OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

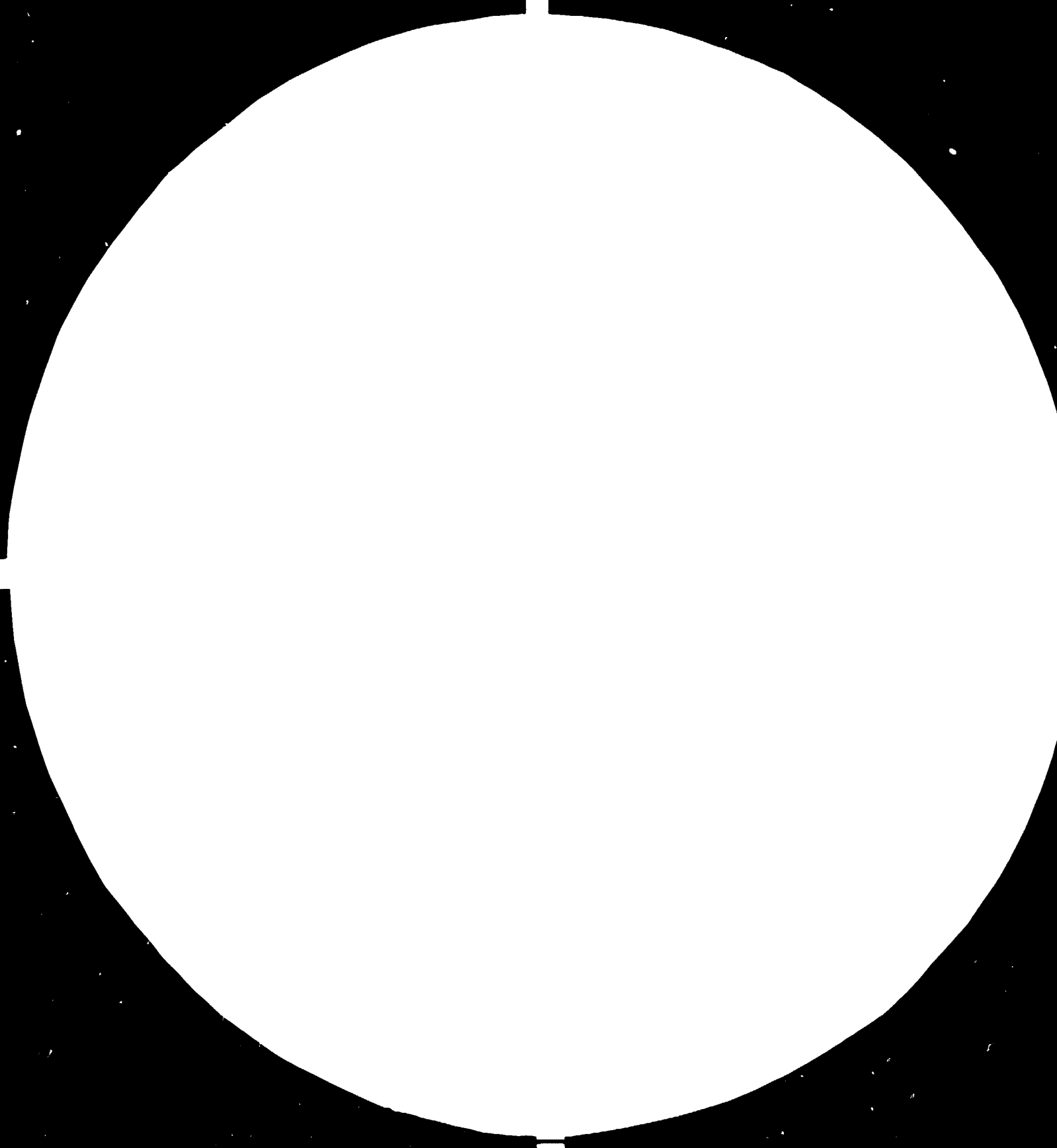
FAIR USE POLICY

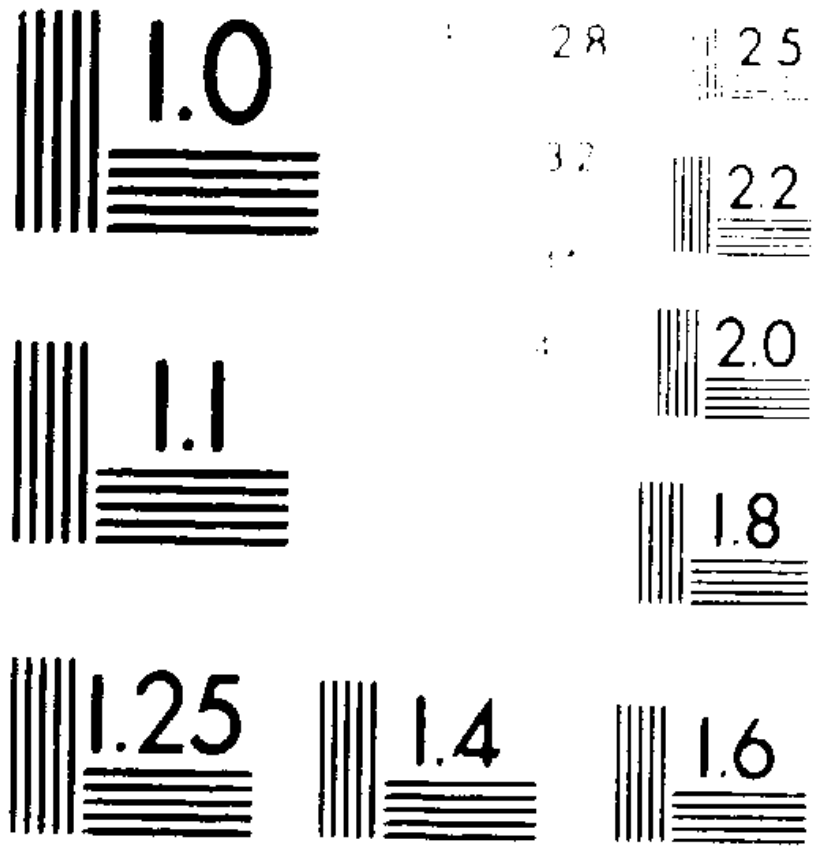
CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org





14123

Turkey.

FINAL REPORT

Paper and Board Coating (SEKA).

SEKA - Turkey

DP/TUR/81/018/11-06/32.1

Trevor W R Dean

Expert in Paper and Paperboard Coating

July 1984

United Nations Industrial Development Organization

VIENNA

CONTENTS

NOTE: The **RECOMMENDATIONS** are published as a **separate** volume.

1. INTRODUCTION

This report describes the second (and final) mission carried out by Trevor W R Dean (UNIDO Expert) at the Dalaman Mill of SEKA. This final mission, originally scheduled for Spring 1985, was brought forward on request by SEKA and took place during the period 08.05.1984 to 09.07.1984 according to the following schedule:

08.05.1984	Travel to UNIDO, Vienna/Briefing.
09.05.1984	Travel to Ankara via Istanbul.
10.05.1984	Briefing UNDP/Travel to Izmit.
	AT IZMIT MILL
15.05.1984	Travel to Dalaman Mill.
	AT DALAMAN MILL
03.07.1984	Visit to Petas, Izmir.
04.07.1984	Visit to TEKEL, Kartal.
	AT IZMIT MILL
08.07.1984	Debriefing in ISTANBUL
09.07.1984	Visit to Linoteks, Isatnbul/Travel to UK.
16.07.1984	Debriefing by Dr. Judt in LONDON.

The job specification for this mission was as that outlined in the interim report (January 1984). Some effort was to be given to the development of coated grades suitable for the Turkish market, and to this end several visits to customers were to be arranged during the mission.

This report will only outline the main areas of work attempted during the mission since a weekly telex report was sent to SEKA,

Izmit, UNDP, Ankara and UNIDO, Vienna. Also, much work was carried out by the Dalaman laboratory in conjunction with members of the Research Department from Izmit and a member of the Central Production Department, Izmit; these people will publish their own reports and the expert has no wish to claim this valuable work as his own. For those wishing to study the day-to-day progress of the mission, the expert has published the minutes of the **morning meetings** which were taken down by Mr Suleyman Sahin and edited by the expert. These minutes are in note form and will also serve as an example of the type of information which should be published daily by the Mill production units.

During the mission, a three-man team from PIRA (The Paper, Printing and Packaging Industries Research Association, England) was on site carrying out a detailed survey of the paper and board making equipment currently installed in Dalaman. It was agreed with the Dalaman Management that the expert would hold a watching brief over the PIRA survey (planned to take four weeks) to ensure that SEKA obtained maximum benefit from the work. This report does not deal with the PIRA study in detail as the Dalaman Management was kept fully informed on a day to day basis.

2. MEETINGS IN IZMIT

The briefing meetings took place on 11.05.1984, 14.05.1984 and the morning of 15.05.1984 before the expert travelled to Dalaman. Following the briefing meeting with Dr Judt in Vienna, the expert was requested to discuss a number of matters with Mr Ziya Yelen in order to expedite the Programme generally. The topics included:

1. Status of the Coating Expert's Interim Report

It was established that the report had been translated into Turkish and distributed during April 1984 to those persons mentioned in the report's distribution list.

2. Training in Recovery Boiler Operation

In connection with a proposed training mission, the possibility of obtaining a suitable Turkish-speaking engineer in Sweden was put forward. This possibility had been established by Dr Judt during a visit to Sweden; the objective being to improve communications throughout a highly technical course so that the SEKA participants on the course could obtain detailed information. It was considered unwise to rely upon a "leader" from the training party to convey (via English) the information to his fellow trainees. SEKA would prepare a brief resume of the trainees in advance of the official documentation in order that Dr Judt could inform the Swedish hosts of the general standard of education and expertise. This information would be necessary when

choosing the Turkish-speaking engineer.

(N.B. Later in the mission, the expert was asked for his opinion as to whether the Head of the Energy Section, Dalaman (a Mr Arikan Alper) could act as "leader" for one of the training groups. Mr Alper is a very intelligent and experienced engineer but, in the opinion of the expert, it would be unfair to ask him to assume the role of interpreter and coordinator since his English is limited. The strain put upon him throughout such a training mission would be intolerable and the whole exercise could be put into jeopardy.)

3. The Dixon Coater

The offer of a secondhand Dixon coater was discussed at length and it was left to Mr Ziya Yelen to establish whether, according to local rules and regulations, SEKA could accept delivery. The decision, when finalised, would be communicated to Dr Judt.

Testing Room Conditioning Unit

The question of the conditioning room within the Research Department, Izmit was discussed during the debriefing of the expert in Vienna following the first mission. It was evident to the expert that the conditioning room would have to be redesigned/rebuilt in order to make it easier to control the testing environment and that a more sophisticated conditioning unit would help. On further discussion with Mr Mengi it was decided not to consider adding a conditioning unit to the current project list since the testing room was to be relocated and its size was unknown. At such times as the design of the new testing

room is finalised then the matter can be reconsidered.

5. Titration Equipment

After careful consideration by the Research Group it was agreed that an automatic titration unit would not serve to improve the efficiency of the Department. The equipment should therefore be deleted from the project list.

6. Spectral Line Meter

This equipment is no longer required.

7. Refiner System

Details of the Sprout Waldron system as ordered were passed on.

8. Pilot Digester/Bleaching Plant

SEKA had requested a 50 litre capacity plant but the expert could see little reason to install this larger, non-standard size. There was considerable debate on the way forward and one suggestion worth considering is that the SEKA workshops make the equipment using designs supplied through UNIDO.

9. Information Expert

The expert passed over a brief resume for **Mrs Deirdre Gardner.**

The above information was passed on to UNIDO, Vienna by telex (via UNDP, Ankara).

3. TRAINING COURSES AT THE CROSS AND BEVAN LABORATORIES

In the Interim Report, the expert made an offer to train three engineers from SEKA at the Cross and Bevan Laboratories. Mr Yelen was displeased that the expert had nominated three suitable (in the expert's opinion) engineers for the tour on the grounds that SEKA should make the final choice. It was pointed out to Mr Yelen that since the training would be carried out on a cost-only basis, Cross and Bevan **must** have the last word on who would be trained. Also, it must be borne in mind that Cross and Bevan is a small organisation and the Partnership is always careful to select persons who will fit in with the existing team and, more importantly, those who can and will communicate. If this condition cannot be accepted then the expert regrets that he must withdraw the offer.

The expert is disappointed that no formal acknowledgement of the offer has been received from SEKA which makes it very difficult for Cross and Bevan to make any plans to accommodate the trainees. It is also surprising that SEKA has not sent any pulp samples for testing (see offer in interim report).

4. INITIAL MEETINGS WITH THE DALAMAN MANAGEMENT

The objective of a series of meetings held on the expert's first day in Dalaman was to establish the work programme and allocate priority ratings to the various phases. The following programme was telexed to Izmit, Ankara and Vienna:

1. The problem of rapid wire wear will be investigated and pre-flocculation techniques tried in order to improve retention. Frequent wire change interfere with production stability and overall economics. Certain coating bases require high ash levels so the problem **must** be overcome.

2. We will continue our endeavours to develop suitable indigenous clays. A machine trial programme will be initiated.

3. A thorough fibre study will be made, investigating possibility of producing a softer softwood pulp at Dalaman. This is necessitated by the short supply and continuing low quality of Afyon pulp.

4. We will attempt to design a suitable one-side coated label paper for TEKEL which will not curl after cutting into labels.

5. Current qualities of plain and coated boards are giving distorted packages (e.g. detergent packs) and we will attempt to optimise machine conditions to produce a more rigid base board.

6. We will progressively close up the backwater system of both machines to conserve short fibre (and filler) and, as a result, strive to produce a better formation.

7. A programme of illustrated training sessions will be held with the idea of creating pre-recorded training modules at a later date. We will test the effectiveness of specially designed slides.

8. We will continue dialogue with raw material suppliers and customers and set up a framework for future customer liaison.

9. The report of the previous mission will be used as a basis for work throughout the Dalaman Mill to improve quality of all products and, wherever posssible, reduce costs.

10. During the forthcoming quality measurement exercise to be carried out by PIRA beginning next week, the expert will assist SEKA to derive the maximum benefit from the work, while ensuring that the tests carried out are meaningful and relevant.

The above telex was dated 17.05.1984 and was transmitted to Izmit in Turkish.

5. ASSESSMENT OF PRODUCTION AND QUALITY STATUS

The expert was delighted to note that the coating department had made so much progress since the last mission towards maximising both quality and throughput. The coating machine was operating for long periods at maximum speed (650 m/minute) due to the experience progressively gained by the crews and a base sheet with fewer physical defects. There were still problems with automatic splicing at these high speeds but the purchase of some special adhesive tapes had reduced the number of failures.

The Mill had also carried out a number of the recommendations made by the expert at the end of the first mission and only the construction of the coating feed tank was outstanding. For a full discussion on the status of the various recommendations, please see the separate report entitled **"RECOMMENDATIONS"**.

6. WIRE WEAR PROBLEM

At the time of arrival on site the Dalaman Mill had only a few wires in stock for the paper machine and, with a wire life of only 4 -6 days, the position was grave. A Valley Abrasion Tester was rushed down from the Research Department, Izmit together with a Technician, and we were then able to measure abrasion levels for various local clays.

The increase in the level of wire wear coincided with the change over by the Mill to pre-ground clay and the installation of ceramic foils in place of table rolls. In his previous report, the expert expressed concern over the degree of wear along the leading edge of some foils after a mere two months in operation; this despite assurances by the suppliers that the foils would operate eficiently for several years. In order to minimise the wire wear problem, the following actions were deemed necessary:

1. Filler retention must be dramatically improved.
2. The abrasive part of the clay must be removed **before** adding to the fibre stream.
3. Some table rolls would need to be re-installed at strategic points along the wire table (already carried out by the Mill).

The first task was to examine the failed wires under the microscope to establish if failure was due to wear or other factors. The first wire checked had most of the under-knuckles worn away after five days and there was no doubt that mechanical

wear was the underlying cause. The original diameter of the wire threads were 0.5 mm and, after running for under one week, the diameter of individual strands had been reduced to between 0.40 and 0.42 mm. A second wire (a synthetic wire that lasted just under two weeks) showed considerable wear but not enough to cause the failure. The edge of the wire was badly worn in places and it was thought that this could be due to either a wire guide or damage caused when the wire had stalled several times. Another theory put forward was the habit of the machine crews to wash from the front side to the drive-side thereby risking the trapping of dirt under the back edge of the wire. A sample taken from the failed wire was returned to the manufacturer for comment. With the acute shortage of wires it was not possible for us to theorise at length but rather take actions to prevent the premature failure of subsequent wires in order to keep the paper machine running.

The first action was to reduce the ash level in the paper to below six per cent. This was regrettable, but necessary to give us breathing space. The next, more constructive action was to add a retention aid in order to minimise losses of clay through the wire. The latter course was initially hindered by the complete failure of a Bayer retention aid over a period of some days. Luckily, the Mill had purchased an alternative supply from Sandoz and this was hurriedly put into use. The dilution and metering apparatus for the Sandoz material had not been delivered and so we were forced to make do with the unit designed for the Bayer retention aid. Despite the obvious shortcomings of this temporary

apparatus, the retention results were still extremely good and the backwater was significantly cleaner following the stabilisation of the system (about 15 hours). The other advantages of using this retention aid were:

1. The steam consumption was reduced by approximately one tonne per hour.

2. It was possible to turn out around 10% of the stock.

The initial cost saving was estimated as around 1 000 Turkish Lira per tonne of finished product, but this should be checked for all qualities over a period of several months before becoming too excited.

The only obvious disadvantage of using the retention aid was a slight deterioration in formation. This "defect" was later overcome once Sandoz had installed their multi-stage dilution apparatus; the root of the problem being over-flocculation of fibre by the poorly dispersed retention aid.

At the same time, the clay preparation plant (see previous report) was further modified to enable us to produce (hopefully) a sand-free filler clay **and** a coating clay with a suitable particle size distribution. The modification involved adding a third settlement tank to collect the coating clay fraction. Initial experiments with pre-ground clay were not successful as, we believe, the sand and other abrasive material are already ground up into very fine particles along with the clay itself. The suppliers, however, do not agree with this assumption and

claim that the abrasive particles are screened out. The next trial was to use crude, lump clay. The lumps were first hammer-milled and then slurried with water in the ball-mill from which all the balls had been removed. The centri-cleaned clay was allowed to go forward to the first settlement tank while the rejects were sent to the screw conveyor from which they were dropped into a trailer. Immediately the trial was started it was obvious that considerable quantities of sand-like material were being discarded and we were far more confident that the filler clay going to the machine house would be far less obnoxious. Tests carried out by the laboratory supported this observation although it was later showed that results could be very variable depending upon the consistency of the ingoing clay slurry. If the consistency was too high then the cleaners blocked and the sand went through to the settling tanks.

As stated above , prior to these trials a third settling tank had been added to the system as drawn up in the previous report. The objective was to collect the overflow from Tank 708 and allow the fine clay content to settle. Initial tests of the "bed" in this new tank were encouraging although it was difficult to assess just how much material accrued. Throughout the mission, the accent was to produce a less abrasive **filler** clay and the collection of coating clay was left to look after itself. Quite obviously, in the long term it will be necessary to optimise the whole process to give acceptable filler and coating qualities. The trial, albeit crude, indicated the following:

1. Starting with crude lump clay the Mill is able to produce a less abrasive clay than that currently supplied from outside sources (pre-ground qualities).

2. The yield of good clay can be as high as 60% with the sandy residue probably being suitable for brick-making.

3. A quantity of coating clay will be produced although the installation of better cleaners and small bore cyclones could well optimise both quality and quantity.

4. The installation of a simple settlement stage prior to the ball-mill will remove large contraries and coarse sand putting less load on the centrifugal cleaners.

5. At this stage, it would appear unnecessary to equip the ball-mill with balls but rather use it as a mixer. The installation of internal, high pressure water sprays will aid the separation of good clay from sand without significantly reducing the particle size of the abrasive fraction. The design of a suitable system has been discussed with the Chief Engineer of Dalaman, remembering that any mechanical treatment at this stage will almost certainly make separation difficult, if not impossible.

6. Even allowing for a 50% yield, the cost of the final product will be less than that of a pre-ground clay; the lower abrasivity will also show significant financial savings through less wire wear, longer pump life and less fibre loss at the paper and board machine cleaners.

The benefits will not be gained without a considerable amount of effort since the clay plant at Dalaman was not designed to accomplish such a task. It will be beneficial to the Mill if a project could be supported by UNIDO/UNDP in which the present "temporary" plant is converted into an efficient, purpose-built unit.

During the work on the clay plant it was extremely useful to have on site Ms Besime Eryener and her Technician to carry out the extensive programme of clay testing. This added help ensured that the Central Laboratory could carry out its day-to-day research and quality control as well as completing many additional tests in connection with retention and fibre conservation projects.

Also on site during the PIRA mission was Mr Ali Aykac (from the Central Production Department, Izmit) and Ms Ilksen Teksoy (from the Research Group, Izmit). The Dalaman Translation Section had been depleted by the retirement of the senior interpreter and Ms Teksoy was able to assist the expert during the period when Mr Turegun (the remaining interpreter) was involved with the PIRA team. Ms Teksoy was also able to oversee the quality from the pulp mill as this section was giving cause for concern.

7. TRAINING

Early in the mission (21.05.1984) a meeting was held with the Dalaman Training Committee to discuss the preparation of training material. The Committee, under the chairmanship of Mr A Kadir Karakuzulu, requested that the expert prepare a list of equipment necessary to prepare slide/tape programmes. This list was submitted and the expert also left the following slides with the Mill to use for in-house training:

1. PIRA Visual Aid Kit: **"Introduction to Coating".**
2. PIRA Visual Aid Kit: **"Introduction to the Printing Processes".**
3. PIRA Visual Aid Kit: **"Paper Requirements for Printing"**
4. An assortment of Cross and Bevan slides covering many aspects of coating.

SEKA will not be expected to pay for these slides.

The expert ran three training seminars for senior technical and production staff using the three PIRA Visual Aid Kits. The objective was to familiarise the English-speaking engineers with the slides and subject matter so that they could, in turn, hold seminars for more junior staff following the departure of the expert. A pilot seminar was run using Mr Suleyman Sahin as "lecturer" for the course entitled "Paper Requirements for Printing". The session went very smoothly and it is hoped that the SEKA engineers will use the training kits and other slides to the full.

8. FLUORESCENT WHITE SPOTS

For several months prior to the mission the Mill had been experiencing an outbreak of small, comet-like spots which only became noticeable under UV light. The occurrence seemed to coincide with the use of certain local latexes but this was not really proved. Since the spots did not show up at all under normal light they could be considered "cosmetic" and in no way would adversely affect the printing characteristics. However, the formation of the spots could have been due to certain incompatibilities between the mix ingredients, which, although not disastrous at that time could herald more severe problems in the future with complete mix breakdown. Cosmetic or not the problem would have to be investigated!

However, at the same time as the above defect was brought to the attention of the expert, a more serious problem was occurring on the board machine. The coating layer applied on-machine by the metering bar coater was dusting very badly and the cause was identified as a partial mix breakdown due to alum being leached from the sheet and transferred to the coating feed tanks. The latex appeared to be rather unstable in the presence of more than a trace of alum and was breaking down giving rise to:

1. Severe dusting.
2. Thickening of the mix in the coating tray.

The problem was overcome by changing over the feed tanks (there are two) every few hours and thoroughly cleaning out the tank

being rested. This cut down the amount of time for the alum-latex reaction to take place.

Quite obviously, the latter problem was tackled with all speed while leaving the esoteric white spots to take care of themselves for a time. A few days later the latex grade was changed and both problems improved considerably although the white spots persisted mainly on the edge of the web. Eventually it was found that the edge spots were due to spray from the blade coating head when running at high speed and it could be that the suspect latex gave rise to more splashing than its replacement. It is imperative that SEKA persists with the use of local raw materials and it is only to be expected that problems will occur from time to time; problems that are not experienced in a Western European mill using tried and trusted raw materials. The Research Group at Izmit should therefore involve itself with these unusual problems and accept from the very beginning that the answers will not always be found in the text books.

A useful approach is to study the mix raw materials one at a time and then, in permutations with other ingredients, test for signs of incompatibility. There is also another lesson to be gained. This is to continue buying raw materials that work on a **production scale** and not change for reasons of price alone. For example, a cheap latex could well cost the mill dearly in lost time, poor product quality and a collapse of customer trust.

On the subject of raw material purchasing, the expert feels that SEKA leaves itself open to problems by trying to technically

specify materials it does not altogether understand. This leads the suppliers to take the "you asked for it, you got it" attitude when things go wrong. The criterion is that the particular material works in the mill environment and the onus should be put on the supplier to sell a product that does the job. It is dangerous to instruct suppliers how they should make a material.

One example of a specification being counter-productive was in the case of coating starch. An enquiry was put out based on a specification drawn up by the mill and the resulting offers were mainly unsatisfactory. The specification was very detailed but omitted to mention that the starch was for a blade formulation. When putting out enquiry, the supplier should be told in simple terms just what his material will be used for; no more and no less. The onus is then on the supplier to deliver a material that is suitable in all respects for the particular application.

9. RAW MATERIAL CONSERVATION

Up until the current mission the expert has always been worried at the attitude of SEKA when dealing with raw material conservation. Excessive material losses were accepted as normal and very little attempts have been made over the years to tackle the problem of closing up the pulp/paper mill systems. It was therefore very refreshing to note that the Dalaman Mill was taking the problem seriously even though the decision had been forced upon the whole SEKA group by the shortage of wood for the pulp mills. The expert was also anxious to keep the short fibres and fines in the mill system; making use of them in the fine papers in order to close up the sheet formation. In addition, the new Dalaman effluent plant was running into severe problems with an adverse inorganic/organic solids ratio. Since the latter plant is designed to burn the dewatered sludge (after filtration) discharged from the two clarifiers, it is extremely important that the organic solids content does not fall below 60% of the total. When the expert arrived on site the ratio was inverse i.e. 40% organic/60% inorganic.

By the judicious use of retention aids, the position was reversed very quickly (see above) but there was considerable discussion with the Mill Management as to whether it was of long term interest to recycle the fibrous "sludge" instead of burning it. The project should be tackled as follows:

The mill system should be closed up as much as possible to reduce fibre/filler loss as much as possible. Cooling water should be separated out of the main effluent stream and, if possible, cooled and re-used as many times as possible. Retention aids should be used in both paper and board machine systems and, if necessary, additional filtration aids at the savealls. Effluent from the pulp mill containing good fibre (and without chemical contaminants) should be diverted into the **paper/board mill** effluent streams.

While this is being carried out two scenarios should be considered:

EITHER

(a) The effluent plant should be carefully examined to see whether it would be possible for the pulp mill and paper/board effluent streams to be treated separately. This would mean constructing a second effluent canal to the treatment plant and then separating the two clarifiers. One clarifier would deal with the pulp mill effluent and sewage with the sludge being incinerated and the overflow going to the lagoon: the other would treat the "clean fibre stream" with the sludge being returned to the board machine (for middles) and the overflow (relatively clean water) recycled.

OR

(b) A new clarifying basin could be constructed near the paper/board machines to treat the excess water from the

machines thus forming an "outer loop". Both the fibre and water would be recycled. It may be possible to install a flotation saveall to deal with the paper/board machine excess water instead of the clarifying basin.

The cost of any modifications should be set against the value of the recovered fibre and the water saved. There is also a considerable energy saving. It may be possible to take the dewatered sludge from the effluent treatment plant and recycle it **as it is** to the board machine via the waste paper treatment plant. This may be a short-term solution while the long-term approach is being planned.

It is strongly recommended that a committee be set up in Izmit to study the possibility of effecting these savings in Dalaman while also considering similar schemes for the other SEKA mills. It must be pointed out that if more recycling is carried out then the more danger there will be of slime growth in the mill systems. The expert has been associated with a project in Kuwait where water conservation has to be taken to the extreme (magazine article left with Mr Yelen). It has been found by Cross and Bevan that UV light can be used with great effect to kill most of the bacteria which form with great rapidity in closed systems and the same technique could find application in Turkey. The overall situation is of course aggravated by the rise in stock temperature which will accompany system closure; a multitude of bacterial colonies will be encouraged to grow as the temperature approaches 30 ^{o}C . It must be noted that the use of UV relies heavily on efficient clarification of the water returning to the

machines since turbidity greatly reduces the chances of the light reaching all the bacteria.

In view of the apparent wood shortages in Turkey, it would be in SEKA's interest to explore the possibility of recycling fibre wherever possible. The other path to take is the use of waste paper which can be upgraded to produce a good virgin fibre substitute. The technique of using hydrogen peroxide prior to the ink flotation cells in the Dalaman waste treatment plant was explored and information was collected from the private mill of Meteksan where upgraded waste is used with some success. Trials were planned to commence as soon as a supply of hydrogen peroxide could be delivered to the mill. Unfortunately, the expert was recalled to Izmit for debriefing before the trials were carried out.

10. MORNING MEETING

One of the major problems in a mill spread over a large area is how to organise an effective communication system. In general, the Turkish approach is to use a "crisis to crisis" style of management with Departmental Heads only discussing matters of immediate interest. This style works reasonably well in small businesses but quickly breaks down in multi-disciplined organisations such as SEKA Dalaman. In consultation with the Paper Mill Manager, Mr Mehmet Ali Ergin, the expert set up a morning meeting to discuss ongoing projects, quality and day-to-day problems. The "committee" was similar to that set up during the previous mission but with rather more specific objectives. Each committee member was allocated an area of responsibity for which he or she would report daily. The members and their responsibilities were as follows:

MEMBER	RESPONSIBILITY
Ms Besime Eryener	Clay testing
Ms Ilksen Teksoy	Pulp Mill quality and short fibre utilisation.
Mr Ali Aykac	Raw material conservation.
Mr Mehmet Ali Ergin	Paper and board production plus control of retention aid addition.
Mr Suleyman Sahin	Coating.
Ms Gurchihan Beslek	All laboratory testing.

The expert acted as coordinator for the committee and Mr Sahin acted as secretary and took detailed minutes of each meeting.

The meetings tended to be rather drawn out due mainly to members not arriving on time followed by too much uncoordinated discussion during the meeting. It is very easy for a "foreigner" to criticise management styles, especially if he is not completely familiar with local ideas and customs. However, the expert is anxious to encourage the Mill to run meetings that are **efficient.** With this objective in mind the following constructive comments are made:

1. Punctuality must be encouraged.
2. The chairperson must be strict but fair in the handling of the meeting. Private discussions should be discouraged.
3. One person should speak at one time so that the appointed secretary can make an accurate record of the important points.
4. The pre-prepared agenda should be strictly adhered to (emergencies excepted).
5. Every member of the meeting should be made aware of his or her responsibilities by the publication of an **action list.**
6. The main objective is to get over the **maximum** amount of information in the **minimum** amount of time.

Several experiments were made to run the morning meeting to so-called "Western" standards by employing very strict chairmanship. This method of control is alien to most Turkish managers and did not come naturally to the committee members who looked for a degree of informality in any discussion. The whole question revolves around the **time factor.** If managers can afford time then a degree of informality can be tolerated; if not, then meetings

must be kept very formal and run to a strict timetable. In either case, it must be stressed that a written record should be kept of each meeting in brief note form so that decisions taken during a meeting are understood and actions are carefully recorded.

For the sake of completeness and as an example of the type of information generated by rational discussion, the minutes of the meetings held during the mission are appended to this report. The minutes are based on the notes prepared by Mr Sahin and augmented by notes prepared by the expert at the time.

11. PULP MILL QUALITY

The pulping section was carefully studied over a period of two weeks by Ms Ilksen Teksoy and the expert. During the initial stages of the study it was very noticeable that minimal control was being exerted by the engineers in charge. The underlying problems manifested themselves by wide swings in bleached pulp brightness which, in turn, gave difficulties in the paper mill. At this point it is worth emphasising once again that the coating operation starts with the **raw materials.** A good coated product cannot be produced if the base paper or board is suspect and, by the same token, it is impossible to produce satisfactory coating bases if the pulp quality is variable. It is very necessary to attack the question of coating quality from the foundations upwards, otherwise there can be no control possible during the actual coating operation.

Eventually it was established that the variations in pulp quality were the result of erratic chemical concentrations coming to the hypochlorite section. The expert also suspects that there were other problems as well, one being wild variations in chip size going to the digester. This latter problem is accepted as one of the fundamental causes of difficulties in the pulping section, yet no positive action has ever been taken to minimise the variation. Perhaps UNIDO/UNDP can assist in this area.

In view of the variations occurring in the section, the expert felt it unwise to consider running trials to produce a softer

pulp. The exercise would have been carried out using a novel pre-treatment stage developed by Cross and Bevan, but to be effective very careful process control is necessary. Time did not permit the stabilisation of the process to the extent required by the Cross and Bevan process, while, at the same time, carrying out the other projects. In some respect this was unfortunate since there are little signs of the Afyon Mill providing Dalaman with the necessary short fibre to enable the sheet to completely closed. However, it was felt that the priority should be to keep the paper machine running by attacking the abrasion problem and make a more economic final product by conserving raw materials.

Later in the mission, the expert was to learn that the pulp mill staff would be running trials with sodium hypochlorite (the mill is currently using calcium hypochlorite which is giving lime formation problems) in order to minimise variations during bleaching.

12. INCREASING THE PERCENTAGE OF SHORT FIBRE IN COATING BASE

This exercise was carried out as a follow-up to the trials carried during the first mission. Unfortunately the unavailability of Afyon pulp does limit the incentive of Dalaman to persevere with high percentages of short fibre. Also, the Afyon pulp has gained a very poor reputation, especially in the case of the straw pulp. At the time of the mission there was only reed pulp available, and not much of that!

It was decided to carry out the rather academic exercise of running with up to 60% short fibre in the furnish, knowing that even if the trial was successful, there would be no possibility of adopting the technique for normal production.

A progressive set of trials was designed where the percentage of short fibre was increased step by step up to a maximum of 60%. The runnability of the paper machine was monitored very carefully to anticipate problems and, because of this, there were no breaks experienced throughout the four hour trial and the machine operated at its normal speed (355 metres per minute for 60 g/m^2 paper) without press picking. The formation did not improve as expected but, as explained above, the retention aid dilution system was at fault causing over-flocculation of the fibre.

From this trial it was obvious that the paper machine was capable of running with greatly increased amounts of short fibres in the furnish. Also, we know from previous trials that ash figures of 10 - 12% can also be maintained. This means that it will be no

problem for the Dalaman Mill to produce a satisfactory gravure base. Unfortunately, due to the shortage of wires, it was not considered wise to run prolonged trials with high levels of filler so it was not possible to take the logical step of running a base with 60% short fibre and at least 10% clay.

The trial was run under the supervision of Ms Ilksen Teksoy who had spent some time in the Afyon Mill during the mission of the UNIDO Straw Pulping Specialist. It was therefore very useful for her to see at first hand the techniques for running high levels of short fibre, while gaining experience of organising a machine trial.

Ms Teksoy has produced her own report.

13. INCREASED PAPER MACHINE SPEEDS

At the conception of the Dalaman coating project (around 1973), the expert had warned SEKA that the high production rate of a 4.5 metre wide, high speed blade coating machine would create the following problems:

1. The product would have to be sold (the projected market forecast for coated paper and board in Turkey made by the consultants for 1985 was a mere 5 000 tonnes).

2. Dalaman would be unable to produce enough base to satisfy the coating machine.

When these points were put to the project consultants they advised SEKA to run the coating installation on a **day shift** only. Quite obviously this is very uneconomic and leads to many problems, including set-back of starch-based mixes during overnight storage, wasted time and materials during start-ups and shut-downs, more equipment failure and low efficiency.

Fortunately, the consultants under-estimated the demand for coated products and this is no longer a constraint on the section. The other constraint of insufficient base paper was tackled by carrying out controlled experiments at higher machine speeds. A reason for not increasing machine speed put forward by many people is that excessive vibration occurs at the press section. We therefore borrowed a vibration analyser from the Balikesir Mill in order to monitor changes in vibration intensity

as the machine speed was increased.

At the normal running speed for 60 g/m^2 paper of 355 metres per minute, the vibration level at the 3rd press was really unacceptable and increasing the machine speed to 400 metres per minute only brought about a marginal deterioration in the situation. The vibration was probably due to a suspect felt as the bearings were closely inspected by the paper machine engineers and found to be in good order. This must be checked out as the long term effect of running cheap, sub-standard felts at normal speeds may well be serious. The trial proved that the paper machine is quite capable of running at higher speeds and the following observations were made:

1. The machine still has drying in hand at 400 metres per minute.
2. Using a retention aid there is adequate drainage on the wire; probably up to 420 metres per minute.
3. The fan pump has adequate capacity.

Mr Ali Aykac noted down all the machine conditions for the following speeds:

355 metres per minute (normal running speed)
370 " " "
385 " " "
400 " " "

At the same time the laboratory carried out retention checks at the various speed levels.

Assuming that the vibration problems can be overcome, there is no

reason why the paper machine should not be run at 400 metres per minute. Speeds in excess of this should be possible but a close watch must be maintained on the performance of the couplings and gears on the drying sections. These have failed in the past but have now been renewed. The results of running at higher speeds should be at least 10% extra production for the lower grammages and even more for higher grammages if adequate drainage can be consistently achieved. Conservatively, this should mean an extra 3 - 4 000 tonnes of paper per annum which could be coated.

Right at the end of the mission, a similar exercise was carried out on the board machine. Due to limited time and the Seker Bayram it was not possible to take the exercise as far as we did for the paper machine. Nevertheless, the results were promising when we added retention aid to each of the vats in an endeavour to improve drainage, and the conclusion is that a modest increase in production should be possible. It will be necessary to install a sophisticated, branched metering system so that the addition rate of retention aid to each vat can be controlled independently.

14. FURTHER IMPROVEMENT OF PRODUCT QUALITY

It was most heartening to note the improved attitude in the plant regarding **quality.** No longer is the management content to accept high production at the expense of quality. This improvement is mainly due to pressure from the Dalaman top management but also to the efforts of **Mr Mehmet Ali Ergin** to put instructions into action. At the time of the last mission Mr Ergin had only just assumed reponsibility for the Paper Mill and was naturally very cautious in his approach to changes. In the months that followed he adopted a more progressive attitude, which is to be applauded, and the paper and board going through the finishing department is something of which he can be proud. It is a pity that Mr Feridun Yalcinkaya has not settled down in Dalaman and spends most of his time away from the Mill. This has put an extra burden on Mr Ergin and it is hoped that the unsatisfactory situation will be resolved as soon as possible.

During the mission the expert had many fruitful discussions with Mr Ergin on the general question of quality improvement with increased production. A general programme of attack was drawn up, especially directed towards the **board** machine where the supervision appears to be weaker. The programme included the following actions:

1. Draw up a list of priority parameters for the quality control department to act upon. It is common for the QC lab to fail paper and board for relatively trivial defects while

more serious deviations are overlooked. For example, the coated papers are often condemed by the QC lab for uneven coating as viewed under UV light. At the same time stamp marks are ignored. This is a matter for gradual training, as well as preparing a clear set of guideline standards **with priorities** for each grade produced.

2. A set of red "out of control" lights would be mounted in the machine house alongside each machine. The object is to inform anyone coming into the machine house just how the two machines are running. The lights would refer only to the priority tests.

3. Production figures of **good** paper/board would be published by shift. It is hoped that this will encourage healthy competition between the shifts and, in the long term, improve the overall quality level as well as inceasing production.

4. There will be an adjustment in bonus for those shifts producing bad paper/board.

5. A system will be devised so that bad paper/board does not progress into the finishing end prematurely. At the present time there are cases where one reel of bad paper is cut with several good reels thus spoiling many tonnes. Substandard machine reels should be stamped **"HOLD"** by the QC Department and held in a pound until a management decision is made as to their fate.

15. SIZE PRESS

During the PIRA study, it was considered desirable to carry out a trial with the size press. This equipment is very poorly designed and has never been run on a regular basis since the paper machine was commissioned. A local cationic starch was made up into a 3.3% solution (3 500 cps) and applied to a 70 g/m^2 base. The trial lasted for several hours while the PIRA team checked cylinder temperatures and general drying conditions. The paper produced was of reasonable quality although there was pronounced fluting of the wet sheet going into the first cylinder of the last section. The sheet was later successfully coated.

The configuration of the size press was discussed with PIRA and an alternative roll arrangement was proposed. The modification only requires minimum structural alteration to the equipment (the lead out roll is to be located nearer to the size press nip so as to give the sheet less time to expand) and it is hoped that SEKA will expedite the necessary work. The starch inlet system should also be modified so that there is an even "curtain" of solution falling into the nip pond and **not** widely spaced streams impinging directly on to the rolls. In the latter situation the hot starch solution causes the roll to expand locally, forming ridges.

It is most important that the size press is operated on a regular basis so as to improve the litho grades of both plain and coated papers.

16. RAW MATERIAL BALANCE FOR THE PAPER MACHINE

Over a four week period, Mr Ali Aykac (from Izmit) constructed a materials balance diagram for the paper machine system. This was a very complicated but worthwhile exercise and during his investigations he found a number of anomalies. Mr Aykac should take the credit for a very competent piece of work in which he was ably assisted by Ms Beslek.

Mr Aykac will be preparing his own report of this work which should be circulated widely. Similar studies should be carried out at other mills where the expert is sure that many hitherto unknown problems will be shown up.

17. MACHINE CALENDERS

Dalaman has never run the paper machine calenders successfully and, as a result, is forced to run all plain papers requiring a degree of smoothness through the supercalender. This is a very expensive policy and creates many problems (see previous report). The expert had recommended that two rolls should be removed from the stack in order to obtain a **controlled** surface finish. The PIRA team also examined the stack carefully and reported that the loading mechanism was extremely complex and almost impossible to control. Also, the rolls were in a very bad state after standing for so many years. The expert requested that a short trial be run in order to see just what finish could be obtained **if** the moisture content of the sheet could be held between 5.0 and 5.5%.

The trial was run on Saturday 23rd June and lasted for just over two hours. As expected it was impossible to build up an even reel because of ridging but the indications were that a very acceptable finish could be achieved with a moisture content of just over 5.0%. PIRA will be advising the Mill how to simplify the loading mechanism and will supply information as to the various cambers required. The stack will then be modified accordingly and further trials carried out.

18. VISIT OF REPRESENTATIVES FROM EUROPEAN INVESTMENT BANK

Two gentlemen arrived at the Mill to ascertain progress in the following sections which had been financed by the Bank:

1. Coating Section
2. Effluent Treatment
3. Chlorine/Alkali Plant

The general comments after the visit were as follows:

1. Maintenance and general housekeeping left much to be desired in the **CHLORINE/ALKALI** plant.

2. **All** the various laboratories on the Dalaman site should be under **one** head.

   NOTE: In the opinion of the expert, Ms Beslek should have responsibility for all testing so that tests are not duplicated. There would also be less "discussion" over the validity of results due to sampling, testing procedures etc.

3. The effluent stream should be checked at regular interval for **MERCURY.**

19. STIFFNESS OF BOARD

It is recommended that a trial be carried out using a quantity of unbleached straw pulp from Afyon in the board middles and backs. This is a case where preliminary work should be carried in Izmit to investigate combinations of various fibres for stiffness. The Izmit Research Group should actively seek research projects of this nature; projects that can generate more profits for SEKA in the long term.

20. VISITS CARRIED OUT BY THE EXPERT

1. Visit to Petas, Izmir; 03.07.1984.

This private company could be quite a large user of coated products if SEKA would devote some effort to developing some new grades. The plant is extremely modern with both laminating and printing facilities. Some examples of possible "new" grades are as follows:

1. Heavy chromo board with a "full art" (very glossy, smooth) finish. This would be for prestige packaging (chocolate boxes, perfumes etc.).

2. Lighter weight coated papers (50 g/m^2 base) to enable coated wrappers to be more competitive.

3. Double coated label papers (two coats on one side) with a curl control coating on the reverse side.

Petas management members were reasonably satisfied with the overall quality but considered that too many defective sheets were getting through (creases, holes, tears etc.). The private sector also seems to despair of the SEKA "take it or leave it" attitude, although the situation at Dalaman has improved.

Visit to TEKEL, Kartal; 04.07.1984.

It appears to the expert that TEKEL is used as a dumping ground for second rate paper and board. Since the printing plant is very modern with many high speed machines then this SEKA policy is

most unwise. The defective on-machine coated board described earlier was going through the plant at the time of the visit and the amount of dusting was seen to be very bad indeed. Luckily the board was being printed flexo which is very much more tolerant than the other printing processes. The customer was trying to use the material despite the appalling quality whereas a foreign customer would have rejected the whole consignment out of hand.

TEKEL would benefit from a non-curling label paper and less mechanical defects in the paper.

Visit to Linoteks, Istanbul; 09.07.1984.

The object of visiting this chemical company was to discuss:

1. The production of a suitable coating starch.
2. The production of a neutral sizing agent.
3. Other paper/board additives.

The company is well established and has accumulated considerable experience in textile finishing chemicals. It is actively extending its range of products and the expert promised to give help if the company intended to manufacture chemicals that would assist SEKA. Trial quantities of coating starch would be available shortly and the technical department would begin experimenting with materials likely to impart sizing at neutral pH.

21. DEBRIEFING AT IZMIT

The absence of Mr Yelen on holiday and the unavailability of Mr Mengi until late in the afternoon of Friday 6th July meant that formal debriefing was not effected. However, a very detailed meeting was held with Ms Ferhun Taptik where all items set out in this report were discussed. In addition Ms Taptik asked the expert to carry out a brief survey on the Izmit Mill in order to ascertain the viability of:

1. A central finishing section serving the whole Izmit complex. This would be possible but attention should be given to ensuring that the flow of raw materials in does not interfere with the flow of finished product out. A more detailed study could be the subject for a later UNIDO/UNDP project; it is most important to rationalise the Izmit site which has grown without too much attention to material flow.

2. Modifications to the Izmit ball mills/clay plant in line with those carried out at Dalaman. This is also possible although there must be extra cleaning installed. This could be part of the clay project recommended earlier in the report.

The expert also reported on the possibility of processing tall oil using the existing rosin purification plant at Dalaman.

At the instigation of Ms Taptik, the expert was invited to meet

the SEKA General Manager, the Technical Manager and all the managers of the SEKA Mills (Saturday 7th July). During this meeting the following points were covered:

1. The importance of base sheet in the coating operation.
2. The work on clay; the importance of NOT grinding.
3. Development of special coated papers for gravure printing.
4. Development of coated label papers.
5. The importance of raw material conservation.
6. Recovery of water and fibre.
7. The work carried out by PIRA.
8. Quality control.
9. Plant efficiency (e.g. speeding up of paper and board machines.)

The expert was very grateful for the opportunity to discuss his mission with the SEKA Top Management.

Mr Yalinpala showed considerable interest in the work UNIDO was doing within SEKA and promised that Mr Narasimhan would be well received on the latter's forthcoming visit to SEKA, Izmit (10.07.1984). The expert stressed that SEKA should make maximum use of the UNIDO experts and ask for help in the areas where technical difficulties are being experienced.

22. GENERAL

Unfortunately, the equipment ordered by UNIDO had not been cleared from customs when the expert left Turkey. This limited the work on clay where the Sedimat would have been most useful. Also, there was no typewriter with a "QWERTY" keyboard available so the generation of documentation was tedious and put extra pressure on the SEKA secretarial facilities.

The expert agreed to help the Dalaman Commercial Section with the marketing of viscose pulp (in view of Cross and Bevan's particular expertise in this field). To this end, the expert brought back a two samples of pulp for full evaluation by Courtaulds, Coventry. The results will be reported back as soon as they are available.

The expert is extremely delighted with the excellent cooperation he received when in Dalaman, as well as the wonderful hospitality. The whole of the Dalaman Senior Management took a very deep interest in all the work despite having the day to day affairs of the Mill to supervise. At the risk of leaving someone out, the expert wishes to thank the following:

Mr Hilmi Ogeer

Mr A Kadir Karakuzulu

Mr M Ali Ergin

Ms Gurchihan Beslek (and all the laboratory staff)

Mr Suleyman Sahin

Mr Erman Turegun

Mr Abdullah Yilmaz

There was also the valuable assistance rendered by Mr Ali Aykac, who was seconded from Izmit, and Ms Besime Eryener. A special thank you for Ms Ilksen Teksoy who accompanied the expert as interpreter through the Mill despite the adverse conditions, as well as asking the pulp mill operators, technicians and engineers the right questions .

The expert appreciated the interest shown by Mr Salahattin Yalinpala, Mr Ismit Genc and Ms Ferhun Taptik and hopes that future UNIDO experts and SEKA will benefit from the discussions.

NOTE

The recommendations following the two missions are set out in a separate report (q.v.).

Trevor W. R. Dean.

Trevor W R Dean

July 1984

APPENDIX FOLLOWS

(12 Pages)

APPENDIX

MINUTES OF MORNING MEETINGS

23.05.1984

1. We are investigating wire wear on the paper machine; wire slippage is to be checked assuming PIRA stroboscope is suitable.

2. Working on clay plant; feeding ground clay. Samples are to be collected from various points throughout the plant and tested on the abrasion tester.

3. The Bayer retention aid will be tested in the mill today (23.05.1984) and laboratory will take samples from level box, flow box and under the wire (every two hours).

4. Laboratory will assist in determining materials balance at the paper machine.

5. T Dean will prepare list of equipment needed to produce audio-visual training aids.

6. Bright spots (only visible under UV light) are being investigated in lab. and in the plant.

7. Indigenous coating clay (Hisersan) is being used in coating plant up to levels of 100% on total clay pigment. Results to be carefully checked.

8. Work will be carried out to prevent high quantities (as reported by Effluent Section laboratories) from going down to the effluent treatment plant.

24.05.1984

1. The failed wire taken from the paper machine was studied under the microscope. At the worn knuckle areas (0.3 mms wide) there appeared to be an average of 20 scratches over the total width. This would mean that the average size of particles making the scratches are 15 microns in diameter (probably the range would be from 10 to 50 microns).

2. The results of the Bayer retention aid trials were studied at the meeting and it was concluded that there was no noticeable increase in retention whatsoever. The viscosity of the Bayer material was much higher than that of the original sample supplied by the Company.

3. The problem of delamination was discussed. The current making of on-machine coated board showed severe delamination and the expert made certain recommendations in consultation with Mr Ergin and the problem eventually resolved itself. (The quality was later checked during the night and found to be satisfactory.

4. The expert condemned the practice of "flooding" the finishing end (salle) floor with water in order to settle dust. The pools of water lying on the floor following such treatment caused the relative humidity in that area to rise to 90%. The result was very wavy paper.

5. PIRA stroboscope cannot be used to detect degree of slippage between wire and drive roll and couch.

29.05.1984

1. The clay preparation plant was in operation producing both filler and coating clay from the **pre-ground** clay. Work commenced on 28.05.1984 with Esan PDK-Extra grade.

2. On 28.05.1984, trial was effected using retention aid from Bayer but without success. Sandoz material gave considerable improvement to retention and also 1 tonne/hour steam was saved and stock was turned out (about 10%).Lab. continues to monitor progress.

3. Assistance was provided to PIRA for the measurements taken

on the paper machine.

4. Trials were carried out in the lab. to simulate the fluorescent spots experienced in the mill. Various modifications to the production operation were considered.

5. Lab. trials were also under way on the dusting problem experienced on the board machine. It was observed that the latex (Orgal k-430) was pH sensitive. Measures were taken in the mill to minimise the problems: alternate feed tanks were used and "resting" tank thoroughly cleaned out before changing back.

The meeeting was then joined by Mr Palmer of PIRA

6. Stock velocities will be measured.

7. Samples for grammage and caliper checks are to be taken according to PIRA recommendations. PIRA will supervise sampling.

8. Surface temperature profile will be checked on the MG cylinder. A modified contact pyrometer would be used as other methods (IR) can be misleading.

9. Size press to be run using wet-end cationic starch: about 3% solids.

30.05.1984

1. Taking moisture samples on board machine for PIRA.

   (a) End of drying section (6th group)
   (b) Before the metering bar coater
   (c) After MG
   (d) Before MG
   (e) 3rd press doctor
   (f) 2nd press doctor
   (g) 1st press doctor
   (h) Couch (top of pick-up roll)
   (i) Before dandy roll (after transfer felt)

2. PIRA measuring felt moistures with Scanpro (moisture checks of pick-up and transfer felts included).

3. Felt porosities will also be measured if time permits.

4. Nip impressions at MG cylinder will be taken.

5. Considerable variations have been noticed in the pulp mill; especially bleaching parameters and permanganate numbers. These are causing subsequent variations in the paper mill.

6. Cooling water and condensate going to drain. In the pulp mill this clean water is mixed with overflowing black liquor from the digester area. In the long term, it is necessary for the clean water to be recycled and **not** to be contaminated by chemicals.

7. The retention aid addition was raised from Ø.Ø4 to Ø.Ø5% on fibre. Retention aid also now added to board machine system.

8. T Dean expressed dissatisfaction over sampling points for retention checks. Also, there is some doubt over flow readings for clay line. Both will be checked. Ash is varying due to intermittent coated broke addtition.

9. PIRA noticed improvement in moisture profile at presses and reel-up since retention aid added. Probably due to more even drainage on the wire. Grammage improvement also improved when the size press was in operation (29.Ø5.1984).

1Ø. T Dean states that size press should be in operation all the time and this must be the objective. If run correctly, production rate should not fall. Following modifications should be made:

(a) Lead-out roll to be moved nearer nip.
(b) Starch spray system to be evened up.The hot starch must not be allowed to contact the roll.

11. Inorganic content of effluent dropped to 39% (target 40% maximum). Before adding retention aid the figure was 55-60%.

12. A materials balance will be established for the paper machine. Mr Aykac will organise this in conjunction with the lab.

Ø1.Ø6.1984

1. Fresh water is being added to saveall system. This is unnecessary and should be stopped.

2. Retention aid addition to be raised to Ø.Ø8% on fibre (the maximum recommended value). Rate will be gradually increased in

order not to stall the wire.

3. Losses of fibre from press section (paper machine) seem to be excessive. There are variations in consistency results from lab. which must be checked.

4. Modifications to clay plant discussed; possibility of directing clean clay stream to settling tank 408 debated. This was suggested by Ms Beslek following lab checks. The plant would be studied further before making any changes.

5. T Dean is checking for unusual fibre/clay dumping during night shift. Ms Teksoy is assisting with materials balance while investigating pulp mill process conditions.

6. Mr Sahin reports excessive loss of condensate in paper mill. There is also similar losses (together with fresh water) from the pulp mill (T Dean reports).

04.06.1984

1. The clay plant is now collecting coating clay.

2. Abrasion tests carried out on a number of domestic clays. Comparative figure for domestic clays are:

Esan	120 mg	(94 mg after treatment in clay plant)
Dyo	138 mg	
Gorener	234 mg	

3. Clay losses are to be fully investigated. T Dean reports that clay stock tank had been overflowing Sunday (03.06.1984). This was no doubt the cause of high inorganic load at effluent treatment plant.

4. The lab. will try to assess the connection between wire life and Valley Abrasion figure. Synthetic wire failed due to edge nick - cause unknown. T Dean to investigate further.

5. Fluorescent spots still under investigation both in mill and in lab.

6. Fibre losses now under control but paper machine retention figures seem a little low. This is possibly due to insufficient dilution of retention aid. Sandoz will be asked to expedite the

delivery of the proper dilution system.

05.06.1984

1. Retention aid (from Sandoz) performing well. Further inspection indicates synthetic wire failed due to edge damage. Sample to be sent to supplier for comment. Mr Aykac will check wire guide spade.

2. Water from clear zone of saveall is now very clean (0.08% solids) and steam consumption is lower than before the Sandoz retention aid was added. There is increased filler retention and lower vacuum on boxes and couch.

3. Detailed survey to be carried out on effluent streams from paper machine now that system is in equilibrium.

4. A trial will be run with up to 70% short fibre in the furnish; resulting paper will be coated. Two machine reels will be produced.

5. In the pulp mill, the hypochlorite and chlorine dioxide stages function with erratic chemical concentrations. Supervision is suspect.

6. Loss of raw materials from the coating plant during daily wash up is about 40 kg of solids. If all wash downs (at breaks etc.) during the day are counted then total loss is about 100 kg. This will depend upon number of faults in the base paper. Figures contradict those produced by the effluent section lab.

7. Under-wire backwater sample gave an abrasion figure of **1 229 mg** after ashing the filtered solids. Calcination may contribute to this abnormally high figure: This point will be checked.

06.06.1984

1. Attempts to carry out a clay balance for paper machine system gave unexpected results. It transpired that an addition rate of **15%** clay to the stock gave a final ash level of **16%.** Broke addition could explain the result but it is suspected that the clay flow meters are inaccurate.

2. Trial run with 60% short fibre (reed from Afyon) in the

furnish. No machine problems but formation rather disappointing (later found to be caused by poorly dispersed retention aid).

3. Inorganic level in effluent plant down to 40% and below.

4. Calcined clay appears to give higher abrasion than normal clay. Abrasion of clay in board machine backwater reported at 720 mg (calcined gives 1 229 mg (see above). In the paper machine backwater filler abrasion was measured at 400 mg.

5. Only limited amounts of coating clay collect in new tank. particle size distribution being checked.

6. Clay plant running intermittently due to low filler demand. Virtually no coating clay is being produced. Yield of good clay on feedstock will be checked.

7. Coating storage tank overflowed giving foam.

8. Question of softer pulp discussed. If Afyon could produce enough straw/reed pulp then this would be unnecessary. T Dean explained that the operation of producing a softer pulp at Dalaman would entail using a special pre-treatment stage immediately before the Kamyr. This requires very careful control of cooking parameters which is not possible at the present time. Pulp Mill Manager explained intention of changing to sodium hypochlorite in bleaching section.

9. Flows in the effluent canals to be measured using V-notch weirs.

10. Training courses to held on following Monday and Tuesday.

07.06.1984

1. Abrasion checks in clay preparation plant encouraging:

Feed	730 mg	)	ESAN
Discharge	278 mg	)	CLAY

2. Modifications to clay plant discussed; possibility of putting in two settlement stages before the ball mill. Ball mill would be used as a mixer only **without balls.**

3. Esan clay very variable in abrasive properties. Alternative supply will be tried. Retention on paper machine good but clay level has been decreased to conserve wire. At ash level of 6.5% retention is 72% overall. Various figures for effluent quality quoted.

4. Inorganic level at effluent plant 39.7%. pH of discharge form paper mill is 6.5-7.5 indicating addition of fresh/cooling/condensate to the stream. Water usage has risen from 35 000 to 50 000 m^3 per day; effluent discharge volume up by the same ratio. We must conserve fresh water and condensate. Hoses should not be left running. T Dean to carry out checks during night shift.

5. Losses of solids to effluent plant measured at 22.5 tonnes per day (15 tonnes organic; 7.5 tonnes inorganic). Formerly losses have been as high as 40 tonnes per day so use of retention aid coupled with more attention to saveall operation (work by Mr Aykac) is paying dividends. The savings should be costed and the information circulated to other mills.

6. For completeness the abrasion characteristics of reed pulp should be checked (in Romania this was found to be high!).

11.06.84

This meeting was carried out with PIRA present.

1. Measurements of various parameters still to be completed.

2. Line pressure of MG checked; MG doctors should be oscillating continuously to maintain clean, polished surface. Presser roll should be changed at next major shut: pressure drops off 40 cm from front edge giving rise to "bubbly" surface of the board. Damage to presser roll front edge no doubt due to feeding tail.

3. Oktas clay found to be very abrasive (750 mg). There are some doubts about the test method used; Mr Sahin/T Dean to check. The objective would be to use the TAPPI standard method as opposed to that issued with the Valley Tester. The TAPPI method specifies the use of a deflocculating agent when making up the test slurry. It is also necessary to run in the wire before testing.

4. Retention aid dilution system is becoming blocked if not

purged regularly with clean water. Clay spillage from stock tanks suspected for sudden rise in inorganic content during the night.

12.06.1984

1. Fibre loss from paper mill running at 12.7 tonnes (25% inorganic).

2. USA clay checked on Valley Abrasion Tester; result 25 mg. Oktas and Esan clay mined in same area of Turkey and should be similar in properties. Tests indicate wide variation in quality.

3. Sample of coating clay taken for testing but quantity is limited.

4. Possible alternative for Sandoz agent discussed. Percol (Allied Colloids) has given best results in Dalaman but it is a powder and requires careful dispersion before use. However, it has long shelf life.

5. Seminar on printing to be held 4.15 pm.

6. T Dean made proposal to change over to lump clay as pre-ground clay difficult to improve, Theory is that sand is being ground up as well as clay and is difficult to remove as fine particles. The ball mill will be used as a mixer i.e. without balls.

7. Starch conversion discussed at length. Is it possible to obtain starch conversion plant from Silifke Mill? Lab will carry out trials.

13.06.1984

1. Lump clay is now being processed; the lab will monitor quality of final product.

2. Discussions took place on the possibility of using hydrogen peroxide for treating waste paper prior to the flotation cells. The chemical, when tried in the plant, should be done under close supervision by the lab. T Dean to get information from Cross and Bevan on quantities and methods of use. The importance of water glass (sodium silicate) in the process will be ascertained.

3. Paper machine calenders being prepared for trial. Two rolls have been removed and pulleys still have to be installed.

4. Wire now running **11th** day. On inspection, wear is even and not irregular as in the case of the phosphor bronze wire run before retention aid was used. Lower ash levels also help matters, but during the night ash rose to 13% (due to faulty flow meter).

5. Clay plant now running well using lump clay. There is some clay in the rejected material (from the screw conveyor) but the main is sandy in character. Problems were experienced with pumps blocking but the difficulty has been overcome.

6. Wire life was discussed. The "record" for a wire at Dalaman was 62 days but **without** clay in the furnish. Also, there were no ceramic foils. European clays (ECC) gave 20 days at 5% ash. Clearly it is not economic to run without clay so abrasion problem must be overcome.

7. The report of Mr Lintsen (UNIDO China Clay Expert) was discussed. This report advocated the use of small diameter cyclones to segregate particles of different sizes. This would obviate the need for settling tanks but collection tanks would still be required.

14.06.1984

1. The meeting took the form of a debriefing session for PIRA, but the operation of clay plant was discussed before the PIRA team arrived. Discharge abrasivity found to be 104 mg which is quite good when compared to the pre-ground clay. The lump clay is under one third of the price and even allowing for a 50% yield of good clay the final product is both cheaper and less abrasive. Coating clay checked and found to have abrasivity of 10 mg.

2. Wire failed after 12 days.

18.06.1984

1. Pulp Mill still giving variable quality and T Dean recommended that the plan to produce a softer pulp be deferred indefinitely.

2. Attempts were made to estimate the exact yield of good clay

in the clay plant by weighing rejects, correcting for water content and comparing with weight of clay into the plant. The test was to be carried out over one shift. Difficulty was experienced due to intermittent operation and exercise would be repeated. Best estimate was 50% efficiency.

3. Abrasivity of filler clay rose to 408 mg. This is due to a sharp rise in the consistency of the slurry entering the first cleaner bank causing blocking. The operators are being instructed to check the ingoing solids at regular intervals. The laboratory will monitor the performance of the cleaners at varying consistencies and recommend the maximum allowable value.

21.06.1984

1. Board machine is not controlled as tightly as paper machine. Attempts will be made to improve the situation by improved discipline and training.

2. Speed trials run on paper machine. Maximum speed attained was 400 metres/minute. Vibration at the press section was analysed at each speed level. The 3rd press is bouncing (i.e. the vibration is in a vertical plane) and could be caused by pneumatic system or a substandard wet felt. A more detailed analysis should be made.

3. Quality control was discussed and a plan of action was drawn up (see main report for details).

4. Dalaman does not have any semi or unbleached straw pulp to carry out stiffness trials on board machine.

5. Clay plant is running at 63% efficiency and this is higher than expected.

22.06.1984

1. The clay plant operation was discussed and the suggestion of Ms Beslek was taken up; namely to send the accepted clay stream from the cleaners straight to the settling tank 408 and not 407 which easily becomes overloaded especially when the feedstock was crude lump clay.

2. The paper machine calenders are now ready and a trial will be run the next day (Saturday). The Engineering Section will

check pressures and look for uneven nips by means of a strong light.

At this point, the morning meetings became rather erratic due to the holiday season. The expert took minutes of those meetings that did take place and all the points discussed have already been covered in the main body of the report.

RECOMMENDATIONS

Paper and Board Coating

(To be read in conjunction with FINAL REPORT)

SEKA - Turkey

DP/TUR/81/018/11-06/32.1

Trevor W R Dean

Expert in Paper and Paperboard Coating

July 1984

United Nations Industrial Development Organization

VIENNA

NOTE

This section, which contains the recommendations from both the **interim** and **final** reports, is published separately so that the members of SEKA Senior Management do not have to read through the main bodies of the two lengthy reports. The recommendations from the **interim** report are re-stated and underneath each is a comment regarding the action already carried out. Where appropriate, the original recommendations are modified in the light of work carried during the **final** mission and some further recommendations are added.

RECOMMENDATIONS

IZMIT MILL/RESEARCH AND TRAINING CENTRE

---

1. Pay more attention to the stacking of pulp deliveries.

COMMENT The situation has improved considerably since the first mission in November/December 1983, but there is still room for improvement especially when stacking pulp bales from Afyon and Dalaman. In order to aid correct stacking both Afyon and Dalaman should make sure that **all** bales are well strapped and regular in shape.

---

2. De-centralise the research activities by setting up "local" research units. Any specialised equipment should be located in these local units.

COMMENT The principle has been accepted but it is be emphasised that the Research Group in Izmit must work very closely with the "local" units. The Izmit Unit appears to the expert to be rather isolated and requiring considerable

"encouragement" to communicate. With the expertise available in the Research Group it is expected that the individual members will be able to identify worthwhile projects during regular visits to the various SEKA Mills.

---

3. The Central Research Unit at Izmit should work in close cooperation with the Group Production Directorate under Ms Ferhun Taptik.

COMMENT The expert gained the impression that Ms Taptik is leading her section in this direction; the Research Group does not appear to appreciate the need. The work load of the Research Group is very light at the moment and it is hoped that more intensive research will develop as soon as there is more liaison between the two groups. For the sake of SEKA in the long term, the Research Group must **lead** the technological developments and stay in close touch with the **practical** needs of the various mills.

---

4. Before embarking on an expensive pilot plant installation within the Research Centre, it would be prudent to search the Izmit Mill for existing plant that could be used for R and D; for example, the cigarette tissue line.

COMMENT This message has not registed with the Research Group and it is imperative that SEKA does not waste money on expensive pilot plant which is not used. There are many examples of ornamental Research Centres in the world; the expert trusts that Turkey will not fall into this trap. The money would be better spent on **production** plant thus creating more profits.

---

5. Create a more agressive training activity.

COMMENT The expert could see very little evidence of coordinated **Group Training.** Because of this, the expert worked with the Dalaman Training Committee and local engineers in setting up an efficient, professional training activity in that mill. It is hoped that the Mill will have more determination than that shown to date by the Central Training Group.

DALAMAN MILL

---

1. Cap (cover with a waterproof sheet) all stacks of paper and board as they come off the cutters. This is especially important if the relative humidity of the area is above 70%.

COMMENT Throughout the final mission the humidity in the finishing end only rarely exceeded 70%; the exception being when the floor was flooded with water to lay the dust. This latter practice was stopped. Quite obviously it is during the winter months that the humidity is likely to rise above the danger level and it is then that the capping will be essential.

---

2. Fit flexible self-closing doors to the finishing area.

COMMENT The Mill has gone out for tender.

---

3. Set up a more positive quality control scheme within the Finishing Section.

COMMENT The question was discussed at length during the mission and there were encouraging signs of a progressively tighter control being kept throughout the finishing operation as the mission went on.

---

4. Encourage all operators and technicians to concentrate on quality.

COMMENT The situation on the paper machine was very much improved but the board machine crews were under weaker leadership. The implication of a "quality programme" as discussed with Mr Ergin will, hopefully, encourage **all** crews throughout the Paper Mill to become quality conscious. The Pulp Mill, together with the supporting sections throughout the mill complex, must be tackled next.

---

5. Ensure that the Quality Committee sits each morning to consider the quality level of the previous 24 hours.

COMMENT During the final mission the role of the Committee was widened to include projects/trials/development work. Minutes taken during the meetings held during the mission are appended to the **main final report;** these are an example of the type of information that should be recorded as well as being a detailed record of the technical work carried out during the mission. It is essential that the meetings are held punctually at the same hour each morning and that the chairperson exerts strong discipline throughout the meeting to minimise time wasting in irrelevant discussion.

---

6. Keep the on-machine grammage/moisture meters in good working order.

COMMENT Despite the attendance of the Lippke Specialist for one month during December 1983, he was unable to re-commission all the units (especially the moisture measuring units). The units as installed are unreliable and it is recommended that the Mill considers the purchase of more suitable equipment. PIRA may make recommendations as to possible suppliers.

---

7. Simplify the paper machine calender stack by removing two rolls. It must become normal practice to machine finish all plain papers rather than use the supercalender.

COMMENT The modifications are complete and the Mill is waiting for information from PIRA as to the correct cambers to be used and for recommendations how the pressure loading mechanism can be simplified. A preliminary trial showed that a reasonable finish can be achieved using the modified stack. The Mill is under pressure to solve the problems associated with this equipment since it will be necessary to carry out extensive maintenance to the Bruderhaus supercalender (used for plain papers).

---

8. Install a bow roll (Mount Hope) immediately prior to the paper machine size press (to reduce creasing).

COMMENT After consultation with PIRA, it was decided that other modifications are necessary and the configuration of the out-going section must be changed as well. The necessary changes were discussed with the Mill staff and it is hoped that the modifications will be completed in the near future. It will also be necessary

to change the incoming starch spray system to give a more even distribution and to prevent direct impact of the hot starch solution on the size press rolls.

---

9. Consider the installation of spray dampers before the reel-up of both paper machine and board machine.

COMMENT This is still to be carried out.

---

10. Install a hole detector on the paper machine.

COMMENT Still to be carried out.

---

11. Construct a simple hole marker for the coating machine.

COMMENT This is in hand.

---

12. Run all paper and board with a moisture content of at least 5.5% (5.5 - 6.0% would be better).

COMMENT With very few exceptions (usually on the board machine) the moisture level is now maintained between 5.0 and 6.0%. Without reliable moisture meters this is quite difficult to achieve **consistently** and the crews are to be congratulated on their dedication to this cause. The savings are considerable; in steam, raw materials and customer complaints. Quite obviously there is a higher as well as lower limit and the expert found evidence that board had gone out at over 10% moisture (to TEKEL). He was surprised to learn that the excuse given by the Mill was that the UNIDO expert had instructed everyone in the Paper Mill to maintain a high moisture content!!! (The Mill is referred to the interim report pp. 23 and 48).

---

13. Initiate a slime control scheme and ensure that a thorough cleaning programme is observed at each wire change.

COMMENT There were far less slime holes in the coating base

(despite the higher summer temperatures). However, the Mill must not get complacent and should maintain the cleaning programme at each wire change. It will also be advantageous to add a slimicide **regularly** to prevent slime build-up and sudden break-aways. The report prepared by the UNIDO expert on slime control should be circulated to Dalaman Mill.

---

14. Improve the retention of fillers and fines by the use of suitable retention aids (for example, cationic starch).

COMMENT During the mission a Sandoz retention aid was run continuously. The results are very encouraging and all SEKA Mills should be using retention aids to reduce loss of raw materials while, at the same time, reducing pollution of adjacent water courses. There is also a saving in energy (steam in the drying section) due to improved drainage on the wire; also, in the case of Dalaman Mill, it was possible to increase machine speed without reaching the limit of either drainage or drying.

---

15. Run cylinders 47 and 49 on the board machine at 60°C and 75°C respectively to minimise coating pick.

COMMENTS Most crews are carrying out these instructions although the weak control mentioned previously gives rise to variations (especially during the night).

---

16. Reduce the temptation to buy cheap wet felts.

COMMENT The high level of vibration currently experienced on the paper machine third press is almost certainly due to a suspect wet felt. The short term cost saving must be carefully weighed against the long term damage.

---

16. Keep a close watch on the new foil table for signs of wear.

COMMENT The increased level of wire wear since the installation of the all-foil table is also extremely worrying. The leading edge of some of the foils are now worn and it is imperative that the clay abrasion problem is solved

very quickly. In hindsight, it would have been better if SEKA had spent extra money on fully adjustable foils with inserted wear pads.

---

17. Design a simple cascade system for settling out fine sand from the pre-ground clay.

COMMENT After the trials carried out during the final mission, it is now recommended that the Mill buys crude, lump clay and processes that. The pre-settlement stage is even more important to prevent over-loading the centri-cleaners and settlement tanks. It is further recommended that a UNIDO/UNDP project should be implemented as soon as possible to give Dalaman help in this area. The results from such a project would also be of value to Izmit Mill where crude clay is ground prior to using in the paper making system.

---

18. Take positive steps to reduce the excessive amounts of valuable raw materials going to drain.

COMMENT The expert devoted considerable effort to this objective and many improvements were made at the Dalaman Mill due to the excellent cooperation from the Technical Staff. In the long term it is recommended that ways of recycling "fibrous sludge" from the effluent plant are carefully studied. This may mean either the construction of a separate settling basin to deal with effluent from the paper and board machines or a modification to the effluent treatment plant itself.

---

19. Follow up the trials using pre-ground clay as a possible feed stock for a coating clay. Repeat using a micronized grade from Matosan A S.

COMMENT Now that the clay preparation plant has been modified to provide a third settlement stage, it is possible to produce a limited amount of coating clay while processing crude, lump clay for filler. The Matosan grade is still abrasive and alternative ground clays have been investigated by the Mill. The ultimate aim would be to make an acceptable coating clay from local crude, lump clay using the Dalaman clay plant after the latter has been suitably modified. See recommendation refering to a possible UNIDO/UNDP project above. It is important that the laboratory carefully monitors the

filler clay produced and, if necessary, SEKA should purchase a second Valley Abrasion Tester.

---

20. Develop separate grades of coated papers for GRAVURE and OFFSET LITHO according to the work carried out by the laboratory.

COMMENT This work could not be progressed to a production stage because of the problem with excessive wire wear. The gravure grade requires a high ash level and it was not possible to produce such a base during the mission. The only positive step in this direction was the successful trial using 60% short fibre in a coating base which ran well both on the paper machine and on the coating machine.

---

21. The Mill should persevere with using more short fibre in the paper furnishes. Until Afyon can sort out its quality problems, it is suggested that some eucalyptus pulp is obtained; this will be especially useful in the production of coating base.

COMMENT The present position is that Afyon continues to produce a variable quality product and during the mission only a very little reed pulp was available. The trial described above proved beyond doubt that the Mill can run high levels of short fibre in the paper furnish **IF ONLY SHORT FIBRE WERE AVAILABLE.**

---

22. The Mill should install a second coating feed tank.

COMMENT This is still to be constructed.

NEW RECOMMENDATIONS

---

1. It will be to SEKA's long term advantage if a project, supported by UNIDO/UNDP, could be raised to cover the production of a suitable filler clay and, if possible, a reasonable coating clay. The latter could be used to replace

some of the imported coated clay (say 30% - 40%) and could be used in higher quantities in mixes designed for the board machine metering bar. The project would embrace the Izmit site as well.

---

2. The Dalaman Management should put **all** laboratories under the control of Ms Beslek. This would obviate confusion over testing methods and a high degree of coordination could thereby be achieved.

---

3. The paper nad board machine crews should be encouraged to mark all defects (holes, creases, tears, folds etc.) when they see them come down the machine. At the same time, the winders should mark defects for the cutters.

---

4 UNIDO/UNDP should consider supporting a project to investigate the possibility of recycling fibre and water at Dalaman. The first objective would be to close up the paper and board making systems and then study ways of reusing fibre in the board making operation.

---

5. The vibration problems experienced when the paper machine is running above 300 metres/minute should be carefully studied. For this work the vibration analyser should be made available to the Mill for at least one month.

---

6. It seems to be very difficult to clear equipment from customs. Someone should investigate the situation.

AFYON MILL

The expert did not visit the Afyon Mill during this mission and is therefore unable to pass further comment on the progress made by the mill towards a more acceptable product. Furthermore, Afyon was only supplying reed pulp during the final mission and so the expert cannot even judge the current quality of the straw pulp.

The UNIDO Straw Pulping Expert is due back at the Mill any day now and it is hoped that the product will show signs of improving following the implementation of his recommendations.

FINALE

Following the very constructive meetings with the General Director Mr Yalinpala, the Technical Director Mr Genc and Ms Taptik, the expert confirms his offer to return to Turkey **at his own expense** to carry out more work on raw material conservation, the production of a less abrasive filler clay and the production of a sales brochure. This offer was made following the statement made by Mr Ogeer (General Manager, Dalaman) that there were no UNIDO/UNDP funds available for any further missions by the expert. In making this offer, the expert is not committing UNIDO/UNDP in any way and has no wish to interfere with the current programme timetable already agreed.

Despite the outcome of the meeting with Mr Yelen, the expert still continues to make the offer of the Cross and Bevan facilities for the training of Ms Teksoy, Mr Mengi and Mr Cobanoglu. Cross and Bevan will also test three sample of SEKA pulp in order to compare the overall quality with standard market pulps. The expert also undertook to test Dalaman linter pulp in order to assess its quality for the European market.

The timing of the additional mission would be during September, but depends upon the requirements of the Mill. If possible the expert would bring with him a small business computer in order to

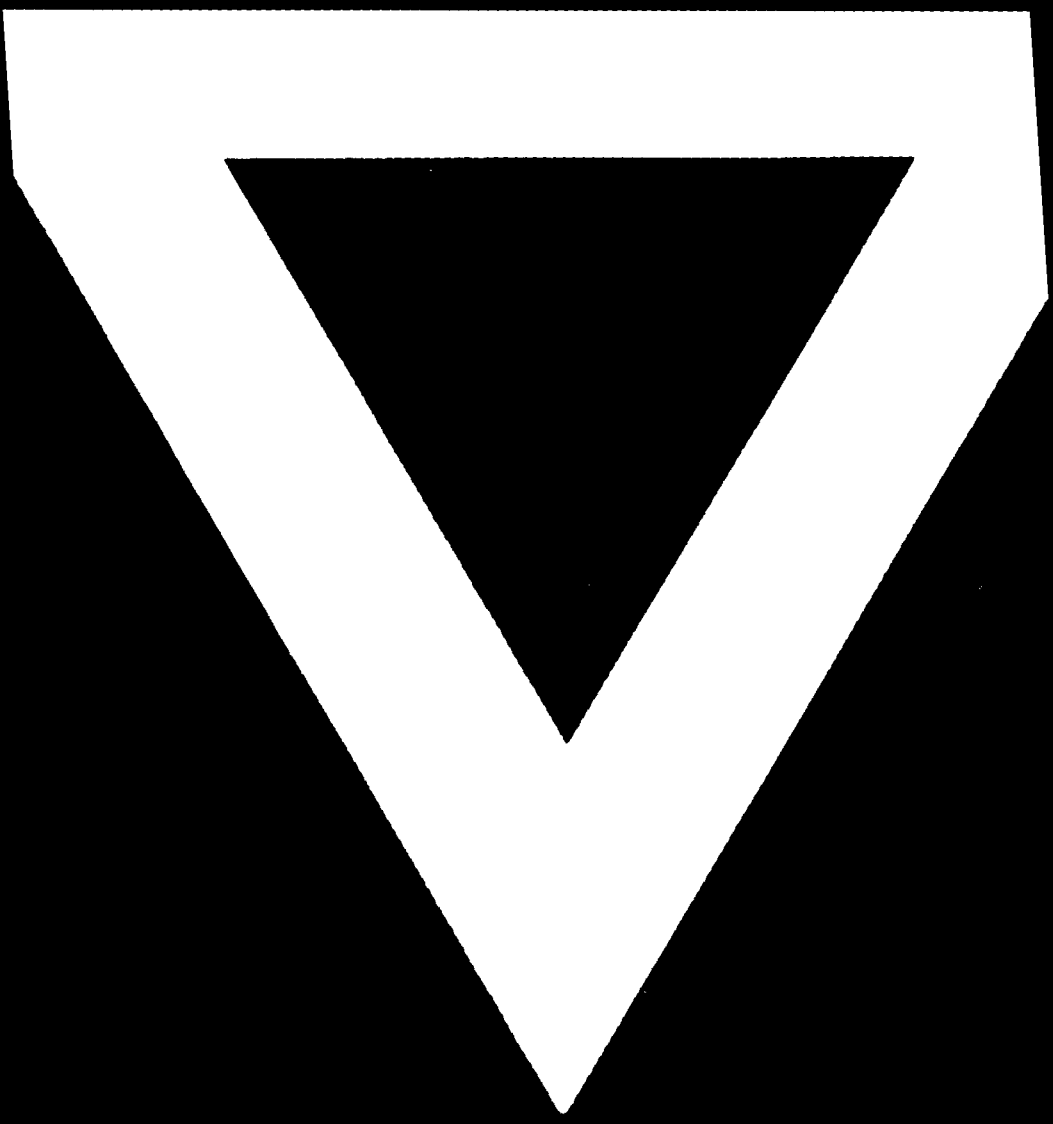
demonstrate its usefulness in stock control, financial analysis and word processing. In this case it would be necessary for the expert to travel by car.

Assuming the mission would be made at the expert's own expense, any report would be made readily available to UNIDO on request.

Trevor W. R. Dean.

Trevor W R Dean

July 1984



.01.17
AD.86.07
ILL 5.5+1