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ASSISTANCE TO THE TEXTILE LABORATORIES AND DESIGN CENTRE*, DP/SYR/72/010 SYRIA .

Terminal report

Prepared for the Government of Syria by the
United Nations Industrial Development Organization
executing agency for the United Nations Development Programme

Based on the work of A. Thorp, expert in textile dyeing and finishing, project manager

United Nations Industrial Development Organization
Vienna

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1. SUMMARY

The project "Assistance to the Textile Laboratories and Design Centre" was planned to start in January 1974. Its aim was to meet the needs of the textile industry for quality control, the establishment of suitable standards, training, and the dissemination of information on new techniques, etc., by means of meetings and seminars.

Because of a delay in the selection of a site the project was two years behind schedule when national and international staff arrived during the period December 1976 to February 1977. At this time, although the Centre building was structurally complete the laboratories and workrooms were empty, except for unpacked crates of equipment.

During 1977 several new machines have been installed. Parts of some of these machines found to be broken or spoilt [illegible] procured.

Other [illegible] mainly looms, cards and knitting machines have been [illegible] from factories and are being installed.

The installation of a roving frame has been delayed by the loss of two of the cases that contained it at Latakia. One case found near Baqqa can be recovered. Replacement parts for those in the other case have been ordered.

Pilot scale dyeing and finishing machines were received this December. When they are installed the Centre will have a very well-equipped experimental dyehouse.

The Fabric Design Expert, after the arrival of drawing equipment in March, started a programme of fabric designing, development, and analysis for counterpart staff. But practical training in the preparation of samples from designs has been prevented by lack of a sample loom. This Expert has prepared a manual on fabric design and development[1/] which should prove extremely useful after it is translated into Arabic. Arrangements for its translation are being made.

After his arrival the Dyeing and Finishing Expert was prevented from carrying out any practical work or training as benches, chemicals and glassware were lacking. He therefore went with the Senior Counterpart to the Industrial Research and Development Centre, made scale drawings of benches and other fittings in the textile laboratories there, obtained addresses of the firms that made and installed them and gave this information to the Director of the Centre. There has been a considerable delay on having the benches made but now some have arrived. Unfortunately they will not be installed before the end of the expert's assignment.

This expert has prepared comprehensive lists of glassware, reagents and other consumables which have now been ordered.

At the request of the Director he has written a manual of test methods for the chemicals, dyestuffs and auxiliaries used in the textile industry.

In company with counterparts he visited mills in Damascus to study their dyeing and finishing processes and advise on any problems that they might be having. However their main problem at the time was a shortage of skilled workers. This is a problem that the Centre will be able to deal with later when fully equipped.

The Dyeing and Finishing Expert was appointed acting Project Manager in June.

1/ Issued as technical report DP/ID/SER.A/123.

Work tables for the Physical Testing Laboratory arrived in May, enabling staff to set-up and test apparatus. All of it was in good order, and staff have been trained in its use by the engineer in charge. This laboratory has now started to provide physical testing and quality control services to factories.

Two fifteen-day courses on quality control in spinning have been held in Homs and Damascus for technicians from local mills.

Assessment.

Although useful progress has been made in certain areas, project implementation has been seriously impeded by delays, particularly in the selection of a site and procuring of benches and other vital equipment from Government. Also, to some extent, project implementation has been hindered by the lack of a car, a telephone and secretarial assistance (for 9 months).

Nevertheless progress should accelerate in 1978, when most of the equipment still awaited will be delivered. But it cannot be over-emphasized that the Centre will need on-the-spot guidance from people with many years of practical experience in the production and testing of textiles to give training on fabric design, evaluation of dyes, auxiliaries, identification and avoidance of fabric faults, etc., that staff will require before they will be able to give effective assistance to the textile industry.

II. I N T R O D U C T I O N

1. Background

1.1.- The leading industry in Syria is the textile industry, which in 1974, while representing only 22 per cent of the total industrial capital, produced 40 per cent of the total net industrial output.

1.2.- Although Syrian cotton and wool are the industry's chief raw materials, it uses only about 18 per cent of the cotton crop, and 33 per cent of the wool. The rest is exported.

1.3.- A comparison of the prices per kilogramme obtained in 1974 for ginned cotton, 0.65 U.S. dollars, and 20 s count cotton yarn, 1.25 $, indicated the possible advantages in expanding the spinning capacity of the industry. Although not stated in the Project Document, the success of any expansion would depend on the maintenance of the profit margin . (See Appendix 1 for some relevant data on spinning costs for 20 s yarn).

However, the profitability of the enterprise seemed reasonably certain, since in 1974 the Syrian textile industry was making a profit. There was every reason, therefore, for expanding the industry, and four new textile plants were planned. The aims were threefold : to process more Syrian cotton and wool; to manufacture finished products which could compete successfully in foreign markets; and to create more jobs for trained technicians and operatives. In order to achieve these aims it was necessary for the industry to increase its productivity and technology. It was also necessary to install an appropriate quality control system, particularly as the industry lacked suitable standards for raw materials, intermediates and finished products.

1.5.- To assist the Government to achieve its aims funds in the U.N.D.P. Country Programme were allocated for the establishment of a textile laboratory and design centre which would meet the needs of the industry for quality control, establishing standards, and provide certain facilities for training and education.

2. Financial Contribution

2.1.- The latest adjusted budget for the project (Project Revision 1977/48) gives the total final U.N.D.P. Contribution as 241,555 U.S. dollars, an increase of 51,555 U.S.dollars on the original contribution quoted in the Project Document. It includes actual expenditures in 1976 and previous years , and provides for the rephasing of expert services, secretarial assistance and training to 1977 and 1978. It also provides for an increase in the equipment component of 1000 U.S. dollars for the purchase of machinery parts which had been lost, damaged, or spoilt by rust.

2.2.- The total final contribution of the Government will be equal to about 489,000 U.S. dollars.

3. Objectives

3.1.- The objectives of the project, outlined in the Project Document, are closely related to the general plan of the Government for the rationalisation and modernisation of the industry and consequent increase in productivity and quality of the goods produced. The project will assist in implementing the plan by (i) establishing consistent testing and quality control methods throughout the textile industry, (ii) setting realistic standards which take into account the raw materials and machinery available in the industry,(iii) establishing new training programmes,and (iv) organising meetings and seminars.

3.2.- The Project Document was submitted in May 1973 and formally signed in January 1974 by the Director of the Union of Textile Industry (the Government Counterpart Agency) and the Resident Representative of the United Nations Development Programme in the S.A.R. on behalf of UNIDO (the Executing Agency). Since then no significant changes have been made to the Project Document other than the rephasing of expert services to 1977/78, the revision of the UNDP budget already noted and some amendments to the list of non-expendable equipment provided by UNDP. The full list of non-expendable machinery and apparatus to be provided by UNDP and Government is tabulated in Appendix 2, which indicates the items already received at the Centre and those still awaited.

3.3.- The present report describes the progress made to date in the project towards its objectives, discusses constraints which have impeded further progress, and gives recommendations for following-up the results already achieved.

4. Documentation

4.1.- A number of reports and other communications have been transmitted to the Government. These are listed in Appendix 3.

III. A C T I V I T I E S

I. General

1.1.- When the experts arrived in early 1977 the building of the Textile Laboratories and Design Centre had been completed, with electricity, supplied temporarily from an adjacent factory, and water supplies connected, but apart from office furniture, steam boilers, air-conditioning plant, and some uncrated equipment lying in the workrooms, was completely empty.

1.2.- Since the arrival of the national and international staff in the period December 1976 to early February 1977 the following progress has been made : minor building defects have been made good, overhead light fittings, one of which fell during working hours, have all been properly secured. The air-conditioning plant underwent commissioning trials and was found satisfactory.

2. Textile Machinery

2.1.- The following new machinery has been erected in the workrooms: Opening and blending range, Automatic warper and sizing range. Intersecting gill box, Rectilinear wool comb.

2.2.- The Centre has also acquired a number of machines from textile mills which are now being installed. These comprise: Two looms with jacquard attachments, One loom with dobby attachment, A pirn winding frame, two stocking knitting machines, five double jersey knitting machines & two cotton carding machines.

2.3.- Some parts of the rectilinear wool comb and intersecting gill box, both UNDP inputs, were found to be either broken or rusty. Replacement parts of the intersecting gill box were ordered from the manufacture, Hanseatischer Maschinenbau A.G. in May 1977. One case sent airfreight has been received. A second case, sent by sea, is believed to have arrived at Latakia. Failure of this firm to forward the shipping documents, despite many reminders, has prevented its collection.

2.4.- The replacement parts of the intersecting gill box have also been ordered (UNIDO Purchase Order 15-4-00848) from the manufacturer Heberlein Hispano S.A. These are also believed to have reached Latakia .Shipping documents have been requested but not received.

2.5.- Because it is the practice of the port authorities to auction off all goods not claimed after 6 months, the shipping documents are needed most urgently.

2.6.- With regard to a roving frame (UNIDO Purchase Order No. 15-5-00349), two of the twenty-six cases in which it was packed were lost after delivery at Latakia, in May 1976 . On 8 March of the same year UNDP received word that one case had been found on a site near Raqqa. UNITEX were immediately informed.

2.7.- In June 1977 the acting Project Manager and Dr. Bechara of the Centre visited the site and confirmed that the case, with contents apparently in good order, is still there Failure to-recover this case is delaying the erection of this costly (35,000 $) machine.

2.8.- The second lost case has not been found and the acting Project Manager has therefore asked for the parts to be re-ordered and recommended that they be sent direct to Damascus by air-freight.

2.9.- A part of the scutcher unit on the Hergeth opening and blending range, a Government input, was found to be damaged and is being replaced.

2.10.- Six laboratory-scale machines for the Dyehouse were received in early December, namely : a dye-jigger, winch, padder, a unit for resin polymerisation and heat-setting, a pad-steam dyeing range, and a washing range.

2.11.- Each machine is provided with spare parts. When the six machines, all Government-contributed, are installed the Centre will possess a well-equipped, modern experimental dyehouse.

3. Design Studio

3.1.- Mr. D. Hargreaves, the Fabric Design Expert arrived on 26 January 1977. As soon as the Design Studio received its equipment in March he was able to start a programme of designing, fabric development and fabric analysis for counterpart staff. Design staff were tested for colour-blindness. Sample designs were prepared for the 1978 Spring season. The range of fabrics covered includes worsted and polyester/worsted suitings, cotton leisure wear fabrics, cotton/polyester shirtings, novelty fabrics for printing, jacquards and upholstery fabrics. The Expert has also made short surveys at various mills to study their manufacturing processes and the types of fabric produced.

3.2.- Unfortunately, the sample loom, listed in the Project Document as a Government input, had not been received by end of the Design Expert's assignment. Designs prepared by counterparts had therefore to remain at the drawing-board stage.

3.3.- He has also written a design manual which is intended to be translated into Arabic for the benefit of those members of the design studio staff who have no English. The manual should be particularly valuable since it is written specially with the Syrian textile industry in view and incorporates much material not found in standard text books on fabric design.

4. Chemical Testing Laboratory and Dyehouse

4.1.- When the Dyeing and Finishing Expert arrived on 6 February 1977, the Chemical Testing Laboratory was empty, except for cases of apparatus. Chemical benches, fume cupboards and other essential fittings had not been installed, nor had they been ordered.

4.2.- To speed up the installation of the benches for this laboratory, early in 1977 the Expert and Senior counterpart visited the Industrial Research and Development Centre where there were well furnished laboratories for the Chemical and Physical testing of textiles. If the benches and cupboards were found to be suitable, similar fittings would be ordered for the laboratories at the Centre.

4.3.- The design and workmanship of these fittings were considered to be satisfactory. The Expert therefore made scale drawings and obtained the addresses of the firms who made and installed them. With the help of the counterparts plans were drawn indicating suitable locations for benches and fittings in the laboratory and dyehouse. The plans were approved by the Director of the Centre in early April.

4.4.- Some benches have now been delivered (in late December), but will not be installed before the end of the expert's assignment.

4.5.- The Expert has checked the equipment for the chemical laboratory that has already been delivered, obtained maintenance and operating instructions, when these had not been sent by the makers, and had damaged equipment repaired in the Centre workshop. He has also prepared comprehensive lists of glassware, reagents, indicators and other consumables in quantities which are estimated to be sufficient for two years work. (Appendix 4).

4.6.- At the request of the Director of the Textile Laboratories and Design Centre, the Expert has written a manual of test methods for the chemicals, auxiliaries and dyes used in the bleaching, dyeing and finishing sections of the textile industry. The manual is intended to act as a guide to chemists concerned with the analysis and evaluation of the common types of bleaching, dyeing and finishing agents. It includes sections on analytical methods; the evaluation of auxiliaries; and a third section dealing with instrumental methods, dye testing, the analysis of water supplies, and some important methods for testing trade effluents. The latter have been included because of the recent trend, motivated by Government concern for the environment, to introduce treatment plant for factory waste liquors. It is necessary therefore, for textile laboratories to be familiar with the tests used for controlling these processes. (The contents of the manual are given in Appendix 4).

4.7.- In company with counterparts the Expert visited four mills in order to study their processes, plant and advise on any problems that they might be having. At the time of the visit the factories did not have any serious technical problems. Their main problem was the shortage of skilled workers. (Short accounts of mill visits are given in Appendix 7).

4.8.- Further visits were made to the Industrial Research and Development Centre in order to survey the apparatus and type of work carried out by the UNIDO textile project then operating there so that unnecessary and wasteful duplication of activities could be avoided. The Expert had useful discussions with this aim in view with Mr. J. Woolfenden, the U.N. Expert in Textile testing who was working there at the time.

5. Physical Testing Laboratory

5.1.- Work tables for this laboratory arrived at the end of May, enabling staff to set up and test the apparatus. All equipment was in good working order and laboratory staff were trained in its use by the engineer in charge.

5.2.- Two fifteen-day courses on quality control in spinning have been held, one at Homs, the other in Damascus. Each was attended by about 20 technologist from the local mills and proved very successful.

5.3.- This laboratory has now started to provide physical testing and quality control services for the mills

6. Library

6.1.- The librarian at the Centre, Mrs. Haifaa Mourady has now completed 6 months training in librarianship at I.R.D.C. Book shelves, an index cabinet and magazine rack have been acquired in readiness for the arrival of the first books in 1978.

Selection of non-expendable equipment

The assignment of international staff was originally planned to begin in January 1975 with the arrival of Mr. O.J. Eidsvik, the consultant for equipment selection.

Mr. Eidsvik actually visited Syria in June 1974. His recommendations were submitted to Government in a report dated 2 July 1974. The list of equipment that he recommends differed to some extent from that given in the Project Document. Whether an item of equipment was recommended by the Project Document, by Mr. Eidsvik, or by both, is indicated in the list of equipment given in Appendix 2.

8. Preliminary Meeting with Government

On 17 February 1977, the experts were invited to give their impressions of the Textile Laboratories and Design Centre at a meeting between Government, the Resident Representative a.i., and Project Leaders. Both experts were complementary about the design of the Centre, building and hopeful about the ultimate success of the Project. At this meeting the Dyeing and Finishing Expert received confirmation that the Chemical Laboratory would have a fume cupboard with fan installed. Also at this meeting the question of a car for the use of the Project was raised by Mr. Danisman. In previous correspondence with the Ministry of Industry it had been agreed that Government would provide a car. The experts urged that a car was necessary for travel on Project business to outlying mills.

9. Fellowship

9.1.- The Director of the Centre completed 2 weeks of his fellowship course in August 1975, and another 3 weeks in July 1977. He expects pressure of work to reduce somewhat in 1978 so that he will be able to complete the remainder.

10. Project Audit Review

10.1.- On 2/3 May 1977 an auditor for the U.N. International Audit Service,(I.A.S.), carried out an audit and inspection of the project. With the help of the experts he made an inspection and check of the non-expendable equipment contributed by UNDP and discussed with them the progress made in implementing the Project Work Plan. The report of the review by I.A.S. was received in October.

10.2.- The report made two general observations warranting management attention. The first expressed the need to align the timing of inputs, such as expert services, with the ability of the project to utilize them.

10.3.- Commenting on this, the Project Manager, in a letter to the Resident Representative (19 Sept.1977) remarked that the project document allows two years from the beginning of the project to the time when it starts to provide all the services that the textile industry in Syria requires. But at the tripartite review in August, the Director of the Centre expressed his opinion that the Centre will need ten years to effect a worthwhile impact on the textile industry. Such conflicting views on timing make it extremely difficult to align the introduction of inputs with the readiness of the project to make use of them.

10.4.- The second observation in the report expressed the need for timely inspection of items received in the field to minimize insurance coverage complications and reduce re-order time.

10.5.- In the opinion of the Project Manager, in order to carry out a prompt inspection of items received it would be necessary for them to be properly stored under cover as soon as they are received, and for a representative from U.N. to be available to make the inspection with minimum delay.

11. Tripartite Review

11.1.- At the tripartite meeting, which was held on 4 August, the current state of the project was reviewed and areas indicated where further assistance may be needed. The opinion of the Director was ,that in view of the delays in the construction of the building, installation of the auxiliary plant, and in the recruiting of staff, progress was satisfactory, although the full development of the Centre will be a time-consuming operation.

11.2.- Also in the opinion of the Director, as already mentioned, it will take ten years before the Centre will be able to effect a substantial impact on the textile industry in Syria and other Arab countries. Further assistance from UNDP may only be required in the area of fellowships.

11.3.- It should be noted that at this meeting the Director expected that the Chemical Testing Laboratory would be operating in the near future, and that an external telephone was about to be secured. As yet neither expectation has been realised.

11.4.- It may be added that the meeting was conducted in Arabic , which prevented the Acting Project Manager from discussing how the various difficulties that were impeding progress might be eliminated.

IV. A S S E S S M E N T

1. Although useful progress has been made since the arrival of National and International staff the final phases of the project as given in the Work Plan have been held up. The following are the more important reasons for the delay.

2. Delay in Site Selection

2.1.- The delay in the selection of the site for the Centre meant that the building was not ready to receive staff until December 1976, two years behind the date originally planned.

3. Delays in Acquiring Government - Provided Non-Expendable Equipment

3.1.- Virtually all items of UNDP - Contributed equipment had been received before the arrival of the experts (with the exception of two cases of the roving frame already discussed), but many items of equipment to be provided by Government have not yet been received. Particularly badly hit have been the chemical laboratory with no benches, glassware or chemicals ; the dyehouse with no equipment (much of this has now arrived); the spinning and weaving departments which still need much vital machinery ; and the Design Studio where a hand-loom is needed so that practical training can begin.

3.2.- The present position regarding the delivery of apparatus and machinery is given in Appendix 2.

4. Language

4.1.- Lack of common language created some difficulties, particularly in the Design Studio. For this reason the Design

Expert has written a manual on fabric design for translation into Arabic.

5. Staff Turnover

5.1.- Several staff have left, either called-up for military service or for other reasons. Staff who have left permanently have been replaced, but difficulties still remained when the person who had left was the only member of the staff with specialised knowledge of a particular piece of equipment.

6. Secretary, Car, Telephone

6.1.- Implementation of project objectives was made difficult by the failure to recruit a secretary to the project , so that the experts had to take turns to do their own typing on the portable typewriter brought out by the Dyeing and Finishing Expert. This difficulty was removed, somewhat belatedly, when a secretary was recruited for the project in October.

6.2.- Problems were also created by the lack of a project car, which prevented the experts from visiting factories outside the Damascus area; and external telephone, which entailed visits to the UNDP office when a telephone call would have been sufficient. However the transport problem was solved towards the end of the Experts'assignments when UNDP provided a car for the project (on 14 December).

7. General Assessment

7.1.- Despite some progress, most of the project objectives have still to be met. Hence the present achievements should not be regarded with undue satisfaction. The rate of progress however, may accelerate in 1978 when most of the equipment that is still awaited will be acquired.

7.2.- It must be stressed, however, that the Centre will need on-the-spot guidance from persons with many years of practical experience to enable it to provide the training, trouble-shooting, testing, quality control, feasibility studies, practical fabric designing, and etc., needed so urgently by the textile industry. But as soon as all objectives are reached the large capital investment in the project will be amply repaid by the increase in productivity and efficiency of the industry which will follow.

V. RECOMMENDATIONS

1. The Textile Laboratory and Design Centre should be developed systematically in all departments to enable it to provide the services needed by the Syrian textile industry. Efforts towards full development should proceed with all possible speed, for the project represents a large capital outlay, which will only start to pay dividends when the project objectives are reached.

2. The Project Document designates the following activities as the main functions of the Centre;
(i) evaluation of raw materials, (ii) development of new products, (iii) advice on the selection of appropriate processing techniques, (iv) advice on process and quality control, (v) performance of techno-economic feasibility studies, (vi) provision of technical consultancy to the factories.
The Project Document also adds, as immediate objectives :
(vii) establishment of testing and quality control methods throughout the textile industry and the setting of realistic standards for finished products which take into account the raw materials and machinery available.
(viii) organization of training programmes, meetings, and seminars.

3. In the following pages these activities are discussed and recommendations made. However it cannot be over-emphasised that none of them can be carried out without the appropriate equipment. The first priority, therefore, is to procure, and instal where necessary, the machinery, apparatus and fittings which have not yet been received. At the same time it is equally important that expert on-the-spot guidance is available when the equipment still outstanding has come, particularly in the areas of chemical testing, dyeing, finishing and fabric design. Without proper expert guidance there is little hope that any of the project objectives will be reached.

4. Some of the activities enumerated in the project document are inter-related, and remarks and recommendations that apply to one also apply to another. For this reason activities(iv)and(vii) are discussed together

5. Three other Government institutions are engaged in different aspects of textile testing : the Industrial Research and Development Centre, the Agricultural Research Centre, and the Wool Grading Centre. There is some possibility that their activities might overlap. The Textile Laboratory and Design Centre should therefore maintain close links with each institution in order to integrate activities and avoid unnecessary duplication.

6. Organisation of Training Programmes etc.(Activity viii)

6.1.- As reported earlier, training courses in quality control of spinning have already been held for mill personnel. Practical training courses dealing with quality control in dyeing and finishing should also be held after the chemical testing laboratory has been set-up.

6.2.- However courses for personnel from the factories should be deferred until the staff of the Chemical Testing Laboratory and Dyehouse are trained in the operation of the equipment and the application of the tests in the manual written by the Dyeing and Finishing Expert.

6.3.- Dyehouse staff must also be familiar with the different methods of dyeing and finishing cotton, wool, man-made fibres, and blends of these with one another. The subject is vast, and some degree of specialisation by staff may eventually be necessary. However initially they should not specialise, but gain experience in the important methods of dyeing and finishing the various types of fibre used in Syrian mills.

6.4.- Mr. Said El-Mouhdy, Director of the Wool Grading Centre, in a discussion with the expert in early December, expressed the need to have members of his staff trained in wool dyeing.

6.5.- An intensive, comprehensive practical course on the theory and practice of wool dyeing would need a minimum of 3 months. When the chemical testing laboratory and dyehouse are fully equipped the T.L. and D.C. would be the best place to provide this course.

7. Establishment of Testing and Quality Control Methods, etc., and Setting of Standards for Finished Goods, (Activity iv & viii)

7.1.- Textile mills differ in their processing methods and the types of product they produce. It would be necessary therefore to spend some time at each factory in order to design a suitable in-plant quality control system. After a system has been introduced follow-up visits should be made to the factory in order to ensure that control tests are being properly carried-out.

7.2.- In view of the need to make frequent visits to factories, it would be absolutely essential for staff engaged in the installation of quality control systems to have transport available at all times.

8. Evaluation of Raw Materials (Activity i)

8.1.- The main raw materials of the Syrian textile industry are wool, cotton, viscose and man-made fibres. Most of the wool and all the cotton are produced locally. Viscose, man-made fibres and some wool of merino quality are imported. Also imported are the chemicals, auxiliaries and dyestuffs used in the processes which convert fibres to finished goods.

Although the end-products of other industries they enter into the composition of the yarn or fabric and can be classed as raw materials of the textile industry.

8.2.- Local Wool - The grading and testing of local wool is the function of the Wool Grading Centre. Now, however, the Textile Laboratory and Design Centre is able to apply instrumental methods to help in determining wool quality. In time it will also have facilities for carrying out spinning trials on the worsted system. Both Centres should co-operate to ensure that their activities are complementary.

8.3.- Raw cotton - Most of the tests used to grade raw cotton, e.g. measurement of staple length, maturity ratio, linear density, fibre strength, and trash content can now be carried out at the Centre. Spinning tests are often used to help improve the strains of cotton. If necessary spinning tests could be carried out at the Centre to help the Agricultural Research Centre maintain and improve the quality of Syrian Cotton. However some experience is needed in order to carry out and interpret the results of fibre and spinning tests [1]. If any programme of this type is planned it would be advisable to first seek specialist advice.

8.4.- Imported wool - In 1974 Syria imported 1,200,000 kg of wool tops of 64-70s quality. Check tests of imported tops should never be omitted. They should be tested in particular for moisture content. In the 1974 imports, for example, an average of 1 percent excess of moisture, if undetected, would have resulted in a loss of about 54,000 U.S. dollars to the industry[2]. Tops should also be examined for pH value, extractable matter, average fibre fineness, and average fibre length to

(1) See Lord,E. Empire Cotton Growing Corporation. Summer Meeting 1961

(2) Assumes a price of 4.68 U.S. dollars per kg for wool tops of 64-70s quality.

ensure that they come up to the specification particulars. Facilities for carrying out three of these tests are now available at the Textile Laboratory and Design Centre ; facilities for making the other tests will be available when the chemical testing laboratory is set-up.

8.5.- Viscose and man-made fibres - It is advisable to examine samples of viscose and man-made fibres that are offered by competitive firms for fluidity in a suitable solvent to detect differences in quality. Also, as water is cheaper than textile fibres, every consignment should be sampled, and moisture contents determined. Bales should be weighed at the time of sampling so that the results can be calculated to the invoice weight.

8.6.- Textile chemicals, auxiliaries and dyestuffs- The majority of these are imported, and most of them are expensive. Particularly expensive are certain classes of dyestuff and finishing agent. Direct materials used in bleaching, dyeing and finishing normally represent 25 to 50 per cent of the total finishing costs[1] depending on the type of dyestuff used, depth of shade, and type of finish.

8.7.- The evaluation of the simpler chemical compounds is usually made without much difficulty by volumetric analysis. The evaluation of dyestuffs is much more difficult, since it includes not only comparative money value tests, but also the determination of dyeing and fastness properties.

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[1] Total processing costs include direct materials and labour, [illegible], depreciation, and minor overheads.

Testing of dyes therefore takes time, and as about 6000 dyes are currently made, under 35,000 trade names, the task is formidable. Testing should therefore be selective, confined to the checking of new deliveries and new samples which promise to offer advantages of price or performance over the dyes in current use.

8.8.- The evaluation of textile auxiliaries, comprising the detergents, wetting agents, dyeing assistants, finishing agents etc. is also difficult , not only because of the great number marketed, but because standard testing methods are not available. Most large manufacturers of these products have devised their own test methods, which they do not publish, because the results of these tests are difficult to interpret : thus the present position is very unsatisfactory.

8.9.- Therefore, as in the case of dyestuffs, the testing of auxiliaries should be confined to the checking of new deliveries and selected samples, following the procedures describes in the manual written by the Expert. New samples should be examined on a cost basis against a standard sample of the auxiliary in bulk use that it would replace. Thus it is essential for the chemist to know the prices of the products that he tests.

9. Development of New Products (Activity ii)

9.1.- The development of new products i.e. new fabrics and yarns is a subject discussed by the Design Expert in the manual that he has prepared for the guidance of counterparts.

9.2.- New fabrics and designs should be introduced in order to satisfy market demands. The first step must be to ascertain the customer's real requirements. Fabric properties that appeal in western markets are well-known as the result of technical advances and commercial pressures, e.g.easy care, light weight

and uniformity. These may not necessarily be properties most in demand in other markets. Fabrics should therefore be designed with a particular market in view.

10. Advice on the Selection of Appropriate Processing Techniques (Activity iii)

10.1.- This activity is related to activity v - the performance of techno-economical feasibility studies, which should precede the adoption of any new processing technique. Before making modifications to an existing manufacturing, process it is recommended that, wherever possible, preliminary trials are made in the laboratory.

11. Performance of Techno-Economical Feasibility Studies (Activity v)

11.1.- As the pace of technical innovation is high, new methods of spinning, weaving, dyeing and finishing are being introduced with increasing frequency. The reason for introducing a new process, or process modification might be to produce a new or improved product, eliminate a production bottleneck, or reduce operating costs. In most cases the overall aim will be to increase profits in some way or other, and the estimated profitability of the process will be the main criterion on which it is accepted or rejected.

11.2.- Of equal importance but often less thoroughly studied are the technical aspects of a process - is it practicable ? Some examples where the introduction of new processes failed because the technical aspects had not been properly [illegible] Appendix 5.

12. Provision of Technical Consultancy to Factories (Activity vi)

12.1.- One of the important services provided by established textile research and testing associations is consultancy. Because a reply to an enquiring often demands knowledge in some technology outside textiles, the associations have built-up reference libraries on a variety of non-textile as well as textile subjects.

12.2.- Therefore, to support its consultancy service the Centre library should gradually acquire, in addition to books on purely textile subjects, handbooks and reference books on chemistry, physics, engineering, and other essential subjects that lie outside the field of textile technology.

12.3.- A second type of enquiry asks for the identification of a fabric fault, its cause, and how to avoid it. To answer this type of enquires a high degree of experience, and most research associations employ specialist staff for the purpose.

12.4.- The staff in the chemical and physical testing laboratories should gradually gain experience in the techniques, (physical and chemical) used to identify faults in yarns and fabrics, together with familiarity with the different manufactuting processes where faults originate. This latter type of enquiry is usually of an urgent nature. To receive and reply to such enquiries, particularly from factories outside the Damascus area, a telephone would be essential.

13. English Language Lessons

13.1.- Some senior staff have a working knowledge of English , but the majority find it difficult to converse in English on technical matters. The acting Project Manager supports the recommendation given in the Internal Audit Report, that Government provide remedial training in English to those members of the staff, of whom there are several, wishing to improve their English.

APPENDIX 1

SPINNING COSTS

The following table gives spinning of 20 s count yarn in 9 Lancashire mills during 1968. Costs are quoted in d/lb (240d=1 pound sterling)

Mill	A Conversion costs B+C+D	B Labour costs	C Overheads including depreciation	D General sales and administration	E Raw materials	F Total A + E
1	13.17	6.96	5.18	0.98	26.92	40.09
2	13.25	6.91	5.24	1.05	24.66	37.91
3	14.93	6.35	6.79	1.75	26.89	41.82
4	16.13	8.31	6.84	0.74	27.23	43.36
5	16.19	7.75	7.21	1.19	26.40	42.59
6	16.49	7.45	8.08	0.91	26.43	42.92
7	16.77	7.95	7.04	1.66	26.36	43.13
8	17.93	7.43	9.19	0.95	26.74	44.67
9	18.47	8.75	8.66	0.98	25.82	44.29
Average	15.92	7.46	7.38	1.13	26.38	42.30

The table gives the average price of raw materials (ginned cotton) as 26.38 d/lb , equivalent to 0.44 $/kg (assuming 1 pound sterling = 1.8 $). This price had risen by 1974 to 0.65 $/kg (from project document).

If it is assumed that conversion costs had risen in the same proportion during the period 1968-74, average conversion costs for the nine mills would have risen to 0.38 $/kg. Thus conversion and raw material costs would total 1.03 $/kg.

From the project document the price of 20 s cotton yarn in 1974 was 1.35 $/kg. So if conversion and raw material costs did in fact rise proportionately during 1968-74 only a narrow margin for profit would remain.

APPENDIX 1 (Contd.)

Syrian spinning mills are able to buy cotton more cheaply than Lancashire mills and therefore profit margins should be wider. Nevertheless the broad conclusions to be drawn from the estimation are still likely to apply, namely, that profits in the Syrian mills are by no means assured, and a tight control of operating costs must be exercised.

APPENDIX 2

NON-EXHAUSTIVE TEXTILE TESTING EQUIPMENT AND MACHINERY

Item	CODE LETTER See end page for key

Physical Testing

1	Air-flow fibre fineness testing apparatus	U O E D
2	Altmeter fibre length testing	U O E D
3	Projection microscope with microtome	U O E D
4	Rapid grease content apparatus	U O E D
5	Uster evenness tester with integrator, recorder, etc.	U O E D
6	Uster automatic dynamometer	U O E D
7	Fabric strength tester (Instron)	U O E D
8	Sensitive electric balance (1 mg sensitivity)	U O E D
9	Fibre bundle tenacity tester	G O E D
10	Non-lint evaluation analyser	G O D
11	Automatic lap evenness tester	G O D
12	Nep evaluation	G O
13	Yarn comparison boards	G O E D
14	Twist tester	G O E D
15	Abrasion tester (longitudinal type)	G O E D
16	Abrasion tester (rotary type)	G O E D
17	Bursting tester	G O E D
18	Fabric shrinkage tester (cubex)	G O E D
19	Two reels for sliver	G E
20	Two balances for slivers	G E
21	Two reels for yarn	G O E
22	Two balances for yarn	G E
23	Drape tester	G O E C
24	Water permeability tester	G O E D
25	Air-permeability tester	G O E D
26	Flame-proof tester	G O E D
27	Fabric thickness gauge	G O E
28	End and pick counter	G O E D

[illegible] (Cont.)

29	Drying oven and conditioning unit	G O E D
30	Probe type moisture meter for fabrics	G O D
31	Top loading balance, readability 0.01 g	U E D
32	Top loading balance, readability 0.10 g	U E D
33	Impurity tester (Shirley analyser)	G E
34	Staple measuring device for cotton (fibrograph)	G E
35	Fibre strength tester for single fibres	G E
36	Luminescent analyser	G E
37	Arealometer for maturity test	G E
38	Comber waste percentage balance	G E
39	Fabric tear strength tester	G E
40	Crimp recovery tester	G E
41	Water spray tester	G E
42	Water absorption tester	G E
43	Determination of fabric weight (balance & table)	G E
44	Balance, analytical, sensitivity 0.0001 g	G O E
45	Two balances weighing up to 10 kg.	G E
46	One balance weighing up to 500 kg.	G E
47	Pilling tester	G E
48	Crock and wear tester	G E

Chemical Testing

1	Flow meter	G C
2	[illegible] tester	G O
3	Titrator	G C
4	Viscometer (Ubbelohde type)	G O D
5	Cooling tank	G O
6	Thermometer	U O D
7	Electric furnace	G O D
8	Heating chamber	G O
9	[illegible]	G O D
10	[illegible]	G O
11	[illegible]	G O
12	[illegible]	G O D
13	[illegible]	G O

APPENDIX 2 (Contd.)

14	Refractometer	G O
15	Analytical balance (Sensitivity 0.1 mg)	G O
16	Laboratory glassware	G C
17	Microscope	G O D
18	Perspiration fastness tester	G O D
19	Bleaching degree tester	G E
20	Tester for determination of dyestaff concentration(colorimeter	G E D
21	Sublimation tester	G
22	Desiccator	G E D
23	Xenotest (light fastness tester)	U O D
24	Two refrigerators	G E(one)D
25	Stroboscope	G E
26	Static electricity eliminator (Ionisator)	G E
27	Laboratory dyeing machine for 12 samples(see end note)	U O E
28	Three calculating machines	G E
29	Hygrometer (7 day)	G E
30	Hygrometer (whirling)	G E
31	Scissors	G E
32	Drying cupboard for printed samples	G E
33	Sewing machine	G E
34	Small boiler	G E
35	Two balances weighing up to 1 kg.	U O D

PILOT PLANT FOR WOOL SPINNING

1	High speed intersecting gill box with autoleveller delivery of 1 sliver into one can	U O D
2	High speed intersecting gill box; delivery of two slivers into two cans.	U O D
3	Roving frame, not less than 12 spindless	U O D (1)
4	Two ring spinning frames of 48 spindles	G O
5	Suitable air-conditioning	G O D
6	Rectilinear comber	U E D
7	Card (single)	G E D
8	Experiment machine (C.S.Cotton)	G E

(1) 24 out of 26 crates delivered, two lost.

APPENDIX C (Contd.)

PILOT PLANT FOR COTTON SPINNING

1	High speed card with metallic clothing	G O D.
2	High speed drawing frame with two deliveries	GO
3	Combing machine with preparatory machines	G O
4	Roving frame not less than 8 spindles	G O
5	Three spinning frames, 48 spindles for each frame, rings 45, 55, 65 m . m.	G o
6	Three laboratory spinning units of about 6 spindles for each machine, rings 45, 55, 65 mm. equipped with variable speed drive.	G O
7	Opening line with 3 hopper blenders waste hopper, mixing belt, hopper feeder, step cleaner, feeding box, beater , opener and scutcher	G E D
8	Filter plant, five cards	G E
9	Filter plant for cards	G E
10	2 Drawing frames (for each)	G E
11	Super lays	G E
12	2 Combing machines (for each)	G E
13	2 Drawing frames (for each)	G E
14	2 Roving frames (24 spindles each)	G E
15	Winding machine (8 heads)	G E
16	Doubling machine (10 heads)	G E
17	Twisting machine (40 spindles)	G E

EQUIPMENT FOR WEAVING

1	Cone winding machine with 8 winding heads equipped to wind from hanks or bobbins to cone	G C
2	Pirn winding machine to suit supplied looms	G O E D
3	Small warp sizing machine (100 cm width)	G O E D
4	Warping machine (100 cm width)	G O E D
5	Small loom for sample weaving with jacquard	G O E
6	Loom (Dobby)(100 cm.width)	G O E D
7	Loom (Jacquard)(100 cm width)	G O E D
8	Loom (Shuttleless)	G E

ANNEX 2 (cont.)

KNITTING

1	Jacquard circular knitting machine	U	O	C
2	Flat knitting machine with jacquard	G	E	
3	Small flat knitting machine (hand)	G	E	
4	Automatic machine for knitting socks	G	E	D
5	Punching machine for jacquard cards	G	E	

DYEING AND FINISHING

1	Laboratory steamer (pad-steam range)	G	O	D
2	Two padders	G	O	D (one)
3	Two fi jjers	G	O	D(one)
4	Laboratory screen printing machine	G	O	
5	Bleaching apparatus	C	E	
6	Calender	G	E	
7	Roller printing machine	G	E	
8	Stenter	G	E	
9	Laboratory winch	G	O	D
10	Washing machine	G	E	D
11	Water softening unit (1000 l/hr capacity	G	O	
12	Cone dyeing machine (one cone)	G	O	

NON-LISTED EQUIPMENT

1	UV double beam spectrophotometer and integrating sphere	G	D
2	Xenon lamp light fastness tester (Atlas)	U	D

KEY

U : Provided by U.N.D.P.

G : Provided by Government

O : Listed in Project Document

E : Listed by U.N.I.D.O equipment consultant

D : Already delivered to Centre

C : Cancelled

NOTE. Item 27 of the chemical testing apparatus has not been received, but a "Linitest" laboratory dyeing machine for 8 samples manufactured by Hanau, has been delivered. This item is not listed in the U.N.I.D.O. non-expendable property control record.

APPENDIX 3

DOCUMENTS SUBMITTED TO GOVERNMENT

1. Project Document (UNIDO/TCD 292) 20 March 1974.
'Assistance tothe Textile Laboratories and Design Centre
(DP/SYR/72/010/A/01/37).

2. Report prepared for Government of the S.A.R. by O.J. Eidsvik, UNIDO Equipment Selection Consultant. 2 July 1974 .
Subject : Project Findings and Recommendations.

3. Letter from the Resident Representative to the State Planning Commission 29 May 1977.
Subject: Designation of Dyeing and Finishing Expert as Project Manager.

4. Project Progress Report by Project Manager a.i., 30 June 1977.

5. Letter from the Resident Representative to the State Planning Commission. 10 August 1977.
Subject: Comments made by UNIDO on Project Progress Report.

6. Tripartite Review Report, 4 August 1977.

7. Letter from Resident Representative to State Planning Commission, 16 August 1977, submitting [illegible] and finishing comments.

8. Letter from Resident Representative to State Planning Commission 19 Sept. 1977.
Subject : Revision to Project Budget(Project Revision No 1977/48)

9. Manual ,by A. Thorp, Dyeing and Finishing Expert,Project Manager a.i.,December 1977
Subject:The Evaluation of Textile Auxiliaries, Dyes, and Chemicals

10. Manual, by D.H. Hargreaves, Fabric Design Expert, January 1977.
Subject:,Fabric Design and Analysis.

APPENDIX 4

EQUIPMENT FOR CHEMICAL LABORATORY AND DYEHOUSE

LABORATORY GLASSWARE

Item No.	Description	Size or Capacity	Quantity
1	Test tubes	150 mm x 25 mm	100
2	"	130 mm x 16 mm	100
3	"	70 mm x 8 mm	200
4	Beaker, lipped	1000 ml	30
5	"	500 ml	50
6	"	250 ml	50
7	"	100 ml	50
8	Measuring cylinders graduates	25 ml	10
9	"	50 ml	20
10	"	100 ml	10
11	"	250 ml	10
12	"	500 ml	5
13	"	1000 ml	3
14	Round bottom flasks	100 ml	8
15	"	250 ml	6
16	"	500 ml	6
17	Flat bottom flasks	100 ml	6
18	"	250 ml	10
19	"	500 ml	10
20	Volumetric flasks	50 ml	10
21	"	100 ml	20
22	"	250 ml	30
23	"	500 ml	20
24	"	1000 ml	15
25	Erlenmayer flasks	100 ml	40
26	"	250 ml	50
27	"	500 ml	20
28	" (stoppered)	250 ml	30
29	" "	500 ml	20
30	Watch glasses	6 cm diam.	10
31	"	10 cm diam.	20
32	"	15 cm diam.	20

APPENDIX 4 (Contd.)

Item No.	Description	Size or Capacity	Quantity
33	Crystallisation dish	10 cm diam.	10
34	"	15 cm diam.	5
35	Petri dish	10 cm diam.	5
36	"	12 cm diam	5
37	Conical funnels, filter	8 cm diam.	20
38	"	10 cm diam.	5
39	"	12 cm diam.	5
40	Funnels, burette		10
41	Funnels, powder		8
42	Flasks, filter	500 ml	10
43	"	1000 ml	15
44	Pipettes, volumetric	1 ml	20
45	"	2 ml	20
46	"	5 ml	20
47	"	10 ml	20
48	"	20 ml	20
49	"	25 ml	20
50	"	50 ml	20
51	Pipettes, graduated	1 ml	20
52	"	5 ml	20
53	"	10 ml	20
54	"	25 ml	20
55	Pipettes, safety	1 ml	15
56	"	2 ml	15
57	"	5 ml	15
58	"	10 ml	15
59	Burette	25 ml	10
60	"	100 ml	5
61	"	50 ml	10
62	Filter crucible, sintered glass No 1 porosity disc diam. 30 cm.		20
63	" No. 4 porosity		10
64	Adaptors, filter crucible (to fit above crucibles)		10

APPENDIX 4 (Contd.)

Item No.	Description	Size or Capacity	Quantity
65	Rubber sleeves, suitable for above crucibles		10
66	Soxlet extraction apparatus	Extractor capacity 70ml Flask capacity 100 ml	6
67	Extraction thimbles to fit above Soxlet extractor		100
68	Separating funnels	100 ml	5
69	"	250 ml	5
70	Kjeldahl flasks	250 ml	5
71	"	500 ml	5
72	Liebig condensor	Jacket length 30 cm	3
73	Measuring cylinders with ground glass stoppers	100 ml	10
74	Condensor, Dimroth		3
75	Kjeldahl distillation apparatus		4
76	Fractionating column Hempel		2
77	Fractionating colums Wurtz		2
78	Weighing bottles, low form	50 ml	20
79	Weighing bottles, high form	10 ml	20
80	"	20 ml	10
81	Dropping bottles	100 ml	50
82	"	50 ml	50
83	Reagent bottles	250 ml	30
84	"	500 ml	30
85	Wide mouth bottles	250 ml	20
86	Aspirator bottles	4000 ml	8
87	Wash bottles	1000 ml	8
88	Hydrometers (set)	0.63 to 2	1
89	Thermometers	0 to 100°C	10
90	"	30 to 100°C	10
91	"	0 to 360°C	10
92	Reagent bottles (dark)	250 ml	10
93	"	500 ml	10
94	Specimen bottles		200
95	Cover glasses, microscope		250
96	Slides, microscope		250
97	Glass rod (for stirring rods)	5 mm diam.	1 bundle
98	Glass tubing	6- 7 mm diam.	1 bundle

APPENDIX 4 (Contd)

OTHER LABORATORY EQUIPMENT

Item No.	Description	Size or Capacity	Quantity
99	Pestle and mortar	8 cm diam.	3
100	"	10 cm diam.	3
101	Crucibles, porcelain and lids	30 mm diam	20
102	"	42 mm diam.	20
103	Evaporating dishes, porcelain	6 cm diam	10
104	"	10 cm diam.	6
105	"	15 cm diam	4
106	Spot test plate, porcelain		10
107	Buchner funnels	7 cm diam(internal)	5
108	"	11 cm diam "	5
109	Drying tubes		5
110	Support stand(Retent stand)		10
111	Bosses (Doppelmuffe)		20
112	Clamps (Stativklemme)	25 mm span	10
113	"	60 mm span	10
114	Support rings		10
115	Tripods		10
116	Crucible tongs		5
117	Beaker tongs		5
118	Wire gauzes		10
119	Bunsen burner(for butane gas)		8
120	Meker burner(for butane gas)		4
121	Tubing clamps(screw)		15
122	" (Mohr)		10
123	Spatulas, nickel		10
124	Weighing cans(Aluminium)		12
125	Forceps (Tweezers)		5
126	Scissors	large	2
127	"	medium	5
128	Dissecting needles		20
129	Rubber stoppers	Assorted sizes	20 of each
130	Corks	"	100 of each

APPENDIX 4 (contd).

Item No.	Description	Size or Capacity	Quantity
131	Pipette fillers		4
132	Draining boards		2
133	Test-tube stands		8
134	Test-tube holders		10
135	Test-tube brushes		20
136	Gas lighter		2
137	Stirrer(electric)		1
138	Clock(interval timer) (Stopclock)		2
139	Stop watch		3
140	Mechanical shaker (for flasks,etc).		1
141	Shirley Fluidity Kit (Complete Initial Installation Kit)		1
142	Water bath-six-hole,for Soxhlet extraction with thermostatic control		1
143	Large wooden table for examining bulk samples of cloth		1
144	Blue standards for the determination of light fastness		1
145	Grey scales for the determination of colour		1
146	Grey scales for assessing staning		1
147	First-aid cabinet,including eye wash bottle and eye-bath		1
148	Fire blanket for extinguishing burning clothing		1
149	Protective goggles		5
150	Pocket magnifying glasses(pick glasses)		4
151	Metre rule		2
152	Needles		50
153	Rubber gloves)		5 prs.
154	Protective apron		1
155	Rubber boots		1 pr.
156	Drum washing machine with heating,Rendix type	Drum 40-60 cm diam.	1
157	Domestic iron,with temperature control		1
158	Surface pyrometer measuring temperatures to 2200C		1

APPENDIX 4 (contd.)

Item No.	Description	Size or Capacity	Quantity
159	Wool felt for ironing surface		1
160	Sewing machine, domestic		1
161	Blow torch, for glass-blowing		1
162	Burette stand		2
163	Cork borers		1
164	Cork borer sharpener		1
165	Rubber tubing, condenser		10 m.
166	" , bunsen		10 m.
167	Jugs, enamel or stainless steel	2-4 litres	2
168	Filter paper circles. Whatman grades 30, 540, and 41. (or equivalent).	7 cm diam.	200 of each
169	"	11 cm diam.	100 of each
170	Filter paper circles, black	7 cm diam.	200
171	pH papers, range 2 to 10		2 boxes of each.
172	Litmus paper, blue and red		2 boxes of each.
173	Hot plate, electrically heated, surface area not less than 1 square foot, with low, medium, and high temperature size		1
174	Bottles, winchester size		6
175	Files, triangular		6
176	Knife, glass-cutting		3
177	Files, round		3
178	Glass-stopper puller		1
179	Pipe-clay triangles		20
180	Quartz filter crucibles (Jena)	30 ml.	3
181	Laboratory coats		2 per chemist.

APPENDIX A (Contd.)

CHEMICAL, ANALYTICAL GRADE

Acetone	2500 ml
Ammonium hydroxide	5000 ml
Acetic acid	5000 ml
Aluminium chloride	500 g
Aluminium oxide	500 g
Ammonium carbonate	500 g
Ammonium chloride	500 g
Ammonium thiocyanate	250 g
Ammonium chromate	250 g
Ammonium sulphate	500 g
Ammonium persulphate	250 g
Ammonium nitrate	500 g
Ammonium sulphide solution	500 ml
Ammonium oxalate	250 g
Ammonium molybdate	250 g
Antimony trichloride	100 g
Aniline	500 ml
Arsenic pentoxide	100 g
Devardas alloy	250 g
Benzene	1000 ml
Boric acid	250 g
Borax	500 g
Bromine	250 ml
Benzoic acid	100 g
Barium chloride	500 g
Barium carbonate	250 g
Barium hydroxide	500 g
Butyro-lactone	100 ml
Carbazole	100 g
Chromotropic acid	25 g
Chromium chloride	100 g
Chromium trioxide	500 g
Chromium acetate	250 g
Chloroform	2500 ml
Citric acid	250 g

APPENDIX 4 (Contd.)

CHEMICAL, ANALYTICAL GRADE

Carbon disulphide	2000 ml
Chloramine T(N-Chloro p-toluene sulphonamide, sodium salt)	250 g
Cyclohexane	500 ml
Cyclohexanone	500 ml
Cyclohexanol	500 ml
l-Cystine	25 g
Chlorobenzene	500 ml
O-Dichlorobenzene	250 g
Charcoal (activated, powder)	250 g
Boiling stones	500 g
m-Cresol	500 g
Carbon tetrachloride	2500 ml
Cadmium chloride	100 g
Cellosolve	1000 ml
Calcium chloride	500 g
Calcium sulphate	500 g
Copper powder	250 g
Cupric chloride	250 g
Cupric sulphate	500 g
Cobaltous nitrate	250 g
Diphenylamine	500 g
Diphenylcarbazide	50 g
Dithizone	5 g
Dimethylaniline	100 g
Dimethylformamide	1000 ml
1,4, Dioxan	1000 ml
Dimethyl glyoxime	25 g
Diethylbarbituric acid	100 g
Ethylene diamine tetra-acetic acid, disodium salt	500 g
Ethyl alcohol	2500 ml
Ethyl acetate	1000 ml
Furfuryl alcohol	1000 ml
Formaldehyde	3000 ml
Formic acid	500 ml
Fluoric acid	500 ml
Glycerine	500 ml

APPENDIX 4 (Contd.)

CHEMICAL, ANALYTICAL GRADE

Glucose	500 g
Histidine monohydrochloride	25 g
Hexamethylene tetramine	100 g
Hydrazine sulphate	100 g
Hydrochloric acid	5000 ml
Iodine	500 g
Iron alum	500 g
Iron metal	500 g
Ferrous chloride	500 g
Ferric chloride	500 g
Ammonium ferrous sulphate	500 g
Ferric sulphate	250 g
Ferric sulphide	1000 g
Ferric nitrate	500 g
Carbon black	500 g
Lanthanum nitrate	25 g
Hydroxylamine hydrochloride	100 g
Lactic acid	500 ml
Magnesium chloride	500 g
Magnesium sulphate	500 g
Magnesium perchlorate	100 g
Manganous sulphate	500 g
Manganous chloride	250 g
Methanol	500 ml
Methyl ethyl ketone	500 ml
Dichloromethane	500 ml
Mercaptobenzthiazol	100 g
Ninhydrin	25 g
Nitrobebzene	500 ml
Nitric acid	1000 ml
Nickel sulphate	100 g
Mercury metal	250 g
Mercury I chloride	25 g
Mercury II chloride	25 g
Mercury II oxide	25 g
Phloroglucinol	50 g
Platinum wire	1 g
Olive oil	500 ml

APPENDIX 4 (Contd.)

CHEMICAL, ANALYTICAL GRADE

Orthonitrobenzaldehyde	50 g
Oxine (dihydroxyquinoline)	50 g
Potassium iodite	500 g
Potassium iodate	50 g
Potassium hydrogen sulphate	250 g
Potassium thiocyanate	250 g
Potassium hydrogen tartrate	250 g
Potassium carbonate	250 g
Potassium nitrate	500 g
Potassium sodium tartrate	250 g
Potassium chromate	250 g
Potassium dichromate	250 g
Potassium nitrite	250 g
Potassium chlorate	250 g
Potassium bromate	100 g
Potassium ferricyanide	250 g
Potassium ferrocyanide	250 g
Potassium dihydrogen phosphate	500 g
Potassium permanganate	1000 g
Potassium titanium oxalate	100 g
Potassium hydroxide	500 g
Perchloric acid	100 ml
Pepsin	100 g
Picric acid	100 g
Pyridine	500 ml
Perchlorethylene	1000 ml
Petroleum ether	2000 ml
Phenol	500 g
Amyl alcohol	500 ml
Phosphoric acid	1000 ml
Paraffin wax	1000 g
Phosphorus pentoxide	500 g
Resorcinol	250 g
Sulphuric acid	4000 ml
Potassium cyanide	250 g
Sodium metal	200 g

APPENDIX 4 (Contd.)

CHEMICAL, ANALYTICAL GRADE

Sodium chloride	500 g
Sodium azide	500 g
Sodium peroxide	500 g
Disodium hydrogen phosphate	500 g
Sodium hexametaphosphate	500 g
Sodium acetate	500 g
Sodium carbonate	500 g
Sodium bicarbonate	500 g
Sodium chromate	500 g
Sodium sulphate	500 g
Sodium chlorate	500 g
Sodium bromite	500 g
Sodium bromide	500 g
Sodium chlorite	500 g
Sodium perchlorate	500 g
Sodium fluoride	100 g
Sodium sulphide	500 g
Sodium bisulphite	500 g
Sodium diethyl dithiocarbamate	25 g
Sodium thiosulphate	1000 g
Sodium nitrate	500 g
Sodium nitrite	500 g
Sodium nitroprusside	200 g
Sodium pyrophosphate	500 g
Sodium dihydrogen phosphate	500 g
Sodium bicarbonate	500 g
Sodium perborate	500 g
Sodium silicate	500 g
Sodium oxalate	500 g
Sodium hydroxide	1000 g
Soluble starch	250 g
Silver sulphate	100 g
Silver nitrate	100 g
Strontium chloride	250 g
Stannous chloride	500 g
Sulphanilic acid	100 g

APPENDIX 4(Contd.)

CHEMICALS, ANALYTICAL GRADE

Tetrahydrofuran	500 ml
p-Toluidine	500 ml
Tartaric acid	1000 ml
Trypsine	250 g
Toluene	1000 ml
Uranyl acetate	100 g
Urea	1000 g
Zinc oxide	500 g
Zinc sulphate	500 g
Zinc chloride	500 g
Zinc metal	500 g
Zinc sulphoxylate formaldehyde	500 g
Starch, potato	1500 g
Starch, corn	500 g
m-Xylol	500 ml
p-Xylol	500 ml
Stearic acid	1000 g
Vaseline	250 g
Oxalic acid	500 g
Thioglycollic acid	100 ml

INDICATORS AND ORGANIC PRECIPITANTS

Alizarin S	25 g
Anthrone	25 g
Bromophenol Blue	25 g
Bromothymol Blue	25 g
Congo Red	50 g
Cresol Red	25 g
C.I.Mordant Black II	25 g
Cupferron (Ammonium salt of nitrosophenylhydroxylamine)	25 g
Cupron (benzoin oxime)	25 g
Cotton Blue IV	25 g
Alizarin Yellow R	25 g
Eriochrome Black T	25 g
Indigo Blue	25 g
Indigocarmine	25 g

APPENDIX A (Contd.)

INDICATORS & ORGANIC PRECIPITANTS

Indanthrene Yellow paper	10 boxes
Eriocyanin R	25 g
Fuchsin	25 g
Lacmus	100 g
Methyl Orange	50 g
Methyl Red	25 g
Methylene Blue	100 g
2-Naptholphthalein	25 g
o-Cresolphthalein	25 g
Phenolphthalein	100 g
Universal Indicator paper 1-5, 5-9, 9-13 pH	5 boxes of each
Universal Indicator paper 1-14 pH	10 boxes of each
Shirlastains A,D and C	500 ml
Titan Yellow	25 g
Murexide	25 g
Unitest solution pH 1-12	500 ml
Xanthydrol	25 g
Schiff's Reagent	500 ml
Dimethyl glyoxime	25 g
Kiton Red G	25 g
Shirlastain D	25 g
Glyoxal bis-(2-hydroxyanil)	25 g
Phosphomolybdic acid	25 g
Sodium rhodizonate	10 g

CHEMICALS, TECHNICAL GRADE

Acetic acid	50 kg
Aluminium sulphate	50 kg
Ammonium hydroxide	40 kg
Bleaching powder	50 kg
Caustic soda, flakes	100 kg
Copper sulphate	50 kg
Formic acid	25 kg
Hydrochloric acid	60 kg
Hydrogen peroxide	75 kg

APPENDIX A (Contd.)

CHEMICALS, TECHNICAL GRADE

Sodium bichromate	120 kg
Sodium hydrosulphite	50 kg
Sodium bisulphite	50 kg
Sodium hydrogen sulphide	50 kg
Sodium sulphide	50 kg
Sodium hypochlorite solution (15% available chlorine)	50 kg
Sodium perborate	50 kg
Sodium sulphate	50 kg
Sodium silicate 60 Be	50 kg
Sodium metasilicate	50 kg
Sodium nitrite	50 kg
Soda ash (light)	50 kg
Sodium sulphoxylate formaldehyde	50 kg
EDTA (sodium salt)	50 kg
Urea	50 kg
Sulphuric acid	50 kg
Sodium bicarbinate	50 kg
Formaldehyde	50 kg
Condensol A(Ammonium nitrate)	50 kg
Trisodium phosphate	50 kg
Ammonium sulphate	50 kg
Glycerine	50 kg
Calcium chloride	50 kg
Sodium chloride	50 kg
Soap flakes	50 kg
Oaracetic acid, 40% solution	50 kg

APPENDIX 4

LIST OF TESTS INCLUDED IN THE MANUAL 'THE EVALUATION OF TEXTILE AUXILIARIES, DYES, AND RELATED MATERIALS'

PART I. ANALYTICAL METHODS

1. Estimation of non-ionic detergents
2. Determination of anionic surfactants
3. Analysis of bleaching powder
4. Analysis of Sodium silicate
5. Analysis of hydrogen peroxide
6. Determination of sodium chloride
7. Determination of sodium dithionite
8. Determination of urea
9. Determination of formaldehyde
10. Determination of formasul
11. Determination of acetic acid
12. Determination of sodium carbonate
13. Determination of caustic soda
14. Determination of sodium alginate
15. Analysis of soaps
16. Determination of the iodine value of an oil
17. Analysis of sulphated oils
18. Determination of the saponification value of an oil
19. Determination of sulphuric acid

PART II. EVALUATION OF AUXILIARY PRODUCTS

20. Evaluation of kier-boiling assistants
21. Evaluation of desizing agents
22. Evaluation of wetting agents
23. Evaluation of mercerising assistants
24. Evaluation of emulsifying agents
25. Scouring efficiency of detergents for general use
26. Evaluation of fluorescent brightening agents
27. Evaluation of detergents for wool
28. Evaluation of dye stripping promoters
29. Evaluation of cationic-dye fixing agents
30. Evaluation of carriers for disperse dyes

APPENDIX 4 (Contd).

31. Evaluation of levelling agents for milling acid dyes
32. Evaluation of restraining agents for vat dyes
33. Evaluation of crease-proofing agents
34. Evaluation of waterproofing agents

PART.III MISCELLANEOUS TESTS

36. Determination of the foaming power of textile auxiliaries and the evaluation of antifoaming agents
37. Evaluation of starch
38. Evaluation of colour fastness to light with a xenon lamp
39. Determination of biochemical oxygen demand
40. Determination of oxygen by the Winkler method (sodium azide modification) for B.O.D. test
41. Determination of the hardness of water
42. Determination of total alkalinity of water supplies
43. Estimation of copper in water
44. Estimation of iron in water
45. Determination of permanganate value (4 hours)
46. Use of the pH meter
47. Use of the Duboseq colorimeter
48. The rapid determination of the oil content of wool
49. Evaluation of direct cotton dyes
50. Evaluation of vat dyes
51. Evaluation of disperse dyes
52. Evaluation of wool dyes
53. Determination of the fluidity of Cotton and Rayon or other forms of native and regenerated cellulose.

APPENDIX 5

1. A factory designed for 80 per cent white goods with continuous rope bleaching. Events soon showed that planning could not have been more wrong. The dyed proportion increased many fold and open-width bleaching had to be introduced[1].

2. A new chain merceriser without a means of washing-out alkali whilst the cloth was under tension, completely ignoring basic principles[1].

3. A firm with a large stock of sodium chlorite which had not been used because the ventilation problems involved had been overlooked[1].

4. A new singeing machine in which there was no feed tank for the after-quenching (usually enzyme)[1].

Finally from the experts own experience :

5. 50 new circular knitting machines, not used because the needles were of too fine a gauge for the yarns available.

6. A chain merceriser, too short to be run at an economic speed.

7. A new hank merceriser, not used because yarn winding costs made its operation uneconomic.

The above example illustrate the importance of making a preliminary study of the technicalities of a process before introducing it into the factory.

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(1) Farrington F. Practical Aspects of Dyeing and Finishing UNIDO Expert Group Meeting on New Techniques in Wet-Processing of Textiles. June 1975. ID/WG. 205/G.

APPENDIX 6

TECHNICAL STAFF AT TEXTILE LABORATORIES AND DESIGN CENTRE.

The following full-time senior project staff joined the Project in December 1976 and January 1977.

Post Description	Name	2nd Language	3rd. Language
1. Project Co-manager	K.Jubrini	German	-
2. Textile Designer	T.Balanoni	English	-
3. Weaving Technologist	H. Kabakibo	-	-
4. Spinning Technologist	M.Zarifé	German	Bulgarian
5. Dyeing & Finishing Technologist	S.Kameel	English(a little)	"
6. Administration & Financial Director	O. Horani	English(very little)	-
7. Mechanical Engineer	H. Husein	English (a little)	-

Also with Mrs.S. Kameel in the dyeing and finishing department are Miss.H. Dada, Mr. Merkhan and Mr. Farventy. Like Mrs Kameel, Mr. Merkhan has a diploma in dyeing and finishing from the Chemical Textile Institute, Sofia. Miss Dada has qualified in biochemistry at Damascus University. Dr. G. Béchara (Ph.D. Leningrad) also worked in this department for some months, but was called up August for Military Service, as was Mr. Merkhar. Miss Dada and Mr. Merkhan are reasonably good in English, Dr. Bechara in Russian.

Mrs. S. Kameel, the senior counterpart in the chemical testing laboratory and dyehouse has assisted in the selection of glassware etc., and with the planning of the lay-out of benches. She has also accompanied me on visits to factories. Mrs. Kameel and the other counterparts in this department worked for much of 1977 in local mills on routine testing. Although they were not working under the supervision of the Dyeing and Finishing Expert, they consulted him when problems arose.

APPENDIX 6 (Contd.)

Other senior staff include Mr. T. Al-Chabab, the Deputy Director, fluent in French and English, and Mrs. Zarifé M.Sc. the Head of the Physical Testing Laboratory, fluent in German and with good English.

All senior staff members would benefit from an appropriate fellowship course in their particular area of technology.

APPENDIX 7

MILL VISITS

The Dyeing and Finishing Expert made brief preliminary visits to four mills in Damascus in order to become acquainted with the types of wet processing used in them, and to help with any technical problems that they might be having.

)i) KHOUMASSIEH .- The largest mill in Damascus; it spins, weaves, dyes and prints a variety of fabrics made from locally - grown cotton. Production goes to the home market. Wet processes include roller printing, jig dyeing, and starch finishing.

In a small laboratory in the charge of a graduate chemist dyestuffs and the materials are tested. Equipment was limited and not all of it was in good working order. The expert was told that dyehouse effluent is discharged without treatment directly into a stream.

The dyehouse manager had no dyeing and finishing problems at the time of the visit.

(ii) Modern Industrial Company, HADESE.- This mill spins, weaves and finishes pure wool and blends of wool with polyester fibres. Wool tops are imported because the local wool is considered to be unsatisfactory. Wet processes include scouring, milling, dyeing of stock with pre-metallised, chrome, and reactive dyes. Stenter drying, London shrinking, and hot pressing on roller machines are the usual end processes in the dyehouse.

The mill has a small laboratory where all dyes and scouring agents are tested.

APPENDIX 7 (Contd.)

(iii) AL MAGHAZEL & MANACEGE COMPANY.- The factory manufactures all cotton fabrics. There is no dyehouse. A great deal of re-equipping is in progress, and in a large extension several Sulzer extra wide looms were being run in.

(iv) Industrial Company for SILK & STOCKINGS .- The experts visited this factory at the invitation of the Production Director, Mr. Mustafa Nader. It is a modern factory engaged in processing nylon and polyester filament yarns purchased abroad. The yarn is texturised by the false twist process, package-dyed and knitted into hosiery. In new extensions five new texterising machines have been installed, and also several types of circular knitting machines for hosiery and tights. A new dyehouse is being equipped with paddle dyeing machines to handle the knitted goods. In the old dyehouse package dyeing, hot air drying and steam setting are the main processes.

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.

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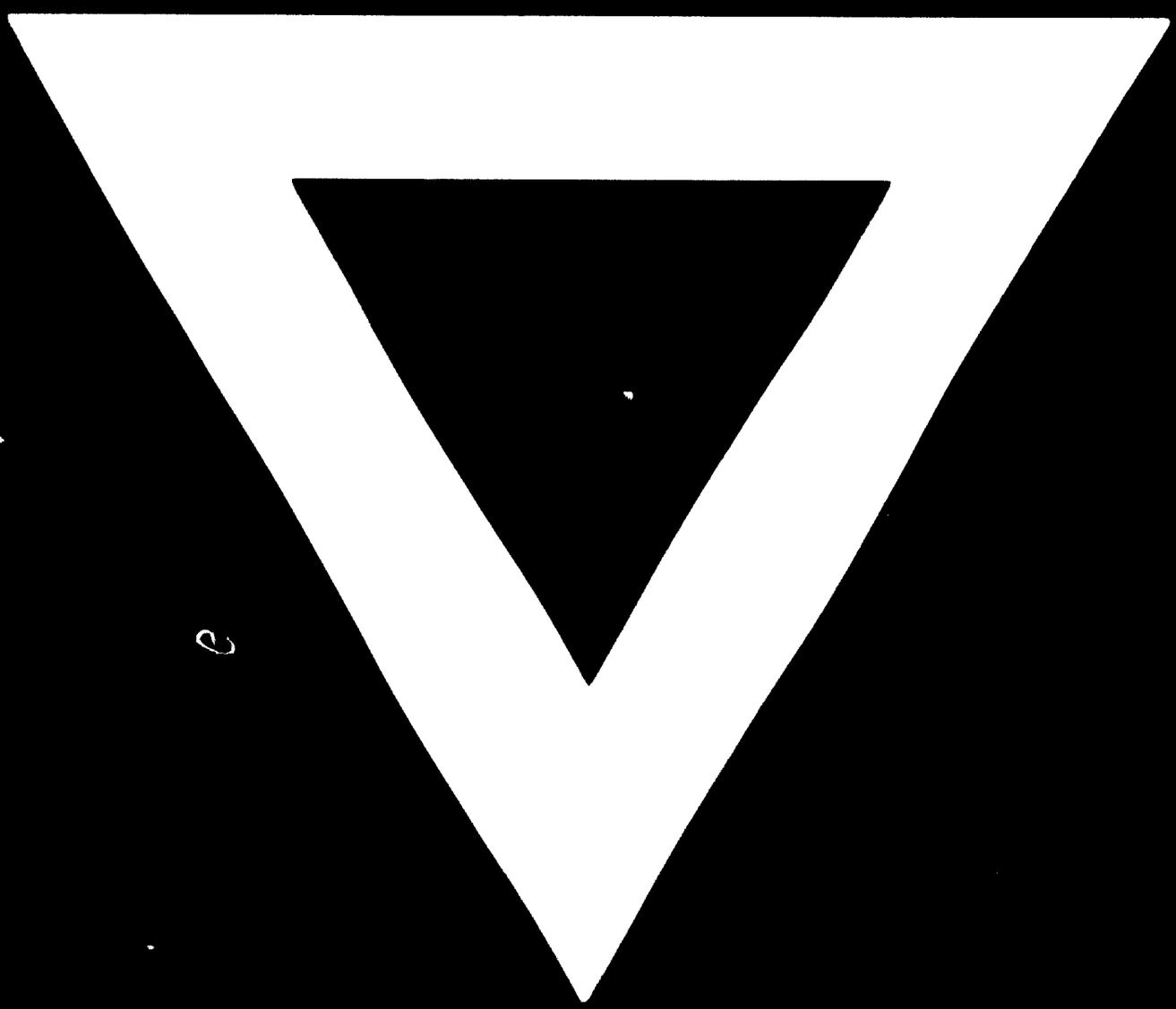

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