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FIELDEN HOUSE PRODUCTIVITY CENTRE

16463

FINAL

REPORT

ON

UNITED NATIONS DEVELOPMENT PROJECT

IN

DAR-ES-SALAAM

TANZANIA

CARD MECHANICS COURSE

PRACTICAL AND THEORETICAL

Submitted by

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 FIELDEN HOUSE PRODUCTIVITY CENTRE

1. INTRODUCTION

This report covers the progress of a ten week Card Mechanic Training Course at Texco Industries, Dar-es-Salaam under the instructions of UNIDO, Vienna.

2. PRE-COURSE ACTIVITY

The course tutor arrived on site five days prior to start date to both acclimatise and review facilities. He was well received by Texco staff and taken on a tour of four mills to evaluate facilities and choose which centre to use as a base.

It was finally decided to operate the course at the Dar-es-Salaam centre with visits to the other centres at relevant points in the course.

The tutor was informed that all twenty eight participants would be assembled and ready to commence the course on the first day. Surprisingly quite a few had never operated as a mechanic and never worked on card machines. It was pointed out to the Company that the number of students was too high to run a really effective practical course to include the necessary one to one student/tutor participation, and the difficulty was increased where some students had no prior knowledge of the machinery involved. However the tutor stated he would cope to the best of his and their ability. In the event it was one of the inexperienced students who achieved the highest standard on the course.

3. COURSE PROGRESS

Daily comments on the progress of the course are covered in the tutor diary in Appendix I of this report.

Theoretical sessions at the centre were supported by practical sessions (often on cards in need of repair) at the various Mills. Locations visited include:-

UBONGO
HADJI BROS.
BLANKET MANUFACTURING
SURATEX
FRIENDSHIP TEXTILES
MOROGORRO POLYESTER
KILTEX

All students built up a two inch manual during the course consisting of printed text reproduced by Texco and technical specifications and diagrams which had been photo-copied and brought from the U.K. This was supplemented by each student making his own notes from the lectures which were kept in a separate folder. A sample of notes from one of the more literate students is included in Appendix II.

Participation from the students in the form of questions and discussion started on day three of the course and carried through to the end with good effect.

Because of the need to visit other locations and link these visits with theory sessions it was agreed to extend the course hours over and above the normal working day. Weekend working was discussed but discounted since many of the students wished to return to their homes at the weekend.

However certain technical problems at the Texco Mills were investigated and rectified by the course tutor during the weekend periods. On these occasions, students who lived locally were more than willing to attend. Texco were pleasantly surprised at this attendance.

Theoretical and/or practical tests were a regular feature of the course programme and all students achieved satisfactory, or above, standards. Many did less well than they could have done, due to lack of ability in expressing their knowledge in written terms.

Due to the longer hours worked each week, the course finished some four days ahead of schedule. Texco expressed complete satisfaction with the programme, and a letter to this effect is included in Appendix III to this report.

The final day of the course was given over to assessment of the work each student had done and the results of the various tests and practical sessions. All students completed the course to the satisfaction of the instructor and a number were commended for their achievements. Texco management, who had followed the progress of the course, were informed of the results of the assessment and the identity of the most promising students.

Finally, on Saturday, 4 April, a formal closing ceremony took place attended by representatives from Texco and UNDP along with the course tutor and students. The manuals and Fielden House Certificate of attendance and satisfactory attainment were presented to the students who in turn presented the course tutor with a gift to mark their gratitude and appreciation. The itinerary for this presentation is included at Appendix IV to this report.

4. GENERAL COMMENTS

It must be said that the high number of students extended the practical sessions on the course and therefore reduced the amount of "hands on" time considerably. Any future course should not have more than twelve students to give an ideal level of practical work. In the training of repair and maintenance personnel, theory is necessary as reference material, but a high degree of structural practical work is essential to ensure complete understanding.

The tutor is however satisfied that all students had a good understanding, but more importantly, a small number have gained sufficient proficiency to supervise on-going experiential training of the rest in the work covered.

However to consolidate the work already done, it is suggested that a follow-up to the course should be carried out after a suitable interval to cover any areas of general weakness which may arise, and to cover advanced diagnostic and quality factors with each group of students in their assigned departments. Recommended duration - 5 weeks.

Discussions on the process areas inevitably took place on the visits to the various Mills and it is abundantly clear to the writer that similar mechanical training is required for the Spinning process. A request from Texco will no doubt be received in the very near future.

The tutor was well received and well treated by both Texco and the students throughout the course. The only cause for complaint was the unreliability of transport arrangements to the various exercise sites.

CARD MECHANICS COURSE - DAR-ES-SALAAMDAILY REPORT

- 28 January Left Manchester Airport for Dar-es-Salaam via Amsterdam.
- 29 January Arrive Dar-es-Salaam met by car but had to pay extra for taxi as the white board was too big. Booked into the Kilimanjaro Hotel then went straight out to the United Nations Development project and then on to TEXCO office and met all the people concerned. All participants looking forward to the project. I viewed four mills to decide on which centre to use as a base and to evaluate the facilities they had to offer.
- 2 February Monday Went to the training centre in Dar-es-Salaam but moved to the UBONGO centre. All the students reported. At first a bit erratic but settled down later. Discussed Health and Safety briefly. Gave information relating to the history of STYAL. Students were very attentive but did not respond with many questions at this stage. Decided on the centre at Dar-es-Salaam.
- 3 February Tuesday Discussed the theory of Cotton spinning preparation from Bale to Winding and the difference between S & Z twist.
- 4 February Wednesday Theory of carding discussed at length. Instructed on calculation theory and practical use of tachometer. Students now asking questions.
- 5 February Thursday Holiday
- 6 February Friday Described Parts and functions of a carding machine. Built a card from scratch from putting frames on floor to erecting piece by piece from drawings. Using white board now.
- 7 February Saturday Went to office for discussions with Mr Kasulwa, the Manager who was very pleased with the progress so far.
- 8 February Sunday Went to Hadji Bros - manager wanted to discuss machinery (about 2 hours) Will be more Sunday lessons I can see. OK.
- 9 February Monday Still on parts and functions. Very thoroughly discussed. Also need for grinding and setting discussed. Stayed until about 5.30 pm
- 10 February Tuesday Principles of card stripping and grinding discussed. This was at long length. Also calculations covered.
- 11 February Wednesday Machine setting theory and discussion on cards.
- 12 February Thursday Continued theory setting also changing of cylinder bearings and how.

13 February Friday Discussed all sorts of problems. Plenty of questions now forthcoming.

14 February Saturday Went to Blanket Manufacturing to see if I could help on stripping.

15 February Sunday Four students attended to discuss carding. They found it very interesting (3 hours)

16 February Monday Visited Suratex shown students all points but they also saw things that they had learned from the course that were not in order at the mill. I was pleased that they had noticed relative points. Returned to Hadji Bros to discuss wire types etc.

17 February Tuesday Visited Suratex again to examine wire on a number of cards by microscope. This method is not used but I stressed the importance of this procedure. All students put in to small teams. Returned to Hadji Bros for discussions and tests. All explanations were very encouraging as it showed they were absorbing the information. NOTE MICROSCOPES AND BATTERIES URGENTLY REQUIRED.

18 February Wednesday At Hadji Bros discussing wire and calculation. Practical tests of tachometer conducted, also practical calculations. Dismantled cylinder shaft.

19 February Thursday Had a theory examination - all students attained my pass mark with a few reaching 100%. I intend conducting tests periodically.

20 February Friday Visited UBONGO received very well, saw a new mill only just commissioned by INDIA. Also opportunity to see a cylinder cracked in transit. They didn't know how to get the shaft out so I saw this as a golden Opportunity to show the students the procedure. Returned to Hadji Bros to continue the discussions.

21 February Saturday Visited Friendship Textile Mill and was well received. This mill was the first to be built some 20 years ago. Low production cards but high quality. Had a long discussion with the Managing Director. Returned to Dar-es-Salaam and saw Kasulwa for discussions on course progress. Also discussed the need for mechanic training on the spinning process.

22 February Sunday Four students for three hours

23 February Monday At Friendship Mill. No.1 team on backs, No.2 team on backs and flats, No.3 team on backs and flats. Return to Hadji Bros for discussion.

24 February All teams concentrated on erection of cards. Took video for later reference. M.D. was involved. Return to Hadji Bros for discussions.

25 February Wednesday	All teams changed about on to different practical work.
26 February Thursday	Still at Friendship on Grinding, all teams O.K. Returned to Hadji Bros for discussions. Held a mock theory exam which was not very good. The majority of the students do not have the ability to put their knowledge on to paper.
27 February Friday	Visited new plant at MOROGORRO POLYESTER. U.C.O. commissioned following fitting by Japan. Very good and modern. I was well received. We also visited a Jute mill nearby.
2 March Monday	At Hadji Bros discussed the Friday's visit. Also a lengthy discussion on conversion of standard card to high production card. Card wire mounting Teams selected for separate work on Tuesday at Suratex.
3 March Tuesday	Dismantling back and under screens, also flat removal for setting. Also dismantling for wire mounting. Returned to Hadji Bros for discussions.
4 March Wednesday	All machines dismantled ready for mounting. Returned to Hadji Bros. Now doing basic calculation and methods. This is an area of little knowledge so the students required a great deal of tuition.
5 March Thursday	Checking bare cylinder with clock and different sections on practical test of flat setting. Returned to Hadji for theory.
6 March Friday	Started bare cylinder grinding and beginning of wire covering. Also flat setting. Returned to Hadji for theory.
8 March Sunday	Four students for two hours
9 March Monday	Covering with top wire using very poor equipment. Also flat setting. Returned to Hadji for theory.
10 March Tuesday	Practical changing cylinder bearings. Checking cylinder for eccentricity. Also flat setting. Returned to Hadji for theory.
11 March Wednesday	Grinding and Setting and rebuilding and continued flat setting. Returned to Hadji for theory. Part theory exam conducted.
12 March Thursday	Continued rebuilding and setting flats. Returned to Hadji for discussions.
13 March Friday	Checked card and test and found to be O.K. Recommended closer settings. Visited Kiltex. This mill is in trouble with poor cards and draw frames. Saw the general manager and said we would go and do two cards as a gesture of goodwill of which he was most appreciative. Returned to Hadji Bros for video and discussions.
15 March Sunday	Three students for 2½ hours.

16 March Monday	At Kiltex checking setting grinding and recovering the lickerin. This is an abortion??? Lack of details. Bad wire. No stone for grinding. GOT ONE. But mechanics do not know what to do.
17 March Tuesday	Continued grinding and re-covering practical.
18 March Wednesday	Ditto
19 March Thursday	Ditto
20 March Friday	Ditto
	We returned to Hadji each day for discussions on the faults found that day and the quality of the production.
23 March Monday	At Kiltex as above. Also fault report for MD Texco and one for F.H. on Kiltex.
24 March Tuesday	At Kiltex as previous. All exams taken. Practical and theory good results.
25 March Wednesday	Visited Blankets, UBONGO to refresh memories. Returned to Hadji for discussion and calculations.
26 March Thursday	Visited Friendship and then Hadji for discussion and calculations.
27 March Friday	Conducting theory quality control and faults and full questions.
29 March Sunday	At Hadji. This is the last Sunday before departure. Been very good. Texco very surprised at turn up on Sundays.
30 March Monday	At Hadji on Quality Control. Course evaluation and calculations.
31 March Tuesday	As above
1 April Wednesday	As above
2 April Thursday	Took copy of work done. Visited Friendship Mills, practical quality control.
3 April Friday	Assessment of course
4 April Saturday	Presentation and departure. A meeting was held at Hadji Bros and a list of those present has been obtained. Presentation of Certificates by Mr Nkya who was very pleased with the course in general and its presentation. He was also impressed with the participation of the students. A request was made for more courses together with a follow-up programme.

I recommend a follow up to this course as soon as possible and I believe the UNDP to be in favour of such a proposition. If this is practical I would like to discuss this back at Fielden House in some depth and submit some practical suggestions since this would involve quite a lot of travel to different areas lasting 5 - 6 weeks.

Expenses still a little low (NOTE) about 20 US \$ per day more would be required to maintain a reasonable standard of living.

The range of the students education level and practical experience was very wide and because of this the course had to be pitched at the lowest level so that students understood it. The course was very well attended by the students and their behaviour was unrepachable and showed a great deal of interest throughout. If a further course of this nature is contemplated I would suggest that transport of some form is supplied to ferry the students to the various sites where the practical experience is to be gained.

We had the fullest cooperation from the staff at the works, especially from Mr Kopua. We experienced practical difficulties due to an acute shortage of tools and basic materials.

I felt that the course suffered because of the number of participants, and would recommend in future 10 - 12 students being taught intensively.

Carding Maintenance Course Monday 2nd Feb. 57.
 Tutor: Mr Arthur Walker, Farm Fielden House Productivity
 Centre Ltd. Rungby.

The Fielden House Productivity Centre was established
 at 1949.

Its Main Functions: (i) Training (ii) Development Courses
 in various field of Textiles (iii) Engineering.

The Short History of Cards.

On the 1930's the Card was very dirty. So the By-pass
 was very common to the workers. As the invention
 of new Machines took place this problem have
 been solved.

As it went on people invented Condenser Card.
 Condenser is a 60" Cylinder. Card with five big
 rollers from back to front, on top and low got small
 five other called Stripper. At the same time it
 has got a differ and felony between the Cylinder
 and differ. Some of the Machines uses PLATO
 rollers to deff the web from the differ by "VARECA"
Crossall Card

This is modern and high production M/c Cards.
 It is very important to co-operate with the quality
 Control Section in the Mill to determine if the
 Crossalls are good.

Turndon Machines.

These are machines or are two Card M/c's working
 together to improve quality and production.
 It is mostly used in Yorkshire. But they
 are very expensive. This is simply because
 the Manufacturing of these M/c's is too expensive
 than the other machines.

Tuesday 3rd February 1985

Spinning:

The main purpose of the Spinning is to produce thread Satisfactory and Suitable for the Customer requirements.

Theory on Card.

<u>Old Method</u>	<u>Modern Method</u>
Cotton Field — Hand ————	—————> Mechanical
Picking — -do- ————	—————> -do-
Ginning — Machine ————	—————> -do-
Bale — -do- ————	—————> -do-

Damaged bales are which have been made to look neat or free from outside defects.

Terms used for Cotton Suitable for twist or Warp Spinning is known as "Staple".

- Bale Breaker
- Opener (Crighton)
- Hopper Feeder

- Blow Room
- Exhaust Opener
- Finisher

Crighton: Is an old type of bale opener Machine used to open most dirty Cotton.

Slubber: 1.5 Hank. Ring - 18^s CTS (Tex).

Uster is an instrument used to examine fault in draft of we's or lo's.

Diameter $\times 3.1416 =$ Circumference.

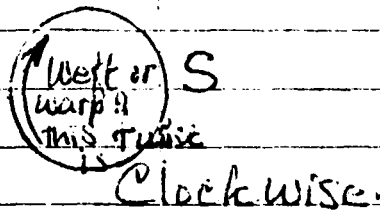
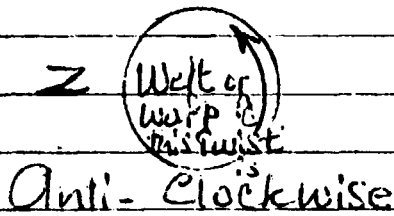
The main purpose to Draft material on every M/c.

Fine every stage: B/P = 1.9 kgs.

Card = 60 grams/lint.

D/F = 40 grams/lint.

Comber = 30 grams/lint.



Theory of Card

Wednesday 4th Febr. 87.

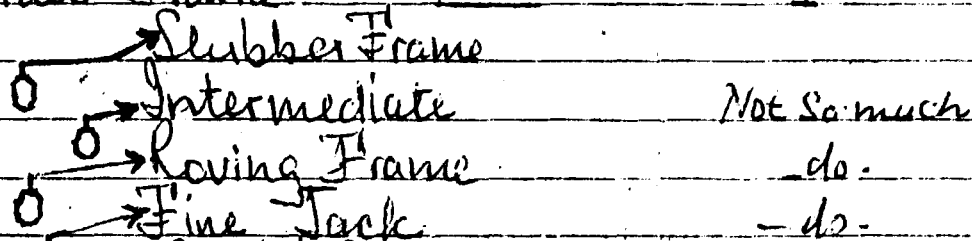
The definition of Card is to try to paralyze fibres suitable for the Draw frame.

The following is the Stages of the paralization of fibre to final Stage of yarn or thread.

Old Method

Modern Method

Opener	NIL
Breaker	-do-
Hopper Feeder	
Exhaust	NIL
Finishes	-do-
Carding Engine	80
Lebby bobbles	2
Comber	4
Draw Frame	1



Ring Mule
Winding Doubling

Old Names	Modern Names	Old Names	Modern Names
(i) Blow Room	Mixing Dept.	G. Manager	Asst Manager
(ii) Stripper Grinder	Curd Dept.		Manager
(iii) Under Carder	Mechanic		G. Manager
(iv) Carder	Dept. Carder		Blow Room
(v) Manager	Head Carder		Carding Engine

Blending Hopper Bale Opener.

The hopper bale openers deliver the opened cotton on to a common conveyor lattice which feeds a No. 1 hopper feeder serving the preliminary opening M/c's of the combination. An alternative system is to deliver the cotton into chutes feeding a common pipe connected to a pneumatic condenser on the No. 1 hopper feeder.

Production.

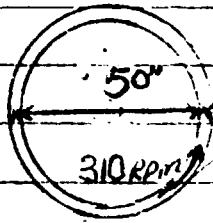
The average production of single 35" blending hopper bale opener is 400 lbs of well opened cotton per hr. Consequently the production of 2, 3, and 4 M/c's is 800 lbs and 1,600 lbs respectively.

Machine wide 39" feeding an opening combination 750 lbs per hour. Machine 46" wide feeding an opening combination 1,000 lbs per hour.

When feeding a single finishing scutcher the production will vary from 270 to 360 lbs per hour according to the weight of lap required from the scutcher. The production is controlled by means of the change wheels and stepped pulley driving the spiked lattice from the cross shaft.

Production is increased by using the 28T or 32T ~~27T and~~ stepped pulley driving wheel to drive the 60T wheel on the spiked lattice shaft and by driving from the middle of the largest diameter of the three-stepped pulley on the cross shaft.

①



Find out the speed of the roller above in Miles, Yard, and Minutes.

1st Stage.

$$= \frac{50 \times \pi}{7} = 157.08 \text{ " Circumference.}$$

$$60 \text{ sec. } 310 \text{ RPM } \left(\frac{5.0 \text{ second}}{\text{Speed every}} \right) \times 310 \text{ RPM.}$$

$$48694.800 \text{ "}$$

1 in = 39.37 inches:

$$39.37 \text{ " } 48694.800 \text{ " } (1236.85 \text{ M/hr.})$$

The speed of roller in M/hr = 1236.85 M/hr.

2nd Stage.

$$1 \text{ Yard} = 36 \text{ " } : 36 \text{ " } 48694.800 \text{ " } (1352.63 \text{ Yrd/hr.})$$

The speed of roller in yrd/hr = 1352.63 Yrd/hr.

3rd Stage.

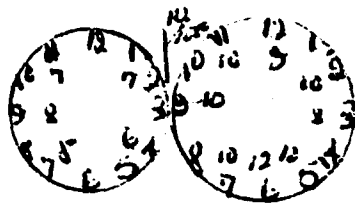
$$1 \text{ hr} = 60 \text{ minutes } : 1352.63 \text{ Yrd} \times 60 \text{ Minutes} = 81157.998 \text{ Yrds.}$$

1 Mile = 1760 Yrds:

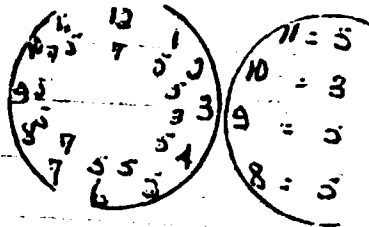
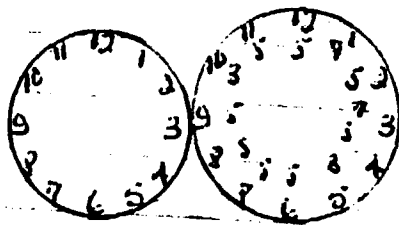
$$1760 \text{ yrd} 81157.998 \text{ yrd} (4611 \text{ mls/hr.})$$

The speed of roller in miles/hour = 4611 miles.

Machine Settings



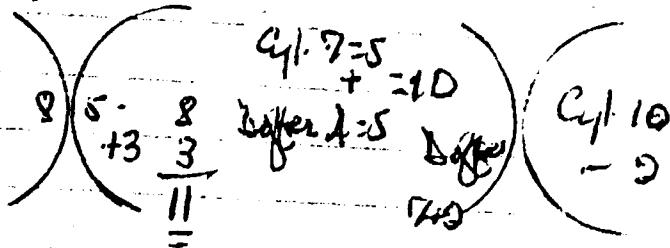
-2+2 Cylinder
= 4/10000



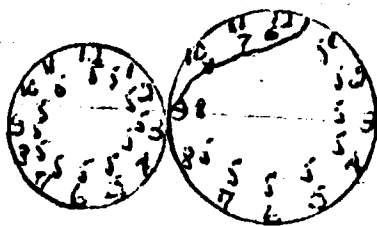
5 Cylinders + 3

8 Differ - 5 which is recommended:

$$5+3 = 8/10000$$



7+3



Specification Settings:

Cylinder Undercasing front $187/1000$
back Undercasing $17/1000$

Front = $34/10000$

Bottom = $17/10000$

Lickering front = $17/10000$

" at the end = $125/10000$

The certain fault as shown on the diagram may be caused by Shaft or Bearing.

The wide setting of Cyl. Differ

Theory of Card.
Calculation in Production

Approx.

Minutes Per Hour \times RPM of Doffer \times Diameter of Doffron Wire
 $\times 3.1416 \times$ Weight of Sliver in Grains per Yard

$$\frac{36 \text{ (Meter)} \times 7000 \text{ (Grains)}}{\text{(Grains)}}$$

Tackometer.

Calculations when using Surface Wheel.

Surface Speed of Roller $\div 2$ (= Feet Minute (39.37" = 1 Mt.)
 Weight of 1 yard Sliver $\frac{\text{Driver - Speed.}}{\text{Driven}}$
 (Grain)

IE (Example)

$$50 \frac{\text{grain}}{\text{yard}} \div 3 = 16.66 \times \frac{36 \text{ inches}}{39.37 \text{ inches}} = 599.76 \div 39.37 = 15.23 \text{ Mts.}$$

Feed Plate

Cotton

Example

English

12025 Lap.

$$= 0.012''$$

Metric

0.100mm per 100gr.

Lap weight.

Machine setting Monday 9th Febr. 87.

Corannular tops are the tops of dead roller like (Corinding roller cloth)

Setting the Sheet Plate too wide causes the production interfered in quality. Also setting the Sheet Plate narrow it causes nepping result. Meaty Strip is rich Strips. Lean Strip is poor Strip.

Short Staple (Under 38mm) 0.012 or 0.20mm.

Synthetics 0.017 or 0.430mm.

Long Staple fibres (over 38mm) 0.022 or 0.560mm.

Convenient Multipliers

- 1) Diameter of a Circle $\times 3.1416$ = The Circumference.
- 2) Circumference of a Circle $\times 3.1416$ = The Diameter.
- 3) Diameter of a Circle $\times 8862$ = The side of an ^{Equal} Square.
- 4) Side of a Square $\times 1.128$ = The Dia. of an ^{Equal} Square.
- 5) Square of Dia. $\times 7854$ = The Area of a Circle.
- 6) Square Root of Area $\times 1.12837$ = The Dia. of an ^{Equal} Circle.
- 7) Area of triangle = $\frac{1}{2}$ base \times Perpendicular height.
- 8) Area of a section of Circle = Length of Arc $\times \frac{1}{2}$ Radius.
- 9) Square inches $\times 0.0695$ = Square Feet.
- 10) Cubic inches $\times 0.000578$ = Cubic Feet.
- 11) Cubic inches $\times 0.026$ = WHT in Cast Iron.
- 12) " " $\times 0.028$ = " " Steel.
- 13) " " $\times 0.30$ = " " Brass.
- 14) " " $\times 0.41$ = " " Lead.
- 15) " " $\times 0.097$ = " " Aluminium.
- 16) Cubic Feet $\times 0.037$ = Cubic Yards.

Definition of Electrical Terms:

- 1) Volt = Unit of Electrical Pressure.
- 2) Ampere = " " Current.
- 3) OHM = " " Resistance.
- 4) Watt = " " Power.
- 5) Ampere = Volts \div OHMS.
- 6) Watts = Amperes \times Volts.
- 7) Horse Power = Watts $\div 746$.
- 8) The usual unit of power is the Kilowatt.
- 9) Kilowatt = Watts $\div 1000$.

Conversion Table. Ath March
of Weights and Measurements for Cotton Spinning

24 grains : 1 Dwt (TROY)
18 Dwt + 5 1/2 qrs (4375 grs) = 1 Oz.
16 Oz (or 7000 grains) = 1 Lb (Avoird)
1 1/2 Yds = 1 Thread or Round of Reel.
120 Yds = 80 Thds = 1 Leaf or Skein
840 Yds = 560 Thds or 7 Leafs
7 Leafs = 1 Hank of 840 yds.

Grains to Grammes		Ounces to Grammes		Pounds to Kilogrammes	
GRS	GRMS	OZS	GRMS	LBS	K.G.S.
1	0.0647	1	28.349	1	0.453
2	0.1294	2	56.699	2	0.907
3	0.1941	3	85.048	3	1.360
4	0.2591	4	113.398	4	1.814
5	0.3239	5	141.747	5	2.267
6	0.3887	6	170.097	6	2.721
7	0.4535	7	198.446	7	3.175
8	0.5183	8	226.796	8	3.628
9	0.5831	9	255.145	9	4.082
	Grammes to Grains		Kilogrammes to Ounces		Kilogrammes to Pounds
GRMS	Grains	KGS.	Ounces	KGS.	Pounds
1	15.432	1	35.273	1	0.204
2	30.864	2	70.547	2	1.409
3	46.297	3	105.821	3	2.613
4	61.729	4	141.095	4	3.813
5	77.171	5	176.369	5	5.022
6	92.594	6	211.643	6	6.227
7	108.026	7	246.917	7	7.432
8	123.458	8	282.191	8	8.636
9	138.891	9	317.465	9	9.841

Checking Maintenance.

- 1) Flats Drive — Every day
- 2) Top flats — Every 2 wks. Visual damage
- 3) Lin Cylinder and Doffer — Check for damage.
- 4) Feed plate & Set Lin Cylinder and Doffer — Every 2w
- 5) Feed Plate — Clean every 2 wks.
- 6) Feed Roller — Check " "
- 7) Settings — Every 1 wks.
- 8) Gears — Lubricate or Spray every 2 wks.
- 9) Screens — Every 1 wks.
- 10) Lin bearings — " 11 wks.
- 11) Cylinder bearings — " 22 wks.
- 12) Doffer bearings — " - do -
- 13) Entire Card — " - do -
- 14) Card Plates — " 1 wks.

The key of Production is Efficiency and key of Maintenance is Production.

- 15) Gear boxes Should be looked — Every day
- 16) Crosrol " " " " "

Metric & English Measures Conversion

Length Measures:

1m (Meter) = 10dm (Decimeter) = 100cm (Centimeter)
1000mm (Millimeter).

1 Hank = 840 Yds = 2520 Feet = 30240 Inches (")

1 Inch = 25.4mm

1 Foot = 12" = 304.8mm

1 Yd. = 3 Feet = 36" = 0.9144m

1 Hank = 768.1m

1 Meter = 39.37 inches (") = 1.0936 Yds.

Weight Measures:

1kg. (Kilogram) = 1000gr. (Grams)

1t. (Ton) = 1000 kgs.

1 Pound (lb) = 16 ounces = 0.4536kg = 7000grs

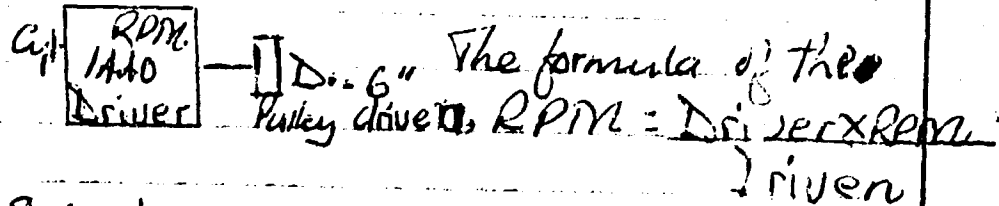
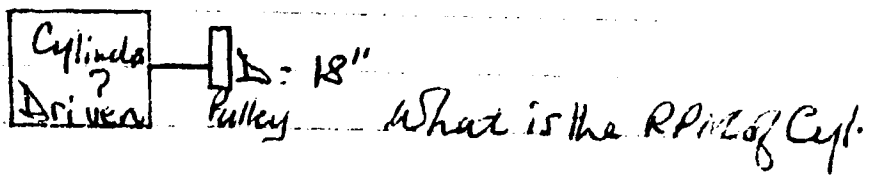
1 kg. = 2.2 LB.

1 Grain = 0.0648 gram.

1 Gram = 15.432 grains.

Formula of Surface Speed.

Revs per Minute x Circumference =
Surface Speed.

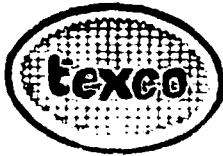


Solution: 144 RPM.

18" Pulley Dia. Driven

6" Pulley Dia. Driver

$$= \frac{1440 \times 6}{18} = 480 \text{ RPM Driven}$$



NATIONAL TEXTILE CORPORATION

TEXCO BUILDING 2ND & 3RD FLOORS

Approved by
CABLE : TEXCO
PHONE : 26681/2/3/4/5
TELEX : 41247

P.O. Box 9531
DAR ES SALAAM
TANZANIA

Ref.No. DMA/T/15

3rd April, 1987

Fielden House Productivity Centre,
856 Wilmslow Road, Didsbury,
Manchester, M 20 8 RY
UNITED KINGDOM.

Dear Alan Jones,

RE: CARD MAINTENANCE COURSE

Please refer to our telephone conversation of Tuesday 24th March, 1987
on the above mentioned subject.

We wish to confirm that the above named course has been conducted to
our satisfaction.

Through working extra hours, the consultant Mr. Arthur Walker has
managed, as of today, to cover the full course syllabus satisfactorily.

Yours Sincerely,

Kasuma L.J.
KASUMA L.J.

DIRECTOR OF MANPOWER DEVELOPMENT & ADMINISTRATION

cc: Resident Representative,
United Nations Industrial Development
Organisation,
P.O. Box 9182,
DAR ES SALAAM.

KLJ/gen

Official correspondence should be addressed to the Managing Director

NATIONAL TEXTILE CORPORATIONCARD MAINTENANCE COURSECLOSING CEREMONY - SATURDAY, 4th APRIL 1987TIME-TABLE

1.15 - 1.35	Remarks - Master of Ceremony (Ndugu Mpambalioto) - Course Organiser
1.35 - 1.50	Course Summary - Mr Walker
1.50 - 1.55	Remarks from Mr Z Mhondo - (Representing Group Companies)
1.55 - 2.03	Course remarks - Participants (Rep.)
2.03 - 2.08	Speech, Mr Kikuchi, UNIDO Representative
2.08 - 2.15	(i) Presentation of Certificates and manuals to Course participants. (ii) Presenting the course instructor. (iii) Closing remarks. Mr S H Nkya, Managing Director