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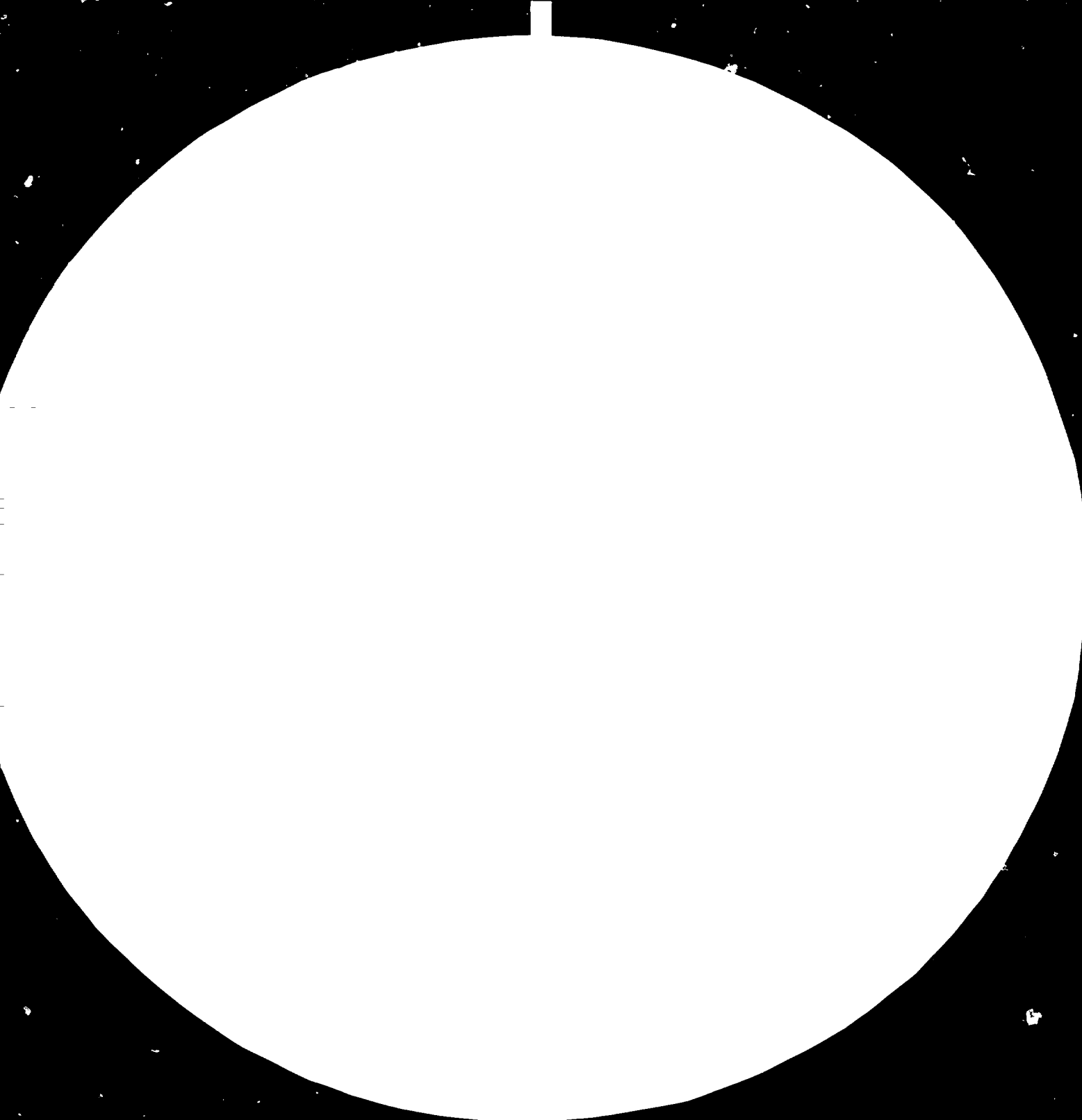
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**INTERIM REPORT**  
**Paper and Board Coating**

Seka - Turkey .

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Dr. Hans Baumgartner  
Expert in Paper Coating  
Vienna, September 1982

United Nations Industrial Development Organization  
Vienna

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Enclosure: samples and copies

**1. General remarks:**

In accordance with the job description (revised edition of April 1981), this two month mission was intended to be devoted mainly to the production of coated cardboard. The prerequisite for this was that the entire plant should be functioning perfectly. However, as this condition was never completely fulfilled, either at the commencement of the mission or at any time during the consultant's stay, it became apparent that it would not be possible to proceed in a planned, objective manner.

Furthermore, many of the employees in key positions (head of the paper production, head and leading workers of the laboratory, head of the control and measuring department, engineers of the coating department, members of the company management, interpreters) had been absent for long periods on holiday and on training courses. This proved to be a considerable handicap because of the resulting lack of experience and technical knowledge on the one hand, and ability and resolution to take decisions on the other.

The resulting waiting times not only reduced the amount of progress that was made, but were also the main reason for the fact that the consultant's mission - originally planned for the period from 1st June till 30th July, 1982 - had to be extended until 3rd August 1982.

Apart from this, considerable progress was made at least with regard to coating and final production quality. This was due to the particular willingness and ambition of individual employees, especially the assistant technical director, Mr. A. Kadir Karakuzulu, and the head of the coating department, Mr. Suleyman Sahin.

**2. Current situation**

On the basis of the intermediate report of 29th May 1982 prepared for the SEKA Dalaman management (mentioned in section March / 3.4, a copy of which was given to UNIDO - Vienna), the consultant formed an impression of the current situation in the course of two-day discussions.

**2.1 Positive aspects**

Of the numerous suggestions and recommendations contained in this report, only those mentioned below had been realised:

- \* Hardwood pulp had been procured.
- \* The centricleaner for the self-produced softwood sulphate pulp was at least partly in operation.

- \* The rewinder behind the paper machine was functional in accordance with present requirements.

At the initiative of Mr. Sahin, a start had been made with fitting all the paper guide rollers with a spiral adhesive strip, the spreading effect of which it was hoped would counteract the formation of creases. This measure proved to be very successful and even made it possible to reduce the web tension to normal values.

## 2.2 Negative aspects

The remaining recommendations in the above-mentioned intermediate report had received no consideration. The fact that the circumstances mentioned below, which are of fundamental importance to the manufacture of coated papers and cardboards of satisfactory quality, had not been altered with success, and did not even receive objective study during the consultant's stay proved particularly detrimental to the desired progress and to the consultant's activity.

- \* The fibre formation in the base paper was conceivably poor and could not be sufficiently improved even by the use of hardwood pulp (in contrast to production in October 1981 and March 1982).
- \* The fibre formation in the Bristol base cardboard was extremely poor when a single ply was produced on the Fourdrinier wire. Multi-ply production was said to be impossible (in contrast to March 1982).
- \* The equipment supplied by the LIPPKE company for measuring the weight per unit area and humidity before and after the application of coating colours and for measuring the viscosity of the coating colours was at no time fully operational. There was no means of calibrating the scale reading and actual value of those items of measuring equipment which were operative.
- \* There was no calcium carbonate pigment with a suitable distribution of particle size.

## 3. Activities and results

The consultant's activities are detailed below by technical fields without consideration for their chronological order.

### 3.1 Raw materials for coating

Negotiations were held with the suppliers of

- \* coating clay
- \* calcium carbonate pigment
- \* synthetic binding agents
- \* starch, dextrin

- \* carboxymethyl cellulose

- \* optical brighteners,

and quality requirements discussed and quotations obtained.

Although several products were regarded as promising with a view to improving quality and/or reducing cost and should have been tested, tests could only be carried out with ORGAL K 430, a synthetic binder on a polyacrylate base and manufactured in Turkey under licence from RHOEM & HAAS, as none of the other substances were delivered on time.

### 3.2 Coating colours

The coating colours specified below were formulated, examined in laboratory tests and tested on the coating machine.

- \* Coating colour with increased solid content and starch as a binding agent.

- \* Coating colours with ORGAL K 430 as binding agent, one of which was introduced as a standard coating colour.

- \* Priming colour for double blade coating on cardboard with a high calcium carbonate content and starch as binding agent.

A suggestion was made for the formulation of a priming coat which would be applied with a roll coater which would have to be installed in the cardboard machine.

A comparison of the costs of some of the coating colours used was drawn up in the form of a report (see item 3.7.2).

### 3.3 Coated papers

About 250 tonnes of base paper were produced for customers' orders and stocks, and the parts shown in Table 1 used to carry out trials.

All the trials were facilitated by the improved smoothness of the base paper, produced by the use of the offset press as suggested. However, they were also adversely affected by the negative aspects (item 2.2), which prevented the formulation of optimal coating colours.

#### 3.3.1 Coating trial 1:

**Objective:** to determine whether the coating machine or the quality of the base paper was responsible for the occurrence of creases.

**Result:** after the paper guide rollers had been fitted with spiral adhesive strips (spreading effect), particularly good quantities of base paper could be coated without creases on both passes (double sided coating) with a reduced web tension.



Table 1

Production series	1	2			3
Production date	7/8 June	29 June			27/28 July
Furnish in %					
Long fibre, wet	70	70	70	60	20
Long fibre, dry	--	--	--	--	40
Short fibre	20	--	--	--	--
Straw/reed	--	20	20	30	30
Broke	10	10	10	10	10
Dandy roller	without	with	with	with	with
Offset press	with	with	with	with	with
Size press	with	without	without	without	with
Substance in gm/m <sup>2</sup>	90	70	60	80	70
Coating trial no.	1 & 2	3	3	4	5

3.3.2 Coating trial 2:

Objective: to carry out a comparative test of various coating colour formulations using domestic raw materials.

Result: coating colours bound with starch always exhibited migration effects and were not sufficiently water resistant, but produced the most brilliant white. Apart from stability problems, coating colours with ORGAL K 430 as a binder were equal in quality to the original coating colour with ACRONAL S 360 as a binder, but were less expensive.

3.3.3 Coating trial 3:

Objective: production of paper coated on both sides with the lowest possible substance.

Result: in order to prevent the formation of creases, we dispensed with the use of the size press. However, creases still occurred, but the pick resistance dropped to Dennison = 3 or IGT = 40 cm/sec with a low viscosity bonding oil. This and frequent tearing of the 60 g/m<sup>2</sup> base paper led to the consultant's recommendation not to include an 80 g/m<sup>2</sup> paper coated on both sides in the standard production range for the time being.

3.3.4 Coating trial 4:

Objective: to manufacture a paper coated on one side without curling.

Result: curling could be completely suppressed by applying the right amount of moisture to the bottom of the web by means of spray nozzles.

### 3.3.5 Coating trial 5:

Objective: the rational production of a standard variety of perfect quality.

Result: unsatisfactory. A production of barely 50 tonnes of coated paper cannot be described as rational if it cannot be completed in seven days - from base paper manufacture to supercalendering - and if only 43% of the opportunities for a flying splice are used, and even then without success. Although the cross-section, pick resistance, gloss and smoothness of the paper produced ranged from satisfactory to very good, the poor sheet forming of the base paper (sample 1), coupled with shadow marking resulted in irregularities in the application of the coating, unevenness of satined paper and a glossy/dull structure in the surface of the paper (sample 2). This considerably reduced the quality of the paper for printing purposes. As a result of the fact that the measuring equipment (2.2) was not ready for operation, variations in the application of coating colour ranging from 10 to 16 g/m<sup>2</sup> on either side had to be accepted.

### 3.4 Coated cardboards

About 300 tonnes of base cardboard (Bristol and Chromo) were produced for customers' orders and stocks, and the parts shown in Table 2 used to carry out trials.

All the trials were impeded by the negative aspects (item 2.2), which made it impossible to optimise the formulation of the coating colours or achieve a satisfactory quality in the result of the trials.

An almost crease-free run, obtained by the spreading effect of the spiral tapes, made it possible to use the hot glazing rollers successfully for the first time.

Table 2

Production series	4	5	6
Production date	19 June	21 June	29 June
Variety	Bristol single ply	Bristol single ply	Chromo multi ply
Furnish in %			top ply 55 g/m <sup>2</sup>
Long fibre, sulphate	40	70	80
Straw/reed cellulose	60	30	20
Offset press	with	with	--
Size press	with	with	one side
Yankee cylinder	without	with	with
Calenders	with	without	without
Substance in gm/m <sup>2</sup>	180	220	230
Coating trial no.	7 & 8	6	7

#### 3.4.1 Coating trial 6:

**Objective:** to improve the printed surface by preliminary pigmentation using the size press in the cardboard machine.

**Result:** Deposits formed on the size press rollers due to the fact that the pump was unable to deliver sufficient pigmenting paste to the rollers (only about twice the amount applied to the paper). This prevented the planned application of 5-6 g/m<sup>2</sup> to either side. Thinning the pigment until it could be used satisfactorily in the size press did not produce any improvement compared to the previous method of working (sample 3).

#### 3.4.2 Coating trial 7:

**Objective:** to improve the printed surface by applying a priming coat in the coating machine.

**Result:** apart from the negative aspects mentioned under item 2.2, it was possible to achieve a very good covering of the base cardboard by applying about 10 g/m<sup>2</sup> of priming coating colour in the first pass through the coating machine and about 10 g/m<sup>2</sup> of top coating colour in the second pass. This result was obtained with both Bristol (sample 4) and Chromo (sample 5). Although the double coating did not produce a noticeably improved gloss, it did result in a considerable improvement in smoothness and a reduction in the irregularities in the coating, apparent in the porometrique test.

#### 3.4.3 Coating trial 8:

**Objective:** to produce Bristol cardboard coated on both sides with an improved surface.

**Result:** as in coating trial 7 (item 3.4.2), the application of a double coat (priming and top coats on either side) produced a good covering of the base cardboard and good smoothness. However, four passes through the coating machine were required to achieve this effect, although this fortunately did not involve any problems. The need for four passes raised the question as to the most suitable method of producing gloss and smoothness:

- \* with the supercalenders after the second top coat (sample 6)
- \* with the hot glazing rollers after the second top coat (sample 7)
- \* with the hot glazing rollers after every top coat (sample 8)

The trivial first alternative produced the highest gloss and smoothness, but the most marked smooth/matt structuring, and placed a considerable strain on the paper rollers of the supercalender.

Initially it was not possible to predict the compressive effect of the hot glazing rollers on the priming coat (keying of the top coat to the priming coat). It was hoped that the second and third alternatives would provide further information

about this. It was found that the top coat applied on a priming coat treated by the hot glazing rollers was just as well keyed as that on the uncompressed priming coat.

Furthermore, these trials proved that even the high coating weight (up to 27 g/m<sup>2</sup> on either side) obtained by double coating is not sufficient to hide the deficiencies of poor fibre formation in the base cardboard. The various production samples also clearly demonstrate that the entire installation, from the cardboard machine to the brushing equipment of the coating machine, was designed for the production of cardboard coated on one side only, and is poorly suited for the production of high quality cardboard coated on both sides.

### **3.5 Laboratory work**

The management and staff of the laboratory were instructed how to implement:

- \* a method of determining curl (curl test),
- \* a method of determining the coating weight using the difference in ash content,
- \* a method of determining the capacity for absorption of printing ink using the IGT appliance (Abkonter test),
- \* a simple method for the comparative determination of the water retention value of various coating colours.

Suggestions were made regarding the comparative testing of raw materials for coating, and in particular binding agents, optical brighteners and anti-foaming additives.

This opportunity was taken to stress the need for careful and accurate sampling of paper and cardboard. Suitable ways of achieving this were explained.

### **3.6 Marketing**

Despite the recommendations that have been made, this field has so far received absolutely no consideration. In order to provide at least an initial impulse, the consultant therefore visited several customers in Izmir together with the assistant technical director. In the travel report (item 3.7.2) written about these visits an attempt was made to point out the way in which the information obtained should be processed in order to derive ideas for the improvement and adaptation of quality.

Samples for practical testing were given to printers. No results have yet been obtained from these, but samples printed on DALMAN paper were made available (e.g. "Festival" cigarette packet, Swedish version of the Ephesus brochure).

### **3.7 Miscellaneous**

#### **3.7.1 Staff training:**

After repeated intervention it was possible to secure the consent of the general management of SEKA to study trips to Europe within the framework of the UNIDO

training programme for leading employees from the coating sector. This means that at least a start has been made with the urgently required training which has already frequently been recommended.

### 3.7.2 Reporting:

As mentioned above, the management has been given various relevant summaries in report form which have been or will be translated into Turkish.

- \* Material costs of coating colours (beginning of July)
- \* Travel report on customer visits in Izmir (mid July)
- \* Cardboard (end of July)
- \* Paper (August)

The last two reports mentioned above are not limited to descriptions of the trial production runs that were carried out. By way of conclusion the reports devote particular attention to the ways and means in which it seems feasible to manufacture various types of paper and cardboard of satisfactory quality using the existing installation. These two reports have not yet been translated. Copies of the translations will be submitted as soon as they are received. The first two reports mentioned have already been translated, and copies of them are attached.

## 4. Conclusions and future activities

By way of conclusion it must be reported that it was not possible to attain the general objective of commencing the commercial production of good quality coated papers and cardboards at the DALAMAN works of the SEKA Group by August 1982. However, the results obtained so far make it clear that coating technology is least responsible for this circumstance. On the contrary, the breakthrough was prevented by the failure to fulfil certain conditions and other unfavourable circumstances.

The unfavourable circumstances which are at least preventing a rapid improvement of the situation include:

- \* administrative factors
- \* consequences of the general economic situation
- \* the attitude of the staff to the tasks before them.

However, the main problems are posed by the failure to fulfil certain conditions:

- \* good quality of the base paper and base cardboard, particularly with regard to fibre formation
- \* unimpaired usability (perfect operating condition) of the mechanical equipment, and in particular of the measuring equipment.

The consultant therefore suggests the following urgent measures:

- a) The staff involved in the manufacture of paper and cardboard must be instructed how to use the existing installations and raw materials effectively

with the aim of producing base paper and cardboard of satisfactory quality. They must also be helped to pinpoint, plan and implement any changes (improvements) that may be necessary. To this end, a qualified expert should be sent to DALAMAN for about three months (which it would be expedient to divide into a two month stay, followed by a one month stay after the implementation of alterations to production equipment). This expert should have particular knowledge of the applications of types of pulp with short fibres (hardwood pulp) and have experience in the manufacture of base paper and cardboard.

- b) The LIPPKE company should be asked to send another specialist out who would be able to put the measuring and control equipment in the paper and coating machines into operation, including adjustment and calibration. However, above all he should be able to instruct the staff of the maintenance department on the maintenance, servicing and repair of these measuring and control devices.

Once the above-mentioned recommendations have been carried out, it would be expedient to send out a coating expert again. By this time the necessary conditions should have been fulfilled to make it possible to implement the following measures, all of which will doubtless still be necessary:

- \* optimise the coating colour formulations
- \* improve the quality of the coated products
- \* adapt the product properties to market requirements
- \* intensify the use of domestic raw coating materials.



