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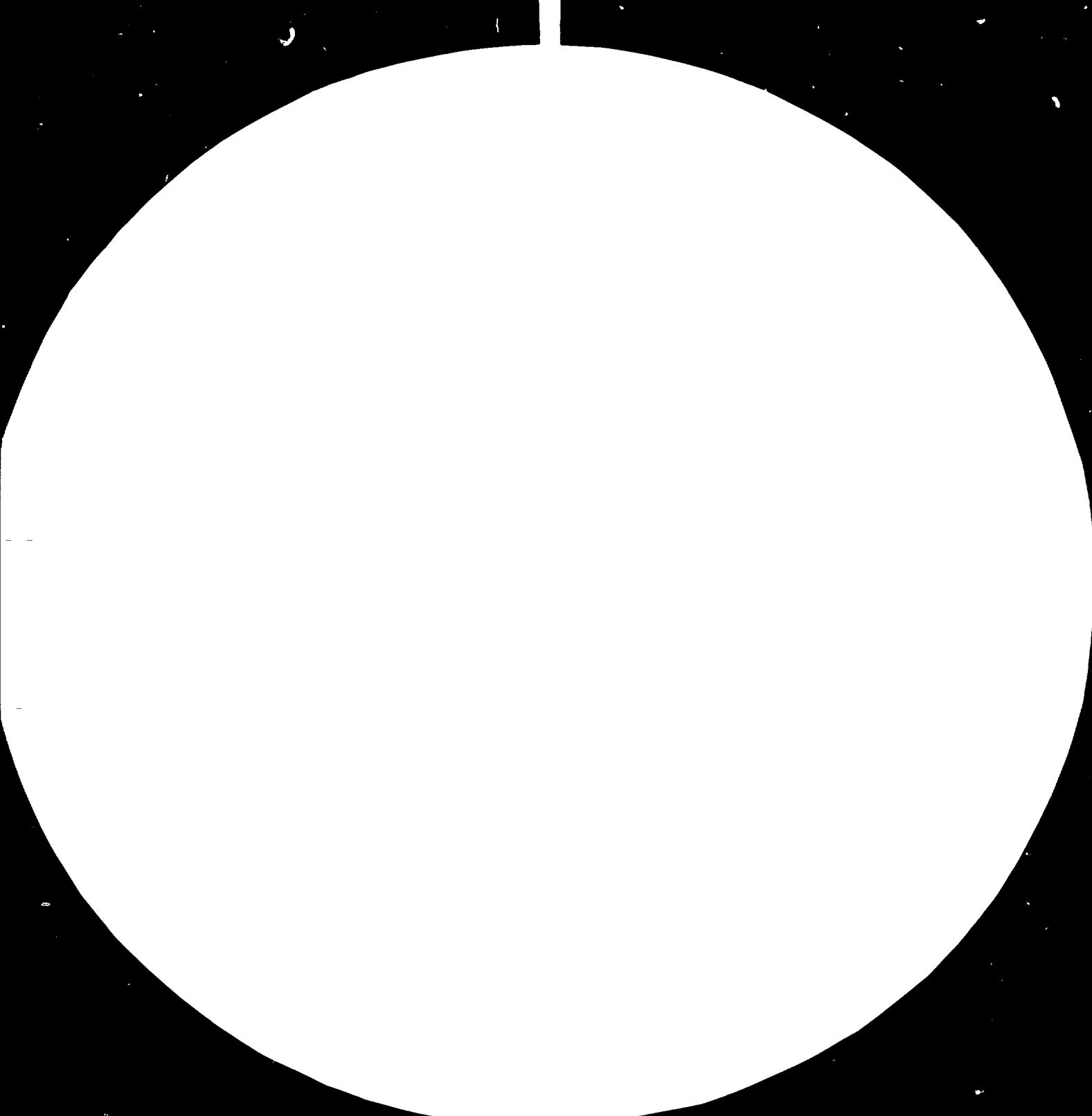

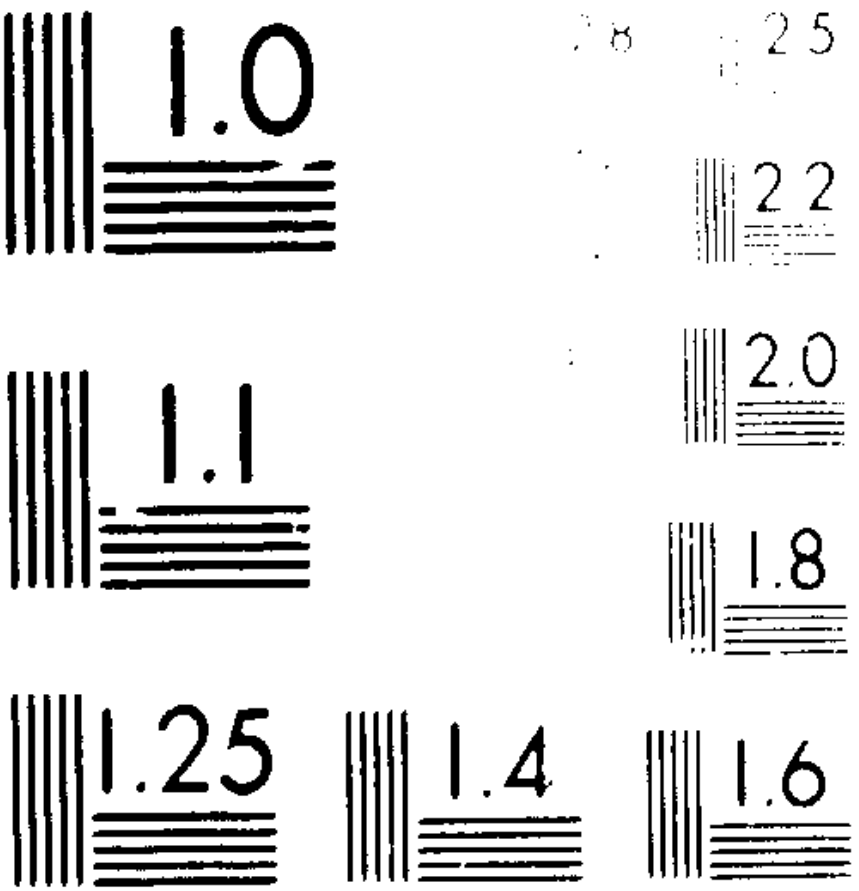
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12 November 1981

Republic of Korea.

DYEING AND FINISHING OF POLYNOSIC RAYON, POLYESTER AND FLAX */

DP/ROK/72/023

Terminal Report

Prepared for the Government of the Republic of Korea by the
United Nations Industrial Development Organization,
executing agency for the United Nations
Development Programme

Based on the work of Osamu Yamamoto,
expert in dyeing and finishing of textiles

United Nations Industrial Development Organization
Vienna

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ABSTRACT

1. Technical fields in which assistance was supplied:

   The dyeing and finishing of the woven fabrics of "Nylon" and cotton, and the knitted fabrics of cotton, PES/cotton, acryl, acryl/cotton, acryl/wool, acryl/polyester and Nylon/spandex, and dyeing of acryl-yarns.

2. Purpose of Project:
   To assist small- and medium-sized manufacturers to improve productivity, production processes and product quality, primarily of products with export potential.

3. Duration: 17 August - 20 November 1981

4. Number of manufacturers assisted: 6 companies

5. Main and common problems faced by the manufacturing companies:

   a) Uneven dyeing by jigger dyeing machines;
   b) The difference in dyeing shades between production-lots;
   c) The creases on fabrics.

6. The causes of the problems were pointed out and some problems among them were solved.

7. Main conclusions and recommendations:

   The Seminars for the makers of dyestuffs, chemicals, textile machinery should be held often in order to improve the present technological level of small- and medium-sized textile dyeing mills.

CONTENTS

INTRODUCTION

The project aimed at assisting small- and medium-sized manufacturers lacking the technological base and the resources to develop and adapt modern manufacturing processes which would allow them to be competitive on the international market.

The Korea Trade Promotion Corporation (KOTRA), supervised by the Ministry of Commerce and Industry (MCI) is responsible for implementing the country's export promotion drive and maintains a network of branch offices overseas.

In specific product areas selected by KOTRA on the basis of their export potential, short-term specialists provide direct assistance to individual manufacturers to improve product design, plant efficiency and productivity, production methods and product quality.

Direct assistance to six individual manufacturer-dyers was supplied for about ten days each under a schedule worked out by KOTRA. Three persons from KOTRA acted as interpreters.

The six commission dyers were as follows:

- KEH LIM DYEING CO.
- SUNG CHANG TEXTILE CO.
- SAM WOO SPECIAL WEAVING AND DYEING CO.
- WOO IL TEXTILES LTD.
- WOO SUNG DYEING INDUSTRIES CO.
- HEUNG IL DYEING AND WEAVING CO.

A brief description of the individual manufacturers is given in the annexes.

The original technical fields in which assistance was supplied were the dyeing and finishing of polynosic rayon staple fibres, polyester (PES) and flax (blend slub, nep yarn).

But in Korea, KOTRA requested the expert to supply assistance for the dyeing and finishing processes for the woven fabrics of "Nylon" and cotton, the knitted fabrics of cotton, PES/cotton, acryl, acryl/cotton, acryl/wool, acryl/PES and Nylon/spandex, and dyeing of acryl-yarns.

"The problems to be solved" at the six manufacturers concerned various kinds of fibres, woven fabrics, knitted fabrics and yarns.

The main and common problems were as follows:

1) uneven dyeing by jigger,
2) the difference in dyeing shades between laboratory and factory,
3) the difference in dyeing shades among production-lots, and
4) creases on fabrics.

The Seminars on these problems were held in Pusan and Seoul.

The employers and the employees in the six mills visited were eagerly making efforts to improve the quality of their products and to reduce their cost of production in spite of old or inadequate facilities, and they were burning with ambition to export.

FINDINGS

1) "Nylon" oxford fabrics had been dyed in the following way:
   a) Nylon threads (the shrinkage-ratio in dyeing condition: 9%) and normal sewing machine threads were used for jointing fabrics on jigger dyeing.
   b) The length of leading cloth was about 1 - 2 m only.
   c) All jiggers for "Nylon" dyeing were unreasonable gears system and some of them were in bad state of maintenance. As an example, some rollers on jiggers did not revolve due to broken bushes. So, the fabric run on the jiggers had excess tension and rubbing.

These conditions produced the following defects in the finished Nylon fabrics:

a) creases;

b) uneven-dyeing: ending, listing, streakiness, uneven dyeing on selvages.

2) Cotton canvas with starch were dyed without desizing. Cotton canvas with starch and without starch were jointed and dyed on jiggers. They produced uneven dyeing and different shades in the same lot.

3) The inspection of fabrics was most of the time not carried out at the mills visited.

a) As a result, it was very difficult to make out if some defects in finished fabrics were the result of defects in grey fabrics (in such a case, the responsibility is that of orderer or weaving factory), or from faulty processing in dyeing mills (the responsibility would be of the dyer). In such cases, dyers are very often obliged to pay for certain defects after unnecessary quarrels with orderers.

b) When defects resulted from faulty dyeing, it was often not clear at which stage in processing they were caused, because of lack of inspection of fabrics.

4) Jigger dyeing machines were mostly gears system types with strong tension and moreover some jiggers were inadequately maintained.

In consequence, "Nylon" fabrics had creases, streakiness, listing and selvages-uneven dyeing, and cotton canvas had listing, selvages-uneven dyeing and insufficient penetration of dyestuff.

5) The relaxings for some texturized fabrics after knitting (or weaving) and some stretch fabrics ("Nylon"/spandex, knitted) were not enough.

As a result, the final finished products had creases with uneven-dyeings.

6) The keeping for synthetic filament fabrics, especially textized fabrics, was not so reasonable. Therefore, the finished goods had creases on the fabrics at random which reduced its commercial value.

7) In kier processing of cotton circular knitted goods, the grey fabrics were directly piled into kier in rope form. So, the final finished goods had in around wale direction creases, that also reduced its commercial value.

8) It seemed that the water used for dyeing was not controlled. Some of the faults in dyeing probably resulted from the water used, for example, uneven-dyeing by vat-dyestuffs.

9) In some factories, the colour matchings were done in between samples from orderers and dyeings on jiggers.
As a result, the shades of the fabrics changed after tentering or resin finishing.

10) In every factory visited, it seemed that pattern-cards and technical information by makers of dyestuffs, auxiliary chemicals and fibres and the necessary technical literature for dyeing and finishing were not sufficient.

RECOMMENDATIONS

Name of manufacturers:

KEH LIM DYEING CO ..... (A)
SUNG CHANG TEXTILE CO. ..... (B)
SAM WOO SPECIAL WEAVING AND DYEING CO. ..... (C)
WOO IL TEXTILES LTD. ..... (D)
WOO SUNG DYEING INDUSTRIES CO. ..... (E)
HEUNG IL DYEING AND WEAVING CO. ..... (F)

1. Polyester sewing thread by over-lock machine for preventing creases on "Nylon" oxford fabrics. (A, B, C, D)

2. The longer the leading cloth,the better for preventing "ending" that is of uneven dyeing. (A,B,C)

3. Tensionless jigger, as an example DC-driving-system jigger for preventing streakiness on dyed Nylon fabrics, listing and insufficient penetration dyeing for "Nylon" and cotton. (A,B,C)

4. A levelling agent consisting of agents of weak cationic and anionic for "Nylon" dyeing. (A,B,C,D)

5. Inspection of grey fabrics including check of starch for the following reasons:

   a) avoiding uneven dyeing
   b) getting same shades at the jointing parts of fabrics in one lot
   c) early finding of the faults during processing
   d) improving quality
   e) avoiding quarrel with orderer and unnecessarily paying orderer on account of certain defects on finished fabrics (A,B. C, D, E, F)

6. Relaxing and relaxer for getting high quality of polyester texturized fabrics and Nylon/spandex stretch fabrics. (D)

7. In kier-processing of cotton knitted goods, a wet processing before piling of grey cotton knitted goods, for preventing creases on final finished goods. (A, E, F)

8. How to keep grey synthetic filament fabrics especially texturized fabrics after weaving till dyeing for avoiding creases. (A, B C, D)

9. Checking water used for dyeing, for avoiding unexpected uneven-dyeing (A, B, E, F)

10. Colour-matching should be done after tentering or after resin finishing and should not be done after dyeing on jigger, to avoid changes in colour. (A, B, C)

11. Increase contact and discussions with dyestuff-makers, auxiliary chemical makers, fibre-ma and textile machinery makers, for improving the techniques of processing. (A, B, C, D, E, F)

ANNEX 1

Name of Company:	KEH LIM DYEING TEXTILE CO.
Date:	20 August - 30 August 1981
Spoken to:	Mr. B. N. Park, President Mr. Kwak, Managing Director Mr. Lee, Production Manager
Interpreter:	Mr. Tae Kon Kim (KOTRA)
Production:	"Nylon" ..... 600,000 m/month Cotton ..... 900,000 m/month
Main Machinery:	Jiggers ..... 25 Mercerizing machine (slack) ..... 1 Kier ..... 2 Tenter (pin and crip) 2
Employees:	120

The company is engaged in dyeing and finishing of "Nylon" and cotton under the local L/C for the makers of shoes and bags meant for export. The material is mainly cotton canvas and "Nylon" oxford of filaments-denier of 150,210 and 420.

The employers and the employees are of one mind and are eagerly making efforts to improve quality.

If the company gets some additional equipments for its production, it seems that it can rightaway produce good textiles and can directly export them.

ANNEX 2

Name of Company: SUNG CHANG TEXTILES CO.

Date: 31 August - 9 September 1981

Spoken to: Mr. J. Y. Kwon, President
Mr. Chon, Manager of Dyeing
Mr. Kim, Ass. Manager of Dyeing
Mr. J. S. Kim, Director, Kukje Corporation

Interpreters: Mr. Tae Joon Yoo (KOTRA)
Mr. Tae Kon Kim (KOTRA)

Production:

Cotton fabrics (dyed)	350,000	yards/month
"Nylon" fabrics (dyed)	450,000	-"-
Cotton fabrics (bleached) ...	500,000	-"-
Acryl yarn	60,000	kg
Acryl fibres	60,000	kg
Knitted cotton fibres ...	40,000	kg

Machinery:

Jigger 49 (closed jigger 19)	
Package dyeing m/c	20
Sprey yarn dyeing m/c	4
Winch	4
Rope washing m/c	6
Kier	5

Employees in Dyeing Department: 80

The company is producing the textiles for sports-shoes, high pile goods for toy, and Boa as the subsidiary of KUKJE Corporation, that is one of the biggest groups in Korea.

Cotton canvas (400-560g/yard) and "Nylon" oxford (150, 210 and 420 denier) are dyed and finished in the mills and then they are used for sport-shades in KUKJE Corporation. The shoes are exported to the USA and European countries.

ANNEX 3

Name of Company: SAM WOO SPECIAL W and D CO.

Date: 17 September - 28 September 1981

Spoken to: Mr. SEON KWEON WANG, President

Interpreter: Mr. DAE SOCK KIM (KOTRA)

Production: Weaving (cotton) .....100,000 yards/month
Dyeing (cotton, "Nylon") .... 1,200,000 yards/month

Machinery: Looms 54
Jigger 23 (closed jiggers 2)
Pin-tenter 1
Rais ng machines 5

The products are used for sport-shoes. In spite of old machines, they are producing good quality textiles including the fancy goods with special techniques.

Mr. Wang is the president of the company and also a technician. Therefore, the discussions were very interesting.

Commission dyeing fee:

1. "Nylon"

WON 70/60g/vard
WON 100/100g/yard
WON 180/300g/yard

2. Cotton

direct dues WON 60/230g/yard
sulphur dyes WON90/230g/yard
vat dyes WON 260/230g/yard

Commission finishing fee (melamine):

WON 25/100g/yard

ANNEX 4

Name of Company:	WOO IL TEXTILES LTD.
Date:	30 September - 10 October 1981
Spoken to:	Mr. OK KYUN CHOI, President
Interpreter:	Mr. TAE JOON YOO (KOTRA)
Productions:	Knitted goods (circular and tricot) 250 tons/30 days x 24 hrs.
Employees:	160
Machinery:	Jet dyeing m/c 7 (double tubes) Beam dyeing m/c 1 Heat-setter 2 Raizing m/c 4 Cutter for circular knitted goods 1

Mr. CHOI, the president of the company, was until 1974 the technical director of SUNKYONG LIMITED, which is one of the biggest textile companies in Korea. So, the technical discussions went off smoothly. According to Mr. CHOI, the textile surface finishing techniques used by his company were No. 1 in Korea. The products are exported to Japan (200 tons/month) and Europe.

ANNEX 5

Name of Company: WOO SUNG DYEING IND. CO.

Date: 16 October - 26 October 1981

Spoken to: Mr. JAE NAM KOO, President
Mr. KYU MYUNG CHO, Managing Director
Mr. W. C. KIM, Factory Manager
Mr. SHIN, Manager

Interpreter: Mr. TAE KON KIM (KOTRA)

Productions: Knitted fabrics of cotton, PES/cotton, acryl/cotton, acryl/PES, acryl/wool, acryl... 7.5 ton/day x 24 hrs.

Machinery:

Jet dyeing m/c	6
Winch	11
Suction drum dyer	1
Heat-setter (circular)	2
Tenter (circular)	1

The company is eagerly making efforts to improve quality and processing. Therefore, their products are of very high quality, and are exported to Europe via trading companies.

ANNEX 6

Name of Company:	HEUNG IL DYEING CO.
Date:	27 October - 5 November 1981
Spoken to.	Mr. H. T. LEE. President Mr. M. A. CHUNG. Managing Director Mr. C. H. LEE. Factory Manager Mr. S. C. PARK. Manager
Interpreter:	Mr. TAE KON KIM (KOTRA)
Production:	Dyed yarns. Acryl 30,000 lbs/day x 24 hrs. PES/cotton 2,000/day x 24 hrs. PES/acryl, acryl/silk, spun polyester
Employees:	200
Machinery:	Package dyeing m/c Sprey hank dyeing m/c Winch Jet dyeing m/c Kier 2 Heatsetter (circular) 3 Calender (circular) 1 Suction drum dryer 1

ANNEX 7

- Job Description: DP/ROK/72/023/11-01/Y/31.3.M.

- Name and function of project counterpart:

  The Government of the Republic of Korea

- Assignment: 17 August - 20 November 1981

- Technical Seminars:

  1. 18 November 1981, at Pusan
  2. 19 November 1981, at Seoul

ANNEX

THE DYEING AND FINISHING OF TEXTILES

DP/ROK/72/023

Seminars held in :

a) Pusan, on 18 November 1981

b) Seoul, on 19 November 1981

by :

Osamu Yamamoto

United Nations Industrial Development Organization (UNIDO)
Vienna

CONTENTS

SUMMARY

I. The main and common problem in six companies assisted were as follows:

1. Uneven dyeing by jigger
2. Importance of inspection of fabrics
3. Different dyeing shades between laboratory and factory, and different dyeing shades among production-lots
4. Creases on fabrics

II. I feel that the employers and employees in the companies I visited are full of ambition under the excellent government policy for the textile dyeing industry. A seminar should be held urgently and often at each industrial district for:

- dyestuffs makers
- auxiliary chemical makers
- fibres makers
- textile machinery makers
- specialists on industrial water and drainage

INTRODUCTION

I am very much obliged to the Korean Government, the Korean Trade Promotion Corporation (KOTRA), the United Nations Industrial Development Organization (UNIDO) and companies that requested technical assistance.

The purpose of project was to assist small- and medium-sized manufacturers to improve productivity, production processes and product quality, primarily for products with export potential.

I am afraid that my visit to each factory was not very effective for this purpose, because the time for assisting each individually was about ten days only, and my preparations for each factory were not enough due to the sudden change in the technical fields to be assisted.

In six factories in Pusan and Seoul, I found that the employers and the employees were of one mind and eagerly making effort to improve the quality and to reduce the costs in spite of old or inadequate facilities.

According to the recent economic news, the achievement of the Korean export-target of textiles this year, of $5,750 million, is just around the corner. Here let me congratulate you on the success.

The present situation of textile industry in the world is indeed very severe. We know the textile industry has been facing the following serious problems:

- rising wages of personnel and rising prices of raw material and machinery;
- increase of countries exporting textiles;
- import-control with quota system by importing countries;
- consumers' preference for fashionable goods of high quality, and also their desire for lower prices.

For over-coming part of these problems, fibre-makers, spinning enterprises, apparel-makers and trading companies have been concentrating on making the textile product-differentiation. Consequently, different types of textile material have been brought to commission dyers and ordered to be finished as commercial goods. Then the orderer-sides demand one-sidedly the commission dyers to dye and finish perfectly - in the work of GOD - the raw textile material with complicated or delicate constructions in limited and short delivery terms.

It needs careful and fine techniques to dye and finish even simple textile goods of single kind of fibres as the commercial goods in present market-situation. Therefore, with the processing of textile blends or mixture of various fibres with different characters, dyers in every country have no end to their problems. And so, modern dyers are obliged to study well the mechanism of machinery, the physical-chemistry of various kinds of fibres, dyestuffs, auxiliary chemicals and the interactions among them during processing.

For surviving, employers and their employees are compelled to make desperate efforts at each enterprise. The efforts are, for example, for making product-differentiation, saving energy and labour.

Generally speaking, small- and medium-sized manufacturers do not have enough facilities such as requisite machinery for production and testing, technical data and accumulated know-how.

The Korean Government's policy towards textile dyeing industry, that was announced officially on 19 March 1981, is very adequate and understanding, therefore, we can say the Korean textile dyeing industry is the most fortunate in the world.

Since the middle of August, under the KOTRA and the UNIDO, I had the chance to discuss the present technical problems at six companies. Among them, three companies are the dyers of mainly "Nylon" and cotton for sports-shoes makers in Pusan and another three are the dyers for knitted fabrics of mainly cotton, "Nylon", acryl, polyester, wool, spandex and their blends or unions in Seoul.

Here let me report to you about the main and common problems that were discussed at each factory.

UNEVEN DYEING BY JIGGER

"Nylon" oxford and cotton canvas are dyed on jiggers in Pusan. As jigger dyeing machines are relatively cheap, and quite convenient for some processing, they have been used at dyeing mills.

But uneven dyeing by jigger, especially "endings", are fatal faults of jigger-dyeing and they have not yet been solved even though recently jiggers, dyestuff and auxiliary chemicals have been improved.

We know there are other uneven dyeings by jigger, such as listing, uneven dyeings on selvages of fabrics, uneven dyeings in warp direction form creases, stripes (streaks), moire on fabrics and so on.

Countermeasures:

I think you should take individually measures against uneven dyeing.

The discussion was as follows:

1. First of all, the technical information on the dyestuff to be used must be read thouroughly. Don't hesitate to ask the dyestuff-makers on how to use the dyestuff and their colour-matching.
2. The inspection of grey fabrics.
   Before dyeing, naturally it is necessary to know well the condition of grey fabrics.
3. Non-shrinkable sewing thread must be used for jointing fabrics.
   For example, thread of polyester or polyester/cotton.
4. The sewing for jointing fabrics must be aligned along the weft of fabrics by over-lock machine.
5. Jigger with covers should be used for keeping planned temperature.
6. Tensionless jigger should be used.
   As an example, DC-driving system jigger. The bearings and bushes for the roller on jigger must be often checked and be well maintained for avoiding excess tension for running fabrics on jigger. The creaking rollers on jigger from broken bushes are out, especially for "Nylon" dyeing.
7. Leading cloth the longer, the better.
8. Desizing and scouring (mercerizing) must be even and enough.
   The following scouring solutions of cotton for jigger are used.

Ex. 1

Soda ash	0.5 - 1.0 % o.w.f.
Caustic soda	2.0 - 1.5
Turkey red oil	0.5 - 1.0
Liquor ratio	1 : 4

Ex. 2

Caustic soda	3.0 % o.w.f.
Nonionic detergent	0.3 %
Liquor ratio	1 : 4

For thick cotton fabrics, scouring is repeated.
"Under-jigger" with covers is suitable for desizing and scouring for thick cotton fabrics. And it is also used for dyeing by vat and sulphur dyestuffs.

9. Naturally, "water for dyeing" should be used and especially the existence of metal ions in the water must be avoided.

10. The selvages of fabrics during processings on jigger must be aligned.

11. The dyestuffs with similar character should be used when the mixing of dyestuffs is necessary.

12. Dyestuffs and salts should be added alternately.

INSPECTION OF FABRICS

Inspection usually takes place on receiving, at intermediate process and final. We must know that inspection is very important for production and quality control.

Even if the grey fabrics with defects are dyed and finished by expensive dyestuffs, chemicals and machinery, naturally, high quality commercial goods cannot be produced.

Intermediate inspection is effective for early discovery of the condition and the faults during processing.

And final inspection is useful for improving the technical level, for preventing claims arising on account of quality from orderers and for maintaining credit among orderers and consumers.

But the inspection works are omitted or infrequent in factories. Such omission or short-cut is the cause of quarrel or unnecessary payments for orderers and also has negative effect on efforts to improve quality in the factories.

The importance of the inspection of fabrics of cotton, "Nylon" and texturized polyester including on storage and transportation of grey fabrics after weaving was discussed at each factory.

- DIFFERENT DYEING SHADES BETWEEN LABORATORY AND FACTORY

- DIFFERENT DYEING SHADES AMONG PRODUCTION-LOTS

How to make the production shades approach the laboratory dyeing shades ?

How to make the dyeing shades among lots similar ?

It is indeed very difficult to handle the above-mentioned matters.

Dyers have to solve the problems, because redyeing uses lots of energy and the delivery date is fixed.

The following ways have been usedfor these purposes by dyeing technicians.

1. First of all, check the water to be used.
   One must use "the water for dyeing".
   The water for industrial dyeing is usually as follows:

Total hardness	0-30
SiO_2	15-20
Bicarbonate	0
pH	6.5-7.4
Iron	0.05
Mn	0.05

./.

Ca	3
Mg	0.5-1.0
Al	0.5-1.0

Chlorine and organic materials in water are usually removed by active carbon.

2. Purchasing of dyestuffs and chemicals in large lot and checking their concentrations periodically.

3. Controlling the temperature and the humidity in storage house for dyestuff and chemicals.

4. Checking of net weight of the textile materials to be dyed. Be careful about moisture, especially for natural fibres and acryl against wetness during storage.

5. Use precision balance (weighing machine) for correct weighing.

6. Dyestuffs and chemicals must be solved by hot (warm) water in vessel.
Naturally, direct steam-pipe must not be used for the solving of dyestuffs and chemicals.

7. Indirect steam must be used for raising temperature on dyeing.

8. The condition of dyeing in between laboratory and production, or in among production-lots, must be the same. The conditions of dyeing are weights of dyestuffs and chemicals, rising temperature, dyeing time, pH and liquor ration, etc.

9. The dyestuffs with similar dyeing-character should be used when their mixings are necessary.

10. Materials to be dyed should be prepared in similar conditions such as desizing, scouring, mercerizing, bleaching, drying etc. In this case, continuous pretreatments are very useful for this purpose.

Even if we follow the above-mentioned ways, in fact, it is very difficult to get the same shades.

As one of reasons, so far it has been very difficult to get the laboratory machinery with same conditions as production machinery.

Laboratory machinery must be improved in parallel with production machinery for avoiding the need for re-dyeing.

CREASES ON FABRICS

The factories that I visited had the problems of creases on "Nylon" filament, woven fabrics and cotton circular knitted goods.

The creases on fabrics during processing at dyeing mills are one of the biggest defects for commercial goods, while the processings that add technically the creases onto fabrics have been increasingly held for making commercial goods with non-competitive prices.

1. Prevention of creases on fabrics

I think you know well the countermeasures for avoiding or mending the creases. Let me mention on the creases as I talked on them at each factory in Pusan and Seoul.

a) Fabrics of "Nylon" filament and texturized polyester

(1) After weaving, immediately the grey fabrics (woven or knitted) must be carefully rolled-up and covered by polyethylene sheets.
Then the operator should put on "Nylon" gloves for this work in order to avoid the fabrics-damage by nail-clawing, if possible.
After weaving, the grey fabrics should not be heaped up for storage or for long transportation to dyeing place.

(2) After weaving, if the fabrics, especially texturized fabrics, are steamed with vibrations in free tension, they will be quite stable for stress or deforming force.

(3) In dyeing mills, before processing, the grey fabrics should be checked for creases including other defects as part of inspection process.

(4) Fabrics should be relaxed, if possible.
(texturized fabrics)

(5) The sewing for jointing fabrics must be aligned along the weft or the course of fabrics without deforming the sewing part by over-lock machine.
Thread of polyester of polyester/cotton should be used for sewing.
The same cloths as the fabrics to be dyed should be used for leading cloths of jigger dyeing (as an example, for Nylon dyeing).

(6) Tensionless-jigger, as an example, DC-driving system jigger, should be used for "Nylon" oxford fabrics.

(7) Of course, pre-heatsetting is effective for the purpose.

(8) For the dyeing of texturized polyester fabrics, of course, reasonable circular - or jet - dyeing machines are used.

(9) After dyeing, the fabrics especially texturized fabrics are usually dryed on drum dryer or short-loop dryer with vacuum hydro-extractor, and then finished in usual ways on each synthetic fabrics.

b) Cotton fabrics (mainly circular knitted fabrics)

In case of kier-bleaching of cotton fabrics, grey cotton fabrics-circular botton knitted fabrics- were directly piled into kier. After bleaching, the creases clearly remained on the final finished fabrics. These creases on the finished goods bring the commercial value down.
If the fabrics are treated in wet condition before piling into kier (as an example, at 80-90°C, with 1g/ℓ penetrating agent, on relaxer, washing machine or winch) the creases on finished fabrics can be remarkably reduced.

2. Creases-finishing

Various kinds of fancy fabrics with technical-creases have been produced as commercial goods by using the characters of grey fabrics.
If grey fabrics are deformed without heatsetting (for synthetic fabrics) or without wet processing (for cotton, silk, rayon, linen, etc.) the deformed patterns (as an example, creases) on fabrics can be fixed.

In the case of synthetic fabrics (example polyester), furthermore the heatsetting is done in the deformed patterns. Then the patterns (creases) are fixed in solid state.

OTHERS

On the following matters, the questions were answered:

1. The colour-changes of dyed fabrics by rubber-vulcanization.
2. The changing shades of dyed fabrics by jigger after tentering.
3. The rubber fastness of Naphtol dyeing.
4. Winch dyeing by sulphur and Vat dyestuffs.
5. Dyeings of acryl/cotton, acryl/wool, acryl/polyester, "Nylon"/ spandex, acryl etc.
6. On mercerized cotton knitted fabrics.

On these matters, as the best way, it was strongly recommended to read and study the technical information by dyestuff-makers, chemicals-makers and fibre-makers, and also to positively discuss with the technicians of these companies and textile machinery makers.