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TEXTILE DYEING AND FINISHING INDUSTRY SERVICE CENTRE

DP/ROK/82/027

REPUBLIC OF KOREA

Technical report: The textile dyeing and finishing  
research centre (TDFRC)\*  
second mission

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

Based on the work of Ahmed Hassan  
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## INTRODUCTION

This report covers the activities of the dyeing and finishing consultant during his second month mission to UNIDO executed Project DP/ROK/82/027. The objectives of the mission is to assist in the establishment of a Dyeing and Finishing Research Centre (TDFRC) at the Korean Research Institute of Chemical Technology (KRICT).

The main objective of the Centre is to assist and guide the development of the textile finishing industry through the introduction of advanced production methods, lead the Research and Development activities towards achieving improved quality and consequently growth in Korea's textile exports.

A recent study on the volume of textile exports shows that internationally, Korea has emerged as one of the major textile exporters after Italy and West Germany (Annex I). From the beginning of year 1987 up to 11 November it has already achieved US \$ 10 billion in exports. Out of which finished textile goods amounted to US \$ 6.4 billion. By the end of the year, exports are expected to reach US \$ 11.8 billion.

It can be seen that Korean textile industry have and expect to play a leading role in the development of the national economy. However technical assistance to the dyeing and finishing industry, especially to the smaller companies, is essential for staying competitive in order to maintain the

existing market share and increase the value of textile exports. The TDFRC project can play an important role towards achieving this aim. With proper equipments and sufficiently trained staff, the Centre can become an important asset of Korea's textile industry.

During our present mission my work was mainly confined to training activities as well as studying future plans for carrying Research and Development activities. Due to shortage of time it was not possible to carry out any mill visits in order to discuss and try to solve mill problems.

I wish to express my thanks to Dr. CHAE, the President, and the Management of KRICT who assisted the expert assignment. My special appreciation is extended to the Project Director, Dr. OH for her cooperation and providing every possible support to make my mission successful.

In the following, a review of the existing conditions and the expert's activities during the present assignment are outlined.

## O B S E R V A T I O N S

### A - The Centre's Laboratories:

The Management of KRICT is actively supporting the project in every way to achieve its progress. From the time of our previous mission, 160 m<sup>2</sup> more laboratory space has been availed to accommodate the new equipment. All the equipment ordered by UNIDO has been received and installed. Some other equipment has also been purchased from the Government funds and added to the laboratories. Annex II gives the available equipment at the Centre. This includes those already supplied by UNIDO, also others available for use and present in other laboratories of KRICT.

At present the equipment are accommodated in three laboratories as follows:

- A - Application laboratory
- B - Testing and evaluation laboratory
- C - Chemical analyses laboratory

It has been observed that although sufficient space is available for the existing equipment, the compatibility of the equipment in the Testing laboratory needs re-arrangement. Wet and heat generating equipment are kept together with others requiring constant environment. On the other hand the equipment in the Application laboratory looks also rather crowded allowing little space for its proper operation.

It is fortunate that the existing problem of shortage for the laboratories is in its way to be solved. The management of KRICT has already started a plan to establish new buildings to accommodate expansions in KRICT activities.

The plan includes availing new premises amounting to 1000 m<sup>2</sup> area for the TDFRC project. On 11th November 1987 I was invited and pleased to attend the ceremony for laying of the foundations for the new buildings. After completing the new buildings there will be ample space to accommodate and expand the activities of the Project.

## 2. Training of the Centre's Staff:

Six UNIDO fellowships for training of the staff members has already been completed. Three staff members Mr. Jongil Shon, Mr. Dong Man Kim and Mr. Il-Gon Suk spent six weeks at the Shirley Institute in UK and three weeks at Ciba-Geigy, Switzerland. They also visited ICI laboratories and machinery makers Roaches, Sir James Farmer Norton and Mather and Platt companies. Other three staff members Mr. Young Suk Kim, Mr. Jung Hwan Mo and Mr. Hee Moon Park went for six weeks in USA. They had their training at Applied colour system Inc. (colour measurement), Analect Instruments (FTIR spectroscopy), Gaston country (dyeing machinery), Sandoz, ICI and the North Carolina Vocational Textile School. From discussions with the participants it appears that their training was quite useful but time was short. It was also a good arrangement that each group of three trainees were attending together as this helped in language facilities. However it may have been better for the candidates before proceeding abroad to have the opportunity to train at local Dyeing/Finishing companies and testing institutes.

In order to provide a more fundamental knowledge of the dyeing and finishing technology and in continuation to the lecture programme held previously by Dr. Erik Kissa, it was agreed with the Project Director to

continue such training for the Centre's staff.

During my mission some 24 hours lecture programme was given. This dealt mainly with application aspects in preparation, bleaching, dyeing and printing of cotton and cotton/polyester blends. Different techniques, machinery and production problems were explained and the latest advancements in production techniques and machinery were indicated. The lectures were translated into Korean by Dr. OH. All the centre's staff attended and shown a keen interest to learn more about production and its problems.

Training on the use of the new equipment received by the Centre has started and some of the staff are now acquainted with its use. However further training is needed in the field of testing and evaluation. As this needs more time it was not possible for the expert to carry on with training on test procedures. It was agreed with the Project Director to have two or three persons from the staff trained at Korea Yarn and Fabric Inspection Testing Institute (FITI) laboratories in Seoul. An alternative arrangement would be to have one of FITI technical staff to give the necessary training at the Centre's laboratories. In this case it will be possible to have more of the staff trained.

### 3. The TDFRC and the Textile Industry:

The Centre's contact with the industry is already established and expected to grow when the stage of the actual study and solving mill problems is started. The Project Director is active in this aspect and making weekly visits to the mills. Some of the topics for carrying Research and Development activities has been identified and plans are underway for its study.



Examples of these are:

- Cost reduction in pre-treatment process.
- Optimum conditions for the application of pad-batch dyeing.
- Problems in discharge and resist printing.
- High quality finish for polyester fabrics to be used in car seat covers.

During our mission the Ministry of Science and Technology arranged a seminar at the Industrial Technology Centre of Daegu. Two lectures were presented at this seminar. The first lecture was given by Dr. OH on the topic of " Present and future of the Dyeing and Finishing Technology with Special Reference to Research and Development activities ". I presented the second lecture " Textile Finishing Machinery at ITMA/1987 and Some Ideas on Cost Reduction ". Forty five participants, mostly plant managers and members of the Association of Dyers and Colourists, Daegu area, attended. As some of the participants did not speak English, my lecture was translated to Korean by Dr. OH. Discussions following the lectures showed a lively interest in the information given during the seminar.

#### 4. Information Library:

From the time of our last mission several new additions of textile periodicals, books and product catalogues from dyestuff and chemical manufacturers has been added to the library. An information book in Korean covering the topics of Basics in Dyeing/Finishing, test methods and evaluation of dyestuffs, spot tests in a textile laboratory, has been published by the Centre and widely distributed. I would also request UNIDO to send a copy of UNIDO publications covering the textile field. This can be a valuable addition to the information library.

## RECOMMENDATIONS

1. Further training of the Centre's staff on use of the available testing equipment is needed.
2. As most of the Centre's staff do not have industrial experience training in the industry is required.
3. Keeping a close contact with the Industry by holding occasional discussions and seminars. During 1987 the Centre conducted four seminars in the field of Dyeing & Finishing. This is a good start and should continue in future.
4. To continue helping the Centre with technical assistance by UNIDO consultants until the Centre becomes capable to perform efficient Research and Development activities.
5. Consider adding new equipment needed to complete the existing laboratory facilities. Such equipment are listed in Annex III. This can be added after availing enough space, probably when the new premises for the Centre are completed.

# BUSINESS

(第三版) (星期四)

THURSDAY, NOVEMBER 12, 1987

## Textile Exports Break Magic \$10 Bil Barrier

Korean textile exports surpassed the \$10 billion mark yesterday, an unprecedented feat for a single industry here.

The cracking of the \$10 billion barrier by textile exports recalls the memory that total Korean merchandise exports broke the same figure only 10 years ago in 1977.

By the end of the year, Korean textile exports are expected to reach \$11.8 billion, according to the Trade-Industry Ministry.

As of yesterday, Korean textile exports for this year represented a 36 percent increase over the comparable period last year.

By item, finished textile goods soared by 39 percent to \$6.1 billion, the ministry statistics show.

Fabrics and yarn, according to the ministry tally, soared 34 percent and 17 percent in exports, reaching \$2.0 billion and \$300 million as of yesterday.

By region and country, Korean exports to the United States increased by 21

percent to \$3.1 billion.

Korean textile exports to Japan and the European Community jumped by 70 percent and 49 percent, to \$1.9 billion and \$1.7 billion, respectively.

Only two nations — Italy and West Germany, recorded more than \$10 billion worth of textile exports last year.

Within the country, the textile industry has played an important role increasing jobs. According to the statistics at the Economic Planning Board (EPB), the Korean textile industry accounted for 20.7 percent of the nation's total employment in 1985 and 19.7 percent last year.

Breaking down the textile industries' place in the total industrial economy last year, textile production accounted for 12.7 percent of the production of the total manufacturing sector.

It can be seen that Korean textile industries have played a leading role in the development of the national economy and will maintain an important position in the nation's total industrial makeup in

### Korean Textile Exports

	1986	1987	Increase rate (%)	As of Nov. 11	Increase rate (%)
North America	3,328	4,026	21	3,480	21
-U.S.A.	2,964	3,586	21	3,100	21
Asia	2,381	3,672	54	3,030	54
-Japan	1,332	2,284	70	1,900	170
Hong Kong	612	778	52	656	62
Europe	1,835	2,452	50	2,060	50
-EC	1,360	2,026	49	1,700	149
Middle East	552	773	40	650	40
C. America	166	240	45	200	45
Oceania	157	212	35	170	36
Africa	216	257	19	210	19
Others	299	248	83	200	83
Total	8,734	11,860	35.9	10,000	36

the future.

Internationally, Korea has emerged as a major textile country as measured by its facilities and exports.

Chemical fibers and spinning facilities, as core parts of the textile industry are at high level: the former ranks 7th in the world, representing the production of 766,640 MT per year as of end of 1984, the latter ranks 9th in the world.

Above all, as Korean textile products are comparatively low priced and superior in quality, they have a good reputation in world markets. They have contributed greatly to the stabilization of clothing prices in advanced countries, such as the U.S., EC and Japan, and at the same time have also contributed greatly to the general improvement of clothing in those countries.

EQUIPMENT AT TDFRC'S LABORATORIES

A - Application Laboratory:

- 2-bowl laboratory paddler(Roaches Model BVAP-350)
- Laboratory steaming, curing and heat setting unit(Mathis Model DHE)
- High temperature dyeing unit/Laundry-C-meter  
(Atlas Electric Company Model L-PI)
- Dyeing apparatus for exhaust dyeing, adaptable to cone dyeing,  
microprocessor controlled(Ahiba Turbocolor)
- Laboratory flat-bed screen printing machine
- Laboratory print paste paddler

B - Testing Laboratory(Climatically controlled, dry area)

- Colour measurement system for color matching and color  
difference measurement, computer controlled(Applied Color System,  
Model 3100)
- Colour assessment cabinet
- Microtome for cutting cross-sections of dyeings
- Microscope, equipped with a 35mm camera
- Crockmeter rubbing fastness tester
- Crease recovery tester
- Abrasion tester
- Lightfastness tester(Atlas xenotester Model 450 LF)
- Scorch tester for testing fastness of dyeings to heat and  
sublimation
- Tensile strength tester

- .. Softness-stiffness tester
- Eppendorf repeater pipet, with 2.5 ml combitip, for oily soil application(Fisher Scientific Co.)
- .. Water repellency test equipment, spray type, AATCC specifications
- .. Perspirometer
- .. Flammability tester
- .. Electric resistance tester

C - Chemical Laboratory(Analyses and formulation)

- Refrigerator
- Centrifuge, IEC Clinical Model
- Scanning electron microscope
- Equipment for elemental analysis: C, H, N, S, Cl, Br, P, F (If water/oil repellent finishes are analysed), alkali metals, alkaline earth metals, Fe, Al, Also in trace quantities.
- Gas chromatograph
- High performance liquid chromatograph(HPLC) with ion chromatography capability
- Equipment for acid/base and redox titrations
- .. Spectrophotometer, UV/visible spectral range
- Infrared spectrophotometer(FTIR), Analect Model FX 6160
- Nuclear magnetic resonance(NMR) spectograph
- Mass spectrometer(GC/MS)
- Thin layer chromatography equipment
- A die, about 12mm diameter, and a plastic covered block, for cutting disks from dyed fabrics for analysis.

Electronic balance - 160 gm. range

Electronic balance - 1600 gm. range

Pipetters, 1 to 5 ml capacity, with disposable tips

Stirring hotplates

Oven dryer

Microwave dryer

Homomixer

Viscometer

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N.B: \* Equipment already present in other laboratories of KRICT

\*\* Equipment supplied by UNIDO

EQUIPMENT FOR FUTURE CONSIDERATION

Pilot Plant(Laboratory scale):

Jet dyeing machine

Automatic jigger

Winch dyeing machine

Foam generator

Pad- steam - thermosol range

Pressure steamer

Laboratory steam generator

Testing Equipments:

Pilling tester

Fabric handle evaluation tester