks/Loom Day	Efficiency (%)	Increase Ratio	904 Looms Suzuki & Toxin 50" R/s Ordinary Loom (159 rpm) Picks/Loom Day	Efficiency (%)	Increase Ratio
1971	July	75,142	33,8	-	99,706	46,5	-
	August	70,086	31,4		87,776	41,0	
	September	87,934	39,5		95,051	44,2	
	October	95,149	42,5		92,341	43,0	
	November	87,971	39,4		86,968	40,5	
	December	93,323	41,8		88,035	41,2	
	July - December Average	84,934	38,0	100	91,646	42,7	100
1972	January	108,139	48,5	-	89,401	41,8	-
	February	127,808	57,5		95,328	44,2	
	March	163,125	73,0		104,672	48,8	
	April	161,033	72,0		107,411	50,2	
	May	150,767	67,5		107,232	50,2	
	June	160,666	72,0		103,540	48,2	
	January - June Average	145,256	65,0	172	101,264	47,2	111
	July	177,474	79,5	-	95,883	44,7	-
	August	202,269	90,0		102,911	48,0	
	September	209,389	94,0		98,611	46,0	
	October	209,936	94,0		105,964	49,5	
	July - October Average	199,767	89,5	235	100,842	46,8	110


Toyoda 56" R/s Automatic Loom Picks/Loom/Day & Efficiency
(165 rpm, 22.5 H/Day)
Picks
210,000
200,000
190,000
180,000
170,000
160,000
150,000
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,00
Picks/Loom/Day
Av. E. = 38%
(July/71 - Dec.)
Av. E. = 65.0%
(Jan/72 - June)
Av. E. = 89.5%
(July'72 - Oct.)
90%
80
70
60
50
40
30
0
Efficiency
July/1971
Aug.
Sep.
Oct.
Nov.
Dec.
Jan./1972
Feb.
March
Apr.
May
June
July
Aug.
Sep.
Oct.

Suzuki & Taxin 50" R/s Ordinary Loom
Picks/Loom/Day & Efficiency
(159 rpm, 22.5 H/Day)



5. CONCLUSION

Their total weaving production was increased 18% in cloth length and similarly 27% in weaving picks and simultaneously the quality and cost of the products were improved during these nine months since the beginning of my activity.

The main reason for these improvements is, I believe, the good co-operation between the Mill and our UNIDO Project.

The next main step to be carried out for this mill is the sufficient training of old weavers and the establishment of maintenance system for machinery.

I hope the same good cooperation as before between the Mill and the Project in order to get more excellent attainment in the near future.

C-586

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