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

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TEXTILE DEVELOPMENT CENTRE

DP/EGY/77/008/11-10

EGYPT

Terminal Report*

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

Based on the work of J. Gordon,
Expert in the stability of knitted cotton

Backstopping officer: A. Eräneva, Agro-based Industries Branch

United Nations Industrial Development Organization
Vienna

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INTRODUCTION

1.A The Textile Development Centre

A Textile Development Centre has been set up over the past six years at the Textile Consolidation Fund in Alexandria where there already exists a Textile Testing and Quality Control Organisation, itself the result of an earlier UNDP programme.

The purpose of the Textile Development Centre is to provide assistance to the textile industry through applied research and development activities in all aspects of textile manufacture from fibres to finished garments.

The Centre when fully established will have the objectives of:-

(i) providing pilot plant and testing laboratories for work on industrial problems of immediate use to the textile industry.

(ii) carrying out pilot plant studies of materials, particularly cotton and its blends, including fibres, dyes, finishes, machines and processes;

(iii) carrying out quantitative and operational studies on industrial processes in textile mills to increase productivity and efficiency;

(iv) providing technical consultancy in management and technological problems and extending modern testing techniques to industry;

(v) communicating to industry at all levels by organising seminars, conferences, symposia, group discussions and training courses.

(vi) disseminating technical information to industry; and

(vii) assisting the industry to set and maintain standards.

1.B. The Expert in the Dimensional Stability of Knitted Cotton Garments

According to Job Description DP/EGY/77/008/11-11/K/31.7.B. the expert was assigned to the Textile Development Centre but the vast majority of the work was undertaken in the four largest vertically integrated weft knitting, dyeing and finishing and garment making companies within the public sector of the Egyptian Textile Industry.

The main tasks of the expert was to :-

1. Study the current levels of dimensional stability achieved in the different companies and compare the results with customer demands and international standards.

2. Make critical surveys of the equipment, technique and procedures used in the companies.

3. Give practical advice on how the dimensional stability of the knitted fabrics can be improved and how these improvements can be ensued in the finished garment.

1.C The Nature and Duration of the Assignment

The purpose of the assignment was to carry out the duties as specified in section 1.B. The total assignment was for a total of two months, which was split into two periods of one month duration. The first period of one month commenced in mid February 1985, and the second period at the beginning of October 1985. Details of the work programme are given in Appendix 1 but can be broken down into three main areas.

A) Assessment of procedures and conducting trials in the four knitting companies comprised over 80% of the experts time when on station in Egypt.

B) Training at the T.D.C. and production staff by practical demonstration of a logical approach to problem solving.

C) Discussions with Production and T.D.C. staff on applied research and fabric development programmes.

2. ACTIVITIES

2.1 Direct Assistance Through Technical Consultancy

A study was made of the organisation and processing procedures of the four largest weft knitting companies in the public sector of the Egyptian Textile Industry. This was facilitated by taking patterns of fabric at the knitting stage and examining changes which occurred during dyeing and finishing.

The four companies involved were :

(a) El-Nasr Clothing and Textile Co (KABO)
(b) Cairo Clothing and Hosiery Co. (TRICONA)
(c) El-Nasr Wool and Selected Textile Co. (STIA)
(d) El-Nasr Spinning, Weaving and Knitting Co (CHOURBAGUI)

Critical assessments were made of the bleaching, dyeing and finishing machinery currently in use within the companies. Recommendations were made as to the areas which would benefit from mechanical improvements and further capital expenditure.

2.2 Works Processing Trials

The major part of the time on station was taken up with the organisation and implementation of practical trials within the three above named companies. These trials included the comparison of the alternative bleaching and finishing methods available in each of the companies on their major fabric qualities. An analysis was made of each step of the processing sequences and their effect on the stability and final performance of the completed garments was assessed.

2.3 Training of TDC Staff in Technical Quality Investigations

Scientific and technical staff members of the TDC were instructed in the planning and practical implementation of processing trials within production companies. These trials were conducted so that the current quality performance could be critically analysed and recommendation for improvements could be made, if applicable.

It is expected that the counterparts Chem. Abdul Hamid Khairallah and Eng. Soheir Seif El-Nasr will be able to give assistance to the public sector mills in the planning of suitable trials and quality control procedure.

3. RECOMMENDATIONS

3.1 Regarding The TDC

Discussions at the three knitting companies visited indicated areas where development work carried out at the TDC could facilitate considerable improvements in the performance of knitted garments. Examples are given below :

a) It was noticed that there was a difference in the degree of whiteness in fabrics from different companies, whilst one mill was using an Organo phosphate stabiliser, the other two are still using Sodium Silicate as a stabiliser in hydrogen peroxide bleaching. If silicate could be replaced by Organo phosphate stabilisers then the fabric would have a softer handle with a reduced risk of sewing damage at making up. Work should be initiated at the TDC comparing whiteness levels and assisting each mill to achieve maximum whiteness.

b) A combined set of recommendations of the procedures and testing equipment required for quality control should be prepared, and an approach made to individual companies with advice on the introduction of standardised testing of both chemical and physical parameters and the regularity at which these tests should be carried out. Subsequent to the introduction of quality control at each mill periodic visits would ascertain the overall changes in quality that have been achieved.

c) The installation of an automatic washing machine and tumble drier has enabled testing to international standards to be carried out. With this facility the TDC should evaluate the difference in products of similar quality from each mill.

d) There is obvious need for work to be undertaken to establish the optimum finished width of each knitted structures with regard to yarn count and stitch length. This work should be set up on a joint basis with help and machine availability being given by the major knitting companies.

e) A significant proportion of the TDC work on knitted fabric has been involved with the warp knitting of cotton. The yarn strength and levelness required for warp knitting is extremely stringent and this has led to only limited success. Additionally the commercial demand for warp knit is small, far smaller than the demand for higher quality weft knitted fabrics. There should be an increase in the number of technicians in the knitting department to allow them to carry out in depth evaluations of knitting structures and machinery, and to expand the type of training courses that are offered to industry.

3.2 Regarding the Operating Companies

Regarding the companies visited, recommendations were given in the technical reports submitted to each individual company. One important area is the need to implement the study of the relationship between the width of the relaxed bleached fabric and the finished width for the major qualities. The staff of the TDC should act in a co-ordinating role so that there is a good flow of information between the operating companies.

The time spent at each company was allocated in relation to the production volume. The Kabo company produces 22 tons of weft knitted fabric per day, Tricona and Stia produce 6 and 2.5 tons respectively whilst Chourbagui produces 0.8 tons of weft knitted fabric.

A reliable system of quality control has been satisfactorily installed within the Kabo company and over the period of the assessment there has been an increase in stringency and the level of performance is showing improvement. A similar approach to quality control should be instigated within the other companies.

In Europe garments made from the finer quality fabrics such as single jersey and fine rib obtain higher prices in the market place. These garments are actually lighter in weight than the popular qualities being produced in Egypt. It would be more advantageous for the Egyptian manufacturers to produce the higher added value qualities for export. In this way the country achieves a far greater return for each kilo of cotton exported.

WORK PROGRAMME

POST : 11-11/K/31.7.B. EXPERT IN THE DIMENSIONAL STABILITY OF COTTON KNITTED GARMENTS

NAME: JOHN GORDON

FEBRUARY 1985

14	Travel to VIENNA
15	UNIDO Briefing
16	Travel to Cairo
17	UNDP Cairo briefing/travel to Alexandria
18	Discussions with the staff of TDC
19	Initial Visit to EL-NASR WOOL and SELECTED TEXTILES "STIA" and is EL-NASR Clothing and Textile Co. "KABO"
20	TRIALS AT STIA
21	TRIALS AT STIA AND KABO
23	Initial Visit to CAIRO CLOTHING AND HOSIERY CO "TRICONA"
24-27	TRIALS AT KABO
28	Discussions on KABO Trials

MARCH 1985

2	Testing at the TDC
3-5	TRIALS AT TRICONA
6	Trails at KABO
7	Discussions at STIA on Recommendations
9	Discussion at the TDC
10	Discussion at KABO on Recommendations
11	Report Writing at TDC
12	Travel to Cairo, Discussion at Tricona, UNDP debriefing
13	Travel to ENGLAND

October 1985

2	Travel to Cairo
3	UNDP Cairo Briefing
4	Travel to Alexandra
5-6	Discussions with the staff at TDC
7	Initial Visit to El-Nasr Clothing and Textile Co (KABO)
8-9	Trials at KABO
10	Initial Visit to El-Nasr Wool and Selected Te tile Co (STIA)
12	Initial Visit to Cairo Clothing and Hosiery Co (TRICONA)
13-14	Trials at TRICONA
15-18	Trials at KABO and STIA
19	Joint Meeting at the TDC with Dr Dahmoush Chairman of Textile Industries Corporation
20-21	Trials at KABO
22	Initial Visit to El-Nasr Spinning, Weaving & Knitting (CHOURBAGUI)
23	Trials at TRICONA, UNDP Debriefing
24-30	Testing at the TDC
27-30	Discussion on Planning and equiping of new dyeing and finishing department at STIA
31	Discussion at STIA and KABO on recommendations

November 1985

2	Discussions at TRICONA on recommendations
3	Travel to Vienna
4	UNIDO Debriefing
5	Travel to England

APPENDIX 2

VISIT REPORTS

PRELIMINARY VISITS TO EL-NASR WOOL AND SELECTED TEXTILES CO. (STIA) ALEXANDRIA ON TUESDAY 19TH FEBRUARY 1985 AND THURSDAY 10TH OCTOBER 1985

SUMMARY

The main purpose of the initial visit was to hand over a letter of introduction to the company and confirm their co-operation in the assessment of their present equipment, procedures and current dimensional stability performance of their weft knitted cotton underwear.

The subsequent visit in October was to discuss with the Chairman the new projected development to improve the knitting, dyeing and finishing of underwear fabric using the existing factory buildings and mill services.

PERSONNEL

Accompanied by the counterparts Chem. Adbul Hamid Khairallah, General Manager of Dyeing and Finishing Department and Eng. Scheir Seif El-Nasr, Knitting & Garment Technologist at the T.D.C. an initial meeting was held with Eng. Gamal Mannaa the General Manager of Spinning and Mrs Inas Amin Selim Chemist and General Manager of the Knitted Fabric Dyeing and Finishing Departments.

DISCUSSION

The "Stia" Company is primarily engaged in the spinning, weaving and finishing of woollen and worsted fabrics and ready-made garments and they operate from nine production mills around Alexandria. Their total production for all the mills is based upon a consumption of 150 tons of yarn per week.

The main purpose of the visit was to hand over a letter of introduction to the company and confirm their co-operation in the assessment of their present equipment, procedures and current dimensional stability performance of their weft knitted cotton underwear business.

The weft knitted production comprises cotton underwear, wool outerwear and half hose. The cotton portion of this production is up to 15 tons per week (7,000 dozen garments), and employs around 350 people in the knitting, finishing and garment making departments. Over 90% of this production is underwear for home trade customers, the remainder is made up of T shirts which are exported to Western Europe.

The knitting department is made up of thirty five weft knitting machines for Interlock, Coarse Rib (Derby) and Single Jersey in the various body size diameters. The machines are generally old and only seven machines are fitted with positive feed.

After a tour of the factory further discussions were held to outline the trials that we would undertake on the two major qualities that are being produced. The details and results of the trials are covered in a technical report.

During the meeting on the 10th October the Chairman explained that he was putting forward a plan to modernise the whole of the weft knitted underwear operation. He planned to instal new knitting machines and re-equip the dyeing and finishing departments. He asked that only a short time be spent on current production as he was fully aware from the previous work of the shortcomings in the current equipment

The Chairman wrote to the Textile Development Centre requesting that some time should be set aside to help in the planning of this project. The request for a short extension to the mission was subsequently approved by UNDP in Cairo. The initial objective was to increase production to 3000 Kg per 16 hr working day. The breakdown staying similar to the current production which is 75-80% Bleached White for underwear and 20-25% piece dyed for T-Shirts and other outerwear.

I would like to thank the following individuals within "Stia" for their help and co-operation in the setting up and successful completion of these trials.

Eng. Ahmed Abdul Wafa, Chairman
Eng. Gamal Mannaa General Manager, Spinning & Knitted plain
Chem. Inas Amin Selim General Manager, Knitted Fabric Dyehouse.
Chem. Safia Bastawy Supervisor, Knitted Fabric Dyehouse.

VISIT REPORT

PRELIMINARY VISIT TO EL-NASR CLOTHING AND TEXTILES CO. (KABO) ALEXANDRIA ON TUESDAY 19TH FEBRUARY 1985 AND MONDAY 7TH OCTOBER 1985

SUMMARY

The visits were made to re-establish the Companies co-operation in the assessment of the current dimensional stability performance, and the processing changes that have been made since the previous appraisal.

PERSONNEL

Accompanied by the counterparts Chem. Abdul Hamid Khairallah and Eng. Soheir Seif El-Nasr of the TDC., an initial meeting was held with Mr Hassan Abdul Kader Abdul Salem, Chairman.

Since the last visit to the company two years ago, there has been substantial changes in the senior personnel of the company, including the appointment of Mr Hassan Abdul Kadar Abdul Salem as Chairman from his previous position as Commercial Director.

DISCUSSION

The Chairman explained the changes in structure and policy that had occurred during the previous year and welcomed any further help that could be given in improving quality and productivity within the company.

The garment production has increased from 10,000 to 12,000 dozen garments a day with no increase in the 6,800 people employed there. The company markets the garments under their brand names. The highest quality is the JIL label, which is used under licence in Egypt and the other Middle Eastern markets from the French manufacturer Andre Gillier. The Super Kabo label is also used in the Egyptian market as well as being the trade mark for exports to Western Europe. The KABO label is used for popular qualities for the home market.

The quality control department has been expanded by the addition of a third automatic washing machine for dimensional stability testing and an Atlas Laudrometer which is being used for wet fastness testing.

A tumble dryer has been ordered which will allow a faster assessment of the total shrinkage potential of the fabric.

The company have extended the quality control procedure so that every batch (approximately 150 kg) of fabric is tested for dimensional stability and approval is required before this fabric can be laid up for cutting. A number of spot checks were made of fabric on the cutting table and in each case approval had been given for laying up.

Fabric intended for garments marketed under the JIL and Super Kabo label have to achieve a specification which calls for maximum shrinkage of 7% in length and in width on machine washing and flat drying.

A tour of the factories was made in the company of Eng. Abdul Khalick Yassin, General Manager, Research and Quality control, during which it was apparent that over the last two years only minor additions had been made to the production equipment in use. It was also noticed that the hand cleaning solvent in use in the garment making department was Trichloroethylene. This has a substantially higher toxicity than III Trichloroethane which has now become the standard cleaning agent throughout Western Europe. It is recommended that this change be made without delay.

I would like to thank the following individuals within 'KABO' for their help and co-operation during my stay.

Mr Hassan Abdul Kader Abdul Salam	Chairman
Eng. Gabriel Naggi	Production Director
Eng. Abdul Khalick Abdul Yassin	General Manager, Research and Quality Control
Eng. Mohammed Ibrahian El-Tabak	General Manager, Dyeing and Finishing
Eng. Omar El-Kadin	General Manager, Knitting
Eng. Moltazm Abdul Monen Sileem	Dyehouse Manager
Eng. Mohammed Ahmed Elbanna	Quality Testing Manager

APPENDIX 2 - (CONT'D)

VISIT REPORT

PRELIMINARY VISIT TO CAIRO CLOTHING AND HOSIERY CO. (TRICONA) CAIRO ON SATURDAY, 23RD FEBRUARY 1985 AND 12TH OCTOBER 1985

SUMMARY

The main purpose of the visit was to hand over a letter of introduction to the company and confirm their co-operation in the assessment of their present equipment, procedures and current dimensional stability performance of their weft knitted cotton underwear.

Further trials were arranged to assess the processing of each of the body size diameters and the correlation between bleached dimension and the calender width setting.

PERSONNEL

An initial visit was made to the Cairo Clothing and Hosiery Company 'Tricona' with Eng. Soheir Seif El Nasr the Supervisor of the knitting Department at the T.D.C. and discussions were held with Textile Eng. Mohammed Ezzeldin Awad the production Director and Technical Manager, Eng. Wadi Younan, Head of Engineering Services and Eng. Hoda Zaki, General Manager of the Dyeing and Finishing Department.

DISCUSSION

The main purpose of the visit was to hand over a letter of introduction to the company and confirm their co-operation in the assessment of their present equipment, procedures and current dimensional stability performance of their weft knitted cotton underwear business.

The company was formed by the amalgamation of a number of private sector companies engaged in the knitting and finishing of cotton goods. Tricona consume six tons of yarn per day which is made up into 4000 dozen garments and employs a workforce of 4000 personnel at 5 sites.

There are two garment making units within the company, and 95% of production is on underwear and 5% on outerwear.

The knitting operation is carried out on two sites, the outerwear flat knitting and half hose section which is made up of some sixty flat knitting machines. The tubular knitting section contains one hundred and seventy circular knitting machines of which approximately fifty are modern machines with either positive feed or yarn storage units. A further sixty of the weft knitting machines are six and eight feed single jersey link needle machines.

The dyeing and finishing of the knitted fabric is carried out at two plants. A lot of building and modernisation is being carried out at the Sogat factory which is now based on a continuous bleaching system. A Jemco continuous bleaching range is in operation and an additional atmospheric winch is used to scour dirt contaminated fabric.

A Tri-pad water extraction and softening mangle is utilized together with a Tube-tex two drum relaxed drier and three Heliot calenders. Hand operated hank dyeing becks are also used. A Dornier mercerising machine has recently been installed for tubular piece mercerisation and efforts are being made to increase this area of business.

The bleaching and dyeing facilities at the Wadi El Nil mill are based upon batch production machines. Bleaching is carried out in eight open and eight enclosed winches. A two tube Scholl high temperature dyeing machine is used for high temperature dyeing, atmospheric dyeing is also carried out on three winches. The factory has a four drum Fleissner drier and Heliot and Monti calenders. A very short band stenter which equates to a single chamber has been installed.

After discussion it was agreed that trials would be carried out on the four most important production fabrics in each of the two finishing plants. The results and findings are given in the technical report TDC/TR3.46.

During the meeting on the 12th October with the Chairman he explained that they were planning to stop bleaching at Wadi El Nil and move all the production into SOGAT. He therefore requested that all the time be spent at SOGAT. Since the visit in February CHEM. IDA. BENDARY had been appointed responsible for quality control.

I would like to thank the following individuals within Tricona for their setting up and successful completion of these trials.

Eng. Gamal El Manadily, Chairman.
Eng. Mohammed Ezzeldin Awad, Production Director and Technical Manager.
Eng. Wadi Younan, Head of Engineering Services.
Eng. Mrs Hoda Zaki, General Manager of the Dyeing and Finishing Department.
Chem. Miss Ida Bendary, Quality Control Chemist.

VISIT TO EL-NASR SPINNING, WEAVING AND KNITTING CO. (CHOURBAGUI) CAIRO ON TUESDAY 22ND OCTOBER 1985

SUMMARY

An assessment has been made of the current facilities and without a large capital expenditure there does not appear to be much opportunity to increase the quality weft knit underwear operation. The pattern wheel machines could be used more successfully to produce a range of ladies outerwear and dresswear.

PERSONNEL

A visit was made in the company of Chem Abdul Hamid Khairallah, General Manager of Dyeing and Finishing at the Textile Development Centre to Chourbagui, and discussions were held with the newly appointed Chairman Eng Salah El Attar and the Head of the Finishing and Knitting sector Chem Nour Eldin Moustaffa.

DISCUSSION

The Chourbagui company currently produces 8 million metres of fabric per year. The factory has its own weaving operation and a small warp knitting unit producing lingerie fabric.

The weft knitting department has a range of double jersey machines including six Jacquard pattern wheel machines producing cotton underwear. These machines have come from Misr Mahalla. In addition ten of the body size machines are operational but these are 30-40 years old. At the present time the company does not have the correct assortment of body size machines to produce the full range of garment size in any of the standard tubular finished qualities. The 30" diameter pattern wheel machines are currently being used to produce plain cotton interlock fabrics which are then cut and side seamed to fill in the missing diameters.

The Chairman is interested in producing plush velours and filament textured fabrics for ladies outerwear as well as a range of high quality underwear fabric. An increase in production of Interlock, Jersey and Fine Ribs from the current 800 kg per day to 1,500 kg per day is also envisaged. The dyeing and finishing works was set up to handle woven cotton fabric and a small amount of woven polyester/cotton and the warp knitted synthetics of the jet dyeing machine winch dyers and stenter are very suitable for finishing the synthetics fabrics. The Theis R95 jet dyeing machine would be suitable to bleach and dye the knitted cotton fabric, but the current tubular finishing calender is very old and is in need of replacement.

The only drying facilities for tubular knit fabric are in the open air on the roof of the building. Since the appointment of the new chairman his bleaching and finishing of tubular knitted fabrics has ceased and is currently being carried out on commission at the Sogat factory of Tricona. The company has its own making up units and its own retail outlets for underwear and ladies outerwear.

CONCLUSION

Without a large amount of capital spending there does not appear to be much opportunity to increase the quality weft knit underwear operation. The pattern wheel machines could be used more successfully to produce a range of ladies outerwear and dresswear to be sold in their retail outlets this would involve little additional expense.

APPENDIX 3

TECHNICAL REPORT

ASSESMENT OF PROCESSES AND PROCEDURES USED IN THE PRODUCTION OF KNITTED UNDERWEAR AT EL-NASR WOOL AND SELECTED TEXTILE CO. (STIA) ALEXANDRIA

SUMMARY

The dimensional changes that occur during the Standard Processing Routes of the two major fabric qualities are assessed. The findings indicate a number of areas where changes in methods would lead to substantial improvements in the performance of the final garments.

Further trials were arranged to assess the processing of each of the body size diameters and the correlation between bleached dimensions and calender width settings.

INTRODUCTION

A trial was instigated whereby batches of 20 gauge interlock fabric and 14 gauge 2 x 2 rib (Derby), produced from 1/30 'cc carded yarn, were marked up in the greige state and then the fabric passed through the normal production procedure without any modifications being made to the standard conditions.

The dimensional changes that occurred on each of the production steps was measured and the final fabric was then laundered in an automatic washing machine, initially for one wash at 60°C followed by flat drying and then for a further four washes. The laundering was undertaken at the Textile Development Centre make weight pieces being used to give a standard load size.

During the follow up visit a further trial was arranged to assess the current dimensions of the fabric at the greige, bleached, calendered, relaxed and washed stage of processing. An analysis was made of the 20 gauge interlock and 14 gauge coarse rib (Derby) qualities, from each of the machine diameters, and measurements were made at every processing step and the percentage extension in calendered width over bleach width calculated. The results are given in the accompanying tables.

FINDINGS.

The results of this first trial, on the attached table, quantified the dimensional changes that occurred on each processing step.

The scouring and bleaching of the fabric is carried out in five traditional atmospheric winch dyeing machines, which allow the fabric to shrink as near as is possible to the fully relaxed reference state. After scouring, the fabric goes through a two stage bleaching process comprising a pre-bleach in a cold solution of Sodium Hypochlorite followed by a boiling solution of Hydrogen Peroxide and optical brightening agent. The Hydrogen Peroxide bleaching system is currently being stabilised by Sodium Silicate, if this was replaced by an Organo Phosphate stabiliser then the fabric would have a softer handle and the risk of sewing damage at make up would be substantially reduced.

The bleached fabric is centrifuged and then opened on a scutcher fitted with an internal stretcher. The table of results indicates that the scutcher causes some length tension but the extension should only be of a temporary nature. More care is obviously needed in setting the stretcher width as the interlock fabric was opened by 10% above the gross width and this in itself could lead to substantial bow distortion.

The Textima drum driers are currently a major cause of length extension. This is probably due to the entry conveyor speed running slightly slower than the speed of the drums.

After drying, the fabric is calendered to the specified width on one of two Weiss steam calenders. It was found that the calenders were being operated with the edge driving wheels running at a slower speed (giving negative overfeed) than the main drive of the machine. The finished fabric is rolled at the top of the calender to facilitate its transportation to the garment making department.

The batching of fabric on rolls after calendering reduces the opportunity for fabric to relax, if the fabric was plaited at the calender, further relaxation would occur. In pieces where bow distortion was present plaiting would allow the fabric to be calendered a second time in the reverse direction which would help to eliminate the distortion.

Both of the qualities studied have been calendered to a wider width than the original greige fabric. This finished width is specified by the making up department to fit in with the size requirements of the final garments.

Whatever the increase in finished width over the winch bleached width, this additional amount will be reflected in the dimensional stability of the final garment. An assessment should be made of the ratios of winch bleached to the finished width specifications of fabric from the different knitting machine diameters. Excessive shrinkage could be avoided by ensuring good correlation between relaxed and finished width for each machine diameter.

STIA

PRODUCTION STEPS	20 GAUGE INTERLOCK PRODUCED FROM 1/30'SCC CARDED YARN				14 CAUGE 2x2 RIBS (DERBY) PRODUCED FROM 1/30CC CARDED YARN.			
	CUMULATIVE % CHANGE		% CHANGE ON EACH STEP		CUMULATIVE % CHANGE		% CHANGE ON EACH STEP	
	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH
GREIGE FABRIC	0	0			0	0		
WINCH BLEACHED	-9.2%	-1.9%	-9.2%	-1.9%	-6.3%	+10.1%	-6.3%	+10.1%
CENTRIFUGE + SCUTCHER (WITH STRETCHER)	-7.4%	+10.4%	+1.8%	+12.3%	-3.5%	+12.2%	+2.8%	+2.1%
TEXTIMA DRYER	-6.0%	-11.7%	+1.4%	-22.1%	-0.8%	-8.5%	+2.7%	-20.7%
WEISS CALENDER (WITH STRETCHER)	-5.2%	+2.5%	+0.8%	+14.2%	+0.8%	+24.5%	+1.6%	+33.0%
AFTER 24HRS RELAXATION	-5.8%	-0.4%	-0.6%	-2.9%	-1.6%	+20.0%	-2.4%	-4.5%
1 WASH CYCLE AT 60°C + FLAT DRY	-11.2%	-3.6%	-5.4%	-3.2%	-4.0%	+2.2%	-3.6%	-17.6%
5 WASH CYCLES AT 60°C + FLAT DRY	-16.2%	-4.0%	-5.0%	-0.4%	-8.2%	+6.6%	-4.2%	+4.4%

The forgoing table indicates that if each of the qualities had been finished out at the fabric dimensions achieved after winch bleaching then the final garment shrinkage would be well within the internationally accepted limits.

Dimensional Changes on Washing

	Shrinkage			
	Interlock		Derby	
	Length	Width	Length	Width
From calendered dimension to after 5 wash cycles	-11.0%	-6.5%	-9.0%	-18.6%
After 24 hrs relaxation to after 5 wash cycles	-10.4%	-3.6%	-6.6%	-13.6%
Notional performance compared with bleached dimension	-7.2%	-2.1%	-1.9%	-3.7%

There is a need to instigate regular dimensional stability testing on the fabric. It is recommended that an automatic washing machine and tumble drying machine be purchased in order to enable testing to be carried out to set specifications.

FOLLOW UP VISITS

During the second mission a step wise examination of the processing was repeated to assess the changes that had occurred since the first evaluation. The Textima dryers were found to be an area for concern.

Ideally the entry conveyor should run between 10 to 15% faster than the drum speed, therefore allowing the fabric to take up the maximum shrinkage on its passage around the perforated drums.

Examination of the dryers revealed that the overfeed wheels on the side of the machine were very stiff due to lack of use, a maintenance engineer was able to free them so that additional trials could be run with overfeed applied. The overfeed made a substantial improvement but due to wear on the slatted wooden input brattice

some fabric slipping could occur. As the height of the fabric in the wagon feeding the dryer reduced, the weight of fabric being lifted up onto the brattice increased and this resulted in a substantial degree of slippage. The fitting of a roller in contact with the brattice at the point where the fabric first comes onto the entry of the dryer, as installed on the Fleissner dryer, would help to alleviate this problem and enable overfeed to be applied continuously to the fabric.

The following table illustrates the dimensional changes that occurred on drying 20 gauge interlock when overfeed was applied.

Dimensional Changes on Textima Dryer
20 gauge interlock produced
from 1/30's carded cotton

	As Set Up					With addition of overfeed	
Machine Diameter	19"	20"	21"	22"	24"	20"	21"
Extension of fabric	+3.0%	+5.7%	+4.3%	+7.0%	+5.5%	-1.8%	-1.3%

The average of length extension produced on drying was 5.1% in comparison with 1.5% shrinkage that was produced after modification. This reduction of 6.7% in fabric length after drying will be effected in substantially better dimensional stability of the final garments.

The addition of a roller on the entry and/or the replacement of worn wooden slats on the brattice would allow this improvement to be achieved consistently.

An analysis was made of each knitting machine diameter of the 20 gauge Interlock and 14 gauge 2 x 2 Rib (Derby) produced from 1/30 cc carded cotton yarn. Measurements were taken in greige, bleached calendered and laundered conditions and the percentage increase of calender settings over bleached widths were calculated.

The enclosed table shows that there is very poor correlation between these figures for the different diameters. The 13" to 17" diameter fabrics are being finished out at up to 55% wider than the bleached width.

In explaining the effect of the excessive calender widths set by the making-up department, it is important to understand that the only way that a fabric width can be increased in width, for a given structure and count of yarn, is to either increase the knitted loop length or knit the fabric on a larger diameter machine.

For any given knitting machine setting, the only way that excessive shrinkage can be avoided is by reducing the calender width setting. The optimum would be to increase the fabric width to between 20 to 25% above the bleached dimensions for each diameter.

20 GAUGE INTERLOCK PRODUCED FROM 1/30's cc CARDED COTTON YARN

Knitting diameter in inches	Greige width in cms flat tube	Width after bleaching and drying	Current Calender width settings	Width after 24 hrs relaxation	Width after one wash at 60°C + flat dry	% Increase of Calender width over bleached width
13"	28.1	24.6	37	27.9	26.9	55.4%
15"	31.5	27.8	43	32.6	30.1	54.7%
16"	36.4	29.7	45	36.3	33.8	51.5%
17"	37.4	33.3	47	36.4	35.3	41.1%
19"	46.8	40.0	53	44.0	42.4	32.5%
20"	48.0	42.25	55	44.8	44.8	30.2%
21"	50.0	43.2	56	47.7	47.2	29.8%
22"	53.9	44.7	60	50.3	48.4	34.3%
24"	62.9	49.8	65	55.8	55.4	30.4%
27"	60.0	56.3	72	61.7	61.6	27.9%
28"	70.6	57.7	75	64.6	64.1	30.2%

14 GAUGE 2 x 2 RIB DERBY PRODUCED FROM 1/30cc CARDED YARN

Knitting diameter in inches	Greige width in cms flat tube	Width after bleaching and drying	Current Calender width settings	Width after 24 hrs relaxation	Width after one wash at 60°C + flat dry	% Increase of calender width over bleached width
16"	25.0	23.2	35	22.6	23.9	50.8%
18"	26.3	26.4	40	32.2	27.4	51.5%
20"	31.4	29.8	45	33.4	30.4	51.0%
22"	35.1	33.9	47	38.9	34.3	38.6%

ASSESSMENT OF PROCESSES AND PROCEDURES USED IN THE PRODUCTION OF KNITTED UNDERWEAR AT EL-NASR CLOTHING AND TEXTILES CO. (KABO) ALEXANDRIA

SUMMARY

Trials were initiated using three of the major production qualities that had been assessed in the previous study two years ago. It was found that there had been a substantial improvement in dimensional stability over the intervening period.

Further trials were arranged to assess the processing of each of the body size diameter and the correlation between bleached dimensions and calender width settings.

INTRODUCTION

Trials were initiated using three of the major production qualities that had been assessed in the previous study two years ago. These included batches of both high and popular fabric qualities comprising:

(1) 18 gauge Single Jersey Quality 62413 produced from 7/60 'cc Combed and singed Yarn

(2) 20 gauge Interlock produced from 1/30 'cc Carded Yarn

(3) Fine Rib Quality 21814 produced from 1/33 'cc Combed Yarn

Approximately 10 tons of fabric a day is bleached on the Jemco Continuous J-Box machine and a further 6 to 8 tons a day is bleached on atmospheric winches. The remaining 4 to 6 tons a day being dyed on Jet and Winch dyeing machines.

The fabric was marked up in the greige state and then the fabric passed through the various production steps without any modifications being made to the standard condition.

The dimensional changes that occurred on each of the production steps was measured and the final fabric was then laundered in an automatic washing machine, initially for one wash at 60°C followed by flat drying and then for a further four washes. The laundering was undertaken at the Textile Development Centre make weight pieces being used to give a standard load size.

FINDINGS

The results of the trials on the enclosed tables, show once again that the processing route has a major effect on the final fabric dimensions. The Jemco continuous bleaching range is still causing substantial length extension, this problem relates to the design philosophy of the machine rather than how it is operated. The drive roller after the saturator and counterflow washer runs

faster than the padding bowls and this is causing some fabric extension. The fabric is very closely packed into the bleaching J-Box and this high density packing along with the very low liquor to goods ratio restricts the relaxation of the fabric. A check on the liquor pick up on the fabric entering the J-Box gave a pick up of 128%.

These extension problems with the Jemco line has restricted its use to popular qualities, but this in itself is limiting the full utilization of the machine. The current practice of applying softener on atmospheric winches after Jemco bleaching allows the fabric some recovery. One of the main drawbacks of this method is that the fabric is split down into individual pieces for loading onto the winch, wasting time and fabric by edge trimming and re-sewing. An alternative method of loading the winch with a continuous rope was suggested and after three successful trials, it was put into general operation.

As in the previous study the winch bleached fabric is as close to the fully relaxed reference state as is possible and if the fabric was finished out at those dimensions a dimensionally stable fabric would be produced.

After bleaching and softening the fabric was dewatered and dried by one of the three alternative routes available but in each case batches from each of the two bleaching methods were processed by the same drying routes. The Tri-pad extractor is still causing some length extension but this is being more than compensated for by the substantially improved performance of the four drum Fleissner dryer.

Previously the Fleissner drier was causing a length extension of between 6 and 8%, currently the drier is now giving a length shrinkage of 2.5 to 4%.

Since the last visit, a Pegg Whitley Super Express drying and finishing machine has been introduced. The trials carried out using this machine show length extensions on extraction and drying of up to 8%. There are a number of variables connected with input speed and drying speed in different compartments of the machine and a more comprehensive study of the machine should be made in order to optimise running conditions to achieve the best results.

Figures quoted in the table showing dimensional changes on washing from calendering and relaxation to after a 5 wash cycle, were chosen from fabrics which have been processed by a standard route the only variable being the bleaching conditions. With the inclusion of softening on the winch the improvement in performance on the Fleissner drier results obtained after relaxation on fabric from the Jemco line are just acceptable. Results obtained on the winch bleached fabrics after relaxation are excellent. This is not the case before relaxation due to the calender being run with the width setting too high, but as the fabric is plaited from the calender this allows it to relax prior to cutting for garment making up.

As a standard procedure fabric qualities which are prone to bow distortion are run twice on the calender, once in each direction to help reduce the distortion. Overall there has been a marked improvement in the fabric performance on the previous study two years ago.

The calendered fabric is now being plaited and two passes through the calender are now standard for all but the popular qualities. For the second pass a reduced stretcher width is used which, again helps to reduce the distortion.

The fine rib quality is a very robust structure and this study indicates that acceptable dimensional stability can be achieved even when the fabric has been bleached on the Jemco line. A recommendation was made that further trials should be carried out with this fabric so that this quality can be moved onto the Jemco range and so overcome the production inbalance.

KABO

FINE RIB QUALITY 21814 PRODUCED FROM 1/33'CC CARDED YARN

PRODUCTION STEPS	17" DIAMETER				18" DIAMETER			
	CUMULATIVE % SHRINKAGE LENGTH	WIDTH	CUMULATIVE % SHRINKAGE LENGTH	WIDTH	CUMULATIVE % SHRINKAGE LENGTH	WIDTH	CUMULATIVE % SHRINKAGE LENGTH	WIDTH
JEMCO BLEACHED	+1.2%	-20.2%	-0.8%	-17.5%				
JEMCO BLEACHED + WINCH SOFTENED	-0.8%	-20.6%	-2.6%	-15.2%				
WINCH BLEACHED					-3.8%	-21.7%	+0.8%	-22.6%
TRI-PAD EXTRACTION (WITH STRETCHER)								
CENTRIFUGE AND SCUTCHER WITH STRETCHER			-2.8%	-17.3%			+0.2%	-23.8%
PLEISSNER DRY	-2.4%	-18.3%	-4.2%	-13.8%	-3.6%	-25.7%	-5.6%	-24.4%
PEGG WHITELY EXTRACTOR + DRYER								
HELIOT CALENDER (WITH STRETCHER)	0	-9.9%	-0.8%	-7.2%	-0.4%	-12.7%	-0.2%	-11.6%
AFTER 48 HRS RELAXATION	-0.4%	-20.2%	-1.0%	-17.5%	2.0%	-23.5%	-1.2%	-23.8%
1 WASH CYCLE AT 60°C + FLAT DRY	-5.8%	-19.6%	-6.6%	-17.3%	-6.4%	-22.5%	-6.2%	-21.6%
5 WASH CYCLES AT 60°C + FLAT DRY	-7.6%	-20.4%	-9.2%	-16.6%	-6.6%	-23.0%	-9.4%	-20.8%

KABO

18 GAUGE SINGLE JERSEY QUALITY NO.62413 PRODUCED FROM 2/60'CC COMBED AND SINGED YARN

PRODUCTION STEPS	19" DIAMETER				20" DIAMETER			
	CUMULATIVE % SHRINKAGE		CUMULATIVE % SHRINKAGE		CUMULATIVE % SHRINKAGE		CUMULATIVE % SHRINKAGE	
	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH
JEMCO BLEACHED	+11.2%	-27.3%	+13.8%	-28.7%				
JEMCO BLEACHED + WINCH SOFTENED	+8.2%	-25.0%	+12.2%	-27.4%				
WINCH BLEACHED					-1.0%	-24.0%	+0.2%	-24.9%
TRI-PAD EXTRACTION (WITH STRETCHER)								
CENTRIFUGE AND SCUTCHER WITH STRETCHER			+13.2%	-28.5%			+2.0%	-26.1%
FLEISSNER DRY			+10.2%	-28.9%			-0.2%	-27.4%
PEGG WHITELY EXTRACTOR + DRYER	+16.6%	-23.0%			+4.8%	-17.5%		
HELIOT CALENDER (WITH STRETCHER)	+13.0%	-15.5%	+12.0%	-18.8%	+3.6%	-13.7%	+2.8%	-18.4%
AFTER 48 HRS RELAXATION	+11.0%	-24.8%	+11.0%	-24.7%	+3.0%	-22.3%	+2.4%	-26.9%
1 WASH CYCLE AT 60°C + FLAT DRY	+3.4%	-24.5%	+6.2%	-25.0%	+1.2%	-21.9%	+1.8%	-26.1%
5 WASH CYCLES AT 60°C + FLAT DRY	+3.8%	-24.7%	+7.2%	-27.2%	-0.2%	-22.6%	+2.8%	-26.6%

20 GAUGE INTERLOCK PRODUCED FROM 1/30'CC CARDED YARN

PRODUCTION STEPS	21" DIAMETER CUMULATIVE % SHRINKAGE		19" DIAMETER CUMULATIVE % SHRINKAGE		17" DIAMETER CUMULATIVE % SHRINKAGE		20" DIAMETER CUMULATIVE % SHRINKAGE	
	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH
JEMCO	+11.4%	-24.6%			+14.2%	-26.7%		
JEMCO BLEACHED + WINCH SOFTENED	+2.6%	-15.8%			+10.6%	-26.5%		
WINCH BLEACHED			+3.2%	-18.1%			-0.4%	-21.3%
TRI-PAD EXTRACTION (WITH STRETCHER)			+8.8%	-18.8%	+14.4%	-22.2%		
CENTRIFUGE AND SCUTCHER WITH STRETCHER								
FLEISSNER DRY	+3.4%	-25.7%	+2.4%	-20.7%	+7.6%	-26.1%		
PEGG WHITELY EXTRACTOR + DRYER							+10.8%	-19.8%
HELIOT CALENDER (WITH STRETCHER)	-0.6%	-4.5%	-0.2%	-4.7%	+6.8%	-10.7%	+2.8%	-9.1%
AFTER 48 HRS RELAXATION	-1.2%	-18.0%	0	-13.6%	+6.4%	-21.2%	+1.4%	-18.5%
1 WASH CYCLE AT 60°C + FLAT DRY	-4.8%	-18.6%	-3.2%	-16.7%	+0.4%	-21.2%	-3.2%	-18.5%
5 WASH CYCLES AT 60°C + FLAT DRY	-4.8%	-18.6%	-3.2%	-16.7%	+0.4%	-21.2%	-3.2%	-18.5%
5 WASH CYCLES AT 60°C + FLAT DRY	-6.0%	-17.2%	-2.0%	-16.4%	-0.8%	-22.0%	-6.2%	-17.0%

A meeting was arranged with Mr Abd Kadar Abd Salem and several of his senior managers and the results and findings of the trials were discussed. The outstanding problem is still the performance of the Jemco bleaching machine.

During a business trip to North Carolina a visit was made to Jacumin the manufacturers of the Jemco bleaching range. Discussions were held concerning the problem of fabric extension associated with the running of the Jemco range. The Jacumin company arranged for the Jemco range at Carolina Mills to be seen and it was found that their Jemco was not being operated any differently from Kabo's and they were getting similar results. The only solution that Jemco could suggest was that the wash boxes after the J. Box be replaced with a more relaxed jet washing range which would allow fabric relaxation to occur.

In the short term the method of using a winch to relax and soften the bleached fabric is satisfactory but in the long term it is suggested that the wash boxes be replaced with a relaxed washing range. Jemco themselves can supply a machine which could be fitted after the J.Box, or competitive manufacturers such as Bruckner and Goller, West Germany or M.C.S. of Italy could supply suitable machinery.

Further correlation trials

An analysis was made of each knitting machine diameter of the 20 gauge interlock produced from 1/30 'cc carded yarn and 1 x 1 fine rib produced from 1/33 's combed cotton. Measurements were taken in greige, bleached, calendered and laundered conditions and the percentage increase of calender settings over bleached widths calculated. The tables show good correlation for all the knitting diameters of 1 x 1 fine rib, with a low percentage of overall extension above the bleached dimension of 15-20%. The fabrics show excellent dimensional stability.

The results obtained for the 20-gauge interlock show higher than expected results for the narrow width fabrics with an increase of 33-38% over bleached width. The 18" diameter shows an increase of 30%. It would be preferable to have an increase in calender width over bleached width of 20-25% across the size range. These results are substantially better than any achieved by other producers of knitted fabric in the public sector.

1 x 1 FINE RIB PRODUCED FROM 1/33cc COMBED COTTON YARN

Knitting diameter in inches	Greige width in cms flat tube	Width after bleaching and drying	Current Calender width settings	Width after 24 hrs relaxation	Width after one wash at 60°C + flat dry	% Increase of calender width over bleached width
15"	39.5	32.8	38	36.7	33.0	16.0%
16"	41.0	35.0	40	38.2	35.7	14.3%
17"	46.2	35.6	43	41.1	36.8	20.7%
18"	48.3	39.0	45	43.7	39.4	15.4%
19"	51.8	41.1	48	45.0	41.5	16.8%
20"	53.5	44.5	50	47.0	45.0	12.4%

20 GAUGE INTERLOCK PRODUCED FROM 1/30's cc CARDED COTTON YARN

Knitting diameter in inches	Greige width in cms flat tube	Width after bleaching and drying	Current Calender width settings	Width after 24 hrs relaxation	Width after one wash at 60°C + flat dry	% Increase of calender width over bleached width
14"	36.8	30.1	40	38.1	33.3	32.9%
15"	38.5	31.8	43	39.5	34.3	35.2%
16"	43.0	33.4	46	33.4	35.8	37.7%
17"	45.0	35.7	46	42.1	37.4	28.8%
18"	44.5	37.7	49	46.4	41.2	30.0%
19"	49.0	38.5	50	46.6	42.9	29.9%
22"	53.7	44.0	58	56.4	49.2	31.8%
24"	58.0	50.5	64	59.5	54.7	26.7%
30"	82.0	61.7	80	74.1	67.3	29.7%

ASSESSMENT OF THE PROCESSES AND PROCEDURES USED IN THE PRODUCTION OF KNITTED UNDERWEAR AT THE CAIRO CLOTHING AND HOSIERY CO. (TRICONA)

SUMMARY

The dimensional changes that occur during the Standard Processing Routes at the two finishing mills within Tricona were assessed using the four major fabric qualities being produced. The findings indicate a number of areas in each of the mills where substantial improvements could be made in the performance of the final fabric.

During the second visit a reassessment was made of processing routes at Sogat, improvements in production and testing procedures were observed and recommendations were made for further modifications to processing.

INTRODUCTION

Trials were instigated and four of the principal fabric qualities in production were taken in the greige state and marked up before processing at both the Sogat and Wadi El Nil factories. The fabrics used were:

1. 20 gauge interlock produced from 1/30 cc carded yarn 15" and 19" diameter.

2. 28 gauge interlock produced from 1/60 cc combed yarn 30" diameter.

3. 14 gauge 2 x 2 rib (Derby) produced from 1/30 cc carded yarn 16" x 20" diameter.

4. 28 gauge single jersey produced from 1/60 cc combed yarn.

Pieces of each quality were run through the standard production procedures of each of the two mills and dimensional changes occurring at each processing stage determined. The final fabrics were then laundered in an automatic washing machine, initially for one wash at 60°C followed by flat drying and then for a further four washes. The laundering was undertaken at the Textile Development Centre and make weight pieces were used to give a standard load size.

During the second visit further trials were arranged on two of the principal fabric qualities:

1. 20 gauge interlock 19" diameter, produced from 1/30's cc carded yarns.
2. 24 gauge single jersey 18" diameter, produced from 1/30's cc carded yarns.

As in the previous trial dimensional changes were measured at each processing stage. The final fabrics were laundered in the newly installed automatic washing machine. Further washing trials were carried out in the laboratories at the Textile Development Centre. A comparison was made of washed fabric dried flat and tumble dried at the T.D.C. In view of the probability of ceasing production at Wade El Nil the chairman requested that all available time should be spent assessing the Sogat factory.

FINDINGS.

Compared with the relaxed state reference fabrics the Jemco range at Sogat extended each quality of fabric with one exception, by about 15%, the exception being the single jersey fabric which showed a massive 37% extension during this processing. Further extension is being caused at Sogat by the Tri-pad extractor, investigation revealed that the edge driving system was running at different speeds from side to side of the fabric, this created considerable weft distortion. It was also observed that the Tube-tex drier had no obvious indication of the degree of overfeed that was being achieved, the speed indicator was also inoperative.

After drying, the fabric goes to the Heliot calenders, two of which were found to be consistently running at negative overfeed and on investigation it was found that it was impossible to apply overfeed due to mechanical defects. It was not possible to plait the fabric after calendering as the Brattise conveying system was damaged.

As has already been mentioned the Tri-pad mangling and softening machine was giving substantially different overfeed from side to side, the Tri-pad also had two damaged bowls, one being so badly damaged that it was unable to give a level squeeze. No replacement bowls were available and in order to keep the machine in operation a lower squeeze pressure was being used which resulted in a high wet pick up and reduced efficiency of subsequent drying.

The Jemco continuous bleaching range at Sogat is being run on 12 hour days due to insufficient work to run for 24 hours. The machine is loaded in the early evening and cooled down with a substantial amount of fabric in the machine, this entails a lot of fabric being left overnight in the cold bleaching liquor before being reheated the following morning. Although this is recommended by the manufacturer, if iron contaminated knitting oil is present in the fabric this long contact with hydrogen peroxide could result in tendering of the fabric as was shown in the single jersey fabric.

It was found that the single jersey fabric had a substantial number of holes after bleaching, chemical tests on the fabric around the holes indicated the presence of iron, which would have been a contaminant of the knitting oil. The long storage time in hydrogen peroxide in the Jemco continuous bleaching range resulted in the formation of oxycellulose and tendering of the fabric causing the holes.

At this stage a meeting was held with the Chairman Mr Gamal El Manadily, Eng. Mohammed Ezzeldin Awad, Eng. Wadie Younan and Eng. Hoda Zaki and concern was expressed about the proposed move of the bleaching production to the Sogat mill, in view of the current poor relaxation performance of the Jemco continuous bleaching range. Another major concern was the level of maintenance within the Sogat factory and a list of machinery that required urgent attention was produced.

The basic problem at Sogat apart from maintenance is that the Jemco range is causing substantial extension of fabric in the width and none of the subsequent processes are currently reducing this extension.

Wadi El Nil

The bleaching which is carried out on atmospheric winches consists of a pre- bleach in cold sodium hypochlorite followed by bleaching in a boiling solution of hydrogen peroxide, and optical bleaching agent. After winch bleaching the fabric is as close to the fully relaxed state as is possible.

The single jersey fabric, extended some 25% during winch bleaching and clearly the current knitted structure of this fabric requires considerable modification to ensure improvements in performance.

After bleaching the fabric is manually loaded into hydro extractors and then run through a scutcher with an internal width stretcher. Tubular fabric drying is carried out on a Fleissner four drum drier after which the fabric is calendered onto rolls on one of the two Heliot calenders. On the drier the entry conveyor speed and the suction drum running speed are indicated by speed controls, unfortunately neither of these control devices was working.

On average the Fleissner drier extended the length of the fabric between 7 and 9%. It is expected that a correctly maintained drier would allow the fabric to shrink in length between 3 and 6%. The batching of fabric on rolls after calendering reduces the opportunity for the fabric to relax, if the fabric was plaited at the calender further relaxation would occur.

Without any major changes in equipment in the Wadi El Nil mill it should be capable with improved maintenance and control of running conditions to greatly reduce the shrinkage of the final fabrics.

The enclosed table shows the shrinkage values obtained at each stage of processing and indicates the differences found at the two mills. The shrinkage values obtained after a 5 wash cycle illustrate the fact that extension which occurs in a hot aqueous condition as in the Jemco bleaching range at Sogat permanently changes the overall dimensions of the fabric. The extension experienced at Wadi El Nil occurs during dry processing and on subsequent washing the fabrics returns as near as possible to the relaxed winch shrinkage dimensions.

The table of dimensional changes to washing shows the high shrinkage values obtained at both of the mills. None of the fabrics meet acceptable length shrinkage values with only two fabrics giving acceptable shrinkage values in the width, these being the 19" and 30" diameter interlock processed at Wadi El Nil.

The width setting on the calender is set by the making up deparment and it is apparent that some of these widths are unrealistic. In the enclosed table a small range of greige and finished fabrics from different machine diameters were compared. It can be seen that the 18" diameter interlock is being finished out 10% wider than the other interlock diameters. The 2 x 2 rib is being finished at a width way above the greige width, this width increase is only temporary and will be reflected in the poor performance of the finished fabric.

TRICONA

PRODUCTION STEPS	14 GAUGE 2X2 RIB (DERBY) PRODUCED FROM 1/30'CC CARDED YARN				28 GAUGE SINGLE JERSEY PRODUCED FROM 1/60'CC COMBED YARN			
	16" DIAMETER SOGAT MILL CUMULATIVE % SHRINKAGE		20" DIAMETER WADI ELNILE MILL CUMULATIVE % SHRINKAGE		15" DIAMETER SOGAT MILL CUMULATIVE % SHRINKAGE		13" DIAMETER WADI ELNILE MILL CUMULATIVE % SHRINKAGE	
	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH
JEMCO BLEACHING	+7.6%	-6.0%			+37.4%	-30.5%		
WINCH BLEACHING			-7.8%	-11.9%			+24.8%	-29.6%
TRI-PAD EXTRACTION (WITH STRETCHER)	+16.4%	+0.4%			+43.0%	-31.9%		
CENTRIFUGE AND SCUTCHER WITH STRETCHER			-6.2%	-10.8%			+22.3%	-31.3%
FLEISSNER DRY			+1.8%	-16.6%			+35.6%	-35.2%
TUBE-TEX DRYER	+16.6%	-6.0%			+43.8%	-34.2%		
HELIOT CALENDER (WITH STRETCHER)	+12.4%	+24.5%	+0.9%	+9.1%	+36.2%	-20.9%	+26.3%	-19.7%
AFTER 48 HRS RELAXATION	+14.2%	+12.4%	+0.7%	+7.1%	+36.4%	-21.5%	+26.2%	-21.9%
1 WASH CYCLE AT 60°C + FLAT DRY	-2.4%	+1.6%	-11.8%	-8.1%	+13.6%	-28.0%	+11.4%	-31.5%
5 WASH CYCLES AT 60°C + FLAT DRY	-4.6%	+2.4%	-11.8%	-6.2%	+13.4%	-25.9%	+16.2%	-31.0%

TRICONA

PRODUCTION STEPS	20 GAUGE INTERLOCK PRODUCED FROM 1/30'CC CARDED YARN				28 GAUGE INTERLOCK PRODUCED FROM 1/60' CC COMBED YARN			
	15" DIAMETER SOGAT MILL CUMULATIVE % SHRINKAGE		19" DIAMETER WADI ELNILE MILL CUMULATIVE % SHRINKAGE		30" DIAMETER SOGAT MILL CUMULATIVE % SHRINKAGE		30" DIAMETER WADI ELNILE MILL CUMULATIVE % SHRINKAGE	
	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH
JEMCO BLEACHED	+9.6%	-16.1%			+19.0%	-15.7%		
WINCH BLEACHED			-4.4%	+0.4%			-4.6%	-5.6%
TRI-PAD EXTRACTION (WITH STRETCHER)	+12.2%	-13.7%			+20.2%	-11.1%		
CENTRIFUGE AND SCUTCHER WITH STRETCHER			-2.9%	-7.2%			-4.4%	-9.2%
FLEISSNER DRY			+6.3%	-17.0%			+2.9%	-16.2%
TUBE-TEX DRYER	+13.8%	-20.1%			+23.2%	-15.9%		
HELIOT CALENDER (WITH STRETCHER)	+7.0%	+4.0%	+2.8%	+0.3%	+18.4%	+1.6%	+3.5%	-8.5%
AFTER 48 HRS RELAXATION	+6.4%	-0.5%	+1.3%	-0.4%	+18.7%	-0.9%	+1.8%	-9.1%
1 WASH CYCLE AT 60°C + FLAT DRY	-5.2%	-9.9%	-11.0%	-4.2%	+4.6%	-12.6%	-13.2%	-8.9%
5 WASH CYCLES AT 60°C + FLAT DRY	-5.0%	-9.7%	-10.6%	-2.3%	+4.6%	-11.3%	-12.8%	-5.8%

DIMENSIONAL CHANGES ON WASHING

	14 Gauge 2 x 2 Rib (Derby)				28 Gauge Single Jersey			
	16" diameter Sogat Mill		20" diameter Wadi Elnile Mill		15" diameter Sogat Mill		13" diameter Wadi Elnile Mill	
	Length	Width	Length	Width	Length	Width	Length	Width
From calender dimensions to after 6 wash cycles	-17.0%	-22.1%	-12.7%	-15.3%	-20.8%	-5.0%	-10.8%	-11.3%
After 48 hrs relaxation to after 5 wash cycles	-18.8%	-10.0%	-12.5%	-13.3%	-23.0%	-4.4%	-10.0%	-9.1%

	20 Gauge Interlock				28 Gauge Interlock			
	15" diameter Sogat Mill		19" diameter Wadi Elnile Mill		30" diameter Sogat Mill		30" diameter Wadi Elnile Mill	
	Length	Width	Length	Width	Length	Width	Length	Width
From calender dimensions to after 5 wash cycles	-12.0%	-13.7%	-13.4%	-2.6%	-13.8%	-12.9%	-16.3%	-2.8%
After 48 hrs relaxation to after 5 wash cycles	-11.4%	-9.3%	-11.9%	-1.9%	-14.1%	-10.4%	-14.6%	-3.3%

An assessment should be made of the ratios of bleached dimensions to the finished specification fabric from each different knitting machine diameter. Excessive width shrinkage could be avoided by ensuring good correlation between relaxed and finished widths for each machine diameter.

Tricona exercise no quality control of finished fabric and are therefore currently unaware of the shrinkage potential of the garments they produce. There is a need to instigate regular dimensional stability testing on the fabric and it is recommended that an automatic washing machine and tumble drier be purchased to enable testing to be carried out to set specifications.

A meeting was held with the Chairman Mr Gamal El Manadily and a number of his senior managers at which the findings of this study and the recommendations were discussed at length. Concern was expressed on the handling of fabric. The greige fabric is stored on the bare earth and finished fabric is transported unwrapped on open wagons. The Chairman made the request that more time should be spent at the Tricona company during my follow-up visit to Egypt.

Follow up trials and Assessment

With the assistance of CHEM ABDUL HAMID KHAIRALLAH a regular routine testing facility had been set up and CHEM IDA BENDARY had been given reponsibility for quality control. The possibility of closing production at Wadi El Nil was being discussed and it is intended that two atmospheric winch dyeing and one jet dyeing machines are to be transferred to the Sogat Mill. There was a substantial improvement in the overall cleanliness and tidiness at the Sogat factory. Improvements had been instigated in the running of the Jemco bleaching range and defects on the Tri-pad had been rectified. There was an overall impression of a desire to improve the general running of the factory.

Daily chemical testing was being carried out to determine the strengths of hydrogen peroxide and sodium hydroxide in bleach baths and to measure the pH of the bleach bath.

A check was being made for the presence of ferric ions (Fe^{3+}) since tests had shown ferric ions to be present at above the normal level in water. Iron contamination had been confirmed in greige fabric and Tricona had taken up the recommendation not to leave fabric in the Jemco bleaching range overnight.

There is a need to formalise the quality testing of made up garments. Checks should be made on garment sizing and the number of fabric faults as well as the standard physical testing. A tumble drier should be installed to enable maximum fabric shrinkage to be determined.

Unfortunately Miss Ida Bendary is due to leave the company to take up another appointment. Whoever takes the responsibility for quality control should have the required authority to ensure that improvements can be made. They should not report to a production manager. It is preferred that the quality controller reports directly to the Chairman or to the Commercial Director rather than someone who has little responsibility.

In view of the quality problems it would be beneficial to take some of the oldest knitting machines out of production.

The Jemco range is being used primarily for popular qualities and the recommendation was made to reduce the extension caused by the Jemco by subsequent softening on a continuous rope on atmospheric winches. Two of the winches from the Wadi El Nil mill should be transferred to Sugat and take off reels should be fitted to increase productivity and reduce labour costs.

Since the last visit to Tricona discussions have been held with JACUMIN Engineering of North Carolina, Manufacturers of the Jemco range, to examine the problem with them. It is apparant that there is no easy solution, the main fabric extension occurs in the wash boxes following the J. Box and the only permanent solution would be to remove these wash boxes and replace them with a relaxed rope system such as the Bruckner Colorado.

It was observed that fabric was still being calendered on to rolls for transporting to making up units. Calendering on to rolls increases the risk of bow distortion and inhibits fabric relaxation. It is strongly recommended that all fabric should be plaited after calendering. The current steam calenders are capable of plaiting the fabric, but on each calender the fabric support brattice needs replacing. The plaited fabric will need to be covered so that it can be received in the making up unit without excess soiling.

Further trials

Further trials were carried out on two of the principal fabric qualities.

1) 20 gauge interlock produced from 1/30's cc carded yarn 19" diameter.
2) 24 gauge single jersey produced from 1/30's cc carded yarn 18" in diameter.

The single jersey fabric which had been softened and extracted on the tri-pad was the first sample to be dried and the measurements made directly after drying clearly indicated that the TUBETEX drier was still causing substantial length extension. Therefore no further trials were attempted until the source of this extension was located. After removal of the casing of the machine drive it was found that the belt on the variable speed entry was incorrectly threaded and it was therefore impossible for the overfeeding device to work. After modification the second sample of single jersey showed a 2.6% shrinkage on drying compared with the 7.8% extension of the first sample.

TRICONA

SOGAT MILL

PRODUCTION SLIPS	24 Gauge Single Jersey produced from 1/30's carded yarn 18" diameter		20 Gauge Interlock produced from 1/30's carded yarn 19" diameter	
	% CUMULATIVE SHRINKAGE		% CUMULATIVE SHRINKAGE	
	length width	length width	length width	length width
JEMCO BLEACHED	+16.6% -19.0%	+15.4% -21.2%	+12.4% -21.0%	+11.4% -19.8%
+ WINCH SOFTENED AND CENTRIFUGED		+10.8% -18.8%		+ 8.6% -17.2%
TRI-PAD EXTRACTION WITH STRETCHER	+19.8% -20.9%		+13.0% -19.2%	
TUBE-TEX DRYER	+27.6% -26.1%	+ 8.2% -20.6%	+12.2% -22.4%	+ 9.0 -20.7%
HELIOT CALENDER WITH STRETCHER	+22.4% -15.5%	+10.6% -13.6%	+ 6.2% - 0.5%	+ 4.2% - 3.8%
AFTER 24 HOURS RELAXATION	+19.8% -17.2%	+ 9.4% -14.3%	+ 6.6% - 6.2%	+ 3.6 - 7.8%
1 WASH CYCLE AT 60°C + FLAT DRY	+ 8.4% -19.4%	+ 4.8% -16.6%		
1 WASH CYCLE AT 60°C + TUMBLE DRY	+ 0.4% -20.2%	- 2.0% -18.0%	- 6.2% -11.8%	- 7.8% -11.8%

A comparison was made of the amount of extension which occurred in fabric which had been

a) Jemco bleached only
b) Jemco bleached followed by winch softening and relaxing. Measurements showed that the fabric relaxed 5% on winch softening. The Jemco bleached only fabric extended even further on drying. When the TUBETEX dryer was adjusted a 10% reduction in length was measured.

24 gauge single jersey

Dimensional changes from the calendered condition to.	Jemco Bleach Process.		Jemco Bleach, winch relaxed and softened TUBETEX dried with overfeed.	
	length	width	length	width
1 wash + flat dry	- 14.0%	+ 4.3%	- 5.8%	- 3.0%
1 wash + tumble dry	- 22.0%	- 5.1%	- 13.4%	- 4.4%

Large differences were also found on comparing the dimensional changes from calendered width to washed and dried flat and washed and tumble dried. The winch relaxed fabric shrank 13.4% on tumble drying compared with Jemco bleached only which shrank 22%. The figures obtained for tumble drying show what the maximum shrinkage of the fabric would be after a number of conventional washes.

An analysis was made of each knitting diameter of the 20 gauge interlock fabric produced from 1/30's carded cotton yarn, the percentage extension in calendered width over bleached width was calculated. The enclosed table shows that there is still little correlation between calender settings and the bleached width particularly in the narrower diameter fabrics. The 14" to 17" diameter fabrics are being finished out at up to 49% wider than the bleached width. Whatever the increase in finished width over bleached width, this amount will be reflected in the dimensional stability of the final garments. Excessive shrinkage can be avoided by reducing the calender width setting to between 20 to 35% above the bleached dimentions for each knitting machine diameter.

Attention to detail in relaxing the fabric after the Jemco bleach and ensuring that the TUBE-TEX drier and steam calenders are correctly adjusted makes the difference between final garments that would lead to customer satisfaction and garments that would ensure that the customer did not buy Tricona brand again.

20 GAUGE INTERLOCK PRODUCED FROM 1/30's cc CARDED COTTON YARN

Knitting diameter in inches	Greige width in cms flat tube	Width after bleaching and drying	Current Calender width settings	Width after 24 hrs relaxation	Width after one wash at 60°C + flat dry	% Increase of calender width over bleached width
14"	36.6	28.3	40			42.0%
15"	38.0	29.6	42			43.8%
16"	42.0	31.9	46	39.8	37.2	44.2%
17"	42.8	33.5	50	41.0	39.5	49.2%
18"	44.5	38.0	52	45.1	42.0	36.8%
19"	49.8	39.6	55	46.2	44.9	38.8%
20"	52.0	42.5	55	51.0	47.5	29.4%
22"	54.5	45.0	60			33.3%
24"	61.0	51.5	66			28.1%

APPENDIX 4

PLANNING REPORT

PLANNING REPORT FOR THE MODERNISATION OF THE KNITTED UNDERWEAR PRODUCTION AT EL-NASR WOOL AND SELECTED TEXTILE CO. (STIA) ALEXANDRIA

SUMMARY

An assessment has been made of the current floor area available within the knitted fabric, bleaching, dyeing and finishing department at STIA.

Two prospective layouts have been produced incorporating recently developed machinery which will increase productivity and fabric quality.

1. INTRODUCTION

The weft knitted production of the Stia company comprises cotton underwear, wool outerwear and half hose. The cotton portion of this production is up to 15 tons per week (7000 dozen garments) and employs about 350 people in the knitting, finishing and garment making departments. Over 90% of this production is underwear for home trade customers, the remainder is dyed and made up into 'T' shirts and outerwear.

The Chairman proposed to modernise the whole weft knitted operation, with the installation of new knitting machines and to re-equip the dyeing and finishing departments. The aim is that productivity could be increased to 3000 Kg per 16 hour working day without an increase in the number of people employed.

2. FINDINGS

The fabric is currently bleached in atmospheric winches which will hold 80-100 Kg of fabric. The average load being 90 Kgs and processing time 4 hours. Five winches are employed giving a capacity of 450 Kg in 4 hours ie 110 Kg per hour. Approximately 20% of the fabric is piece dyed on the atmospheric winches, with a load of 80-100 Kg per load produced every 8 hour shift, allowing two batches to be dyed in 16 hour day ie 160-200 Kg of fabric (25 Kg/hr). The installation of a continuous bleach range which has a capacity equal to at least ten winches, would mean that a production of 300-450 Kgs per hour could be achieved with only two employees and a girl to sew up. In comparison with at least 6 employees to operate the winch machines. All the preparation could be carried out on this range with the fabric for dyeing being bleached first thing in the morning before being transferred to the winches, this would cut dyeing time down by half. Bleached white fabric could then be run through the continuous bleach range with the addition of optical brightening agent. Dewatering, detwist and plaiting machines would result in a substantial increase in productivity as well as an improvement in appearance and quality with a significant decrease in fabric handling.

2.1 Continuous bleaching machinery

Continuous low tension rope bleaching in comparison with winch bleaching for tubular knitted fabric shows a reduction in water consumption and therefore reduced chemical consumption. A machine 3 metres x 4 metres has a production capacity of 300 Kg per hour, this capacity being based on a peroxide bleach system.

The chemical costs can be further reduced if required by the addition of a sodium hypochlorite saturator and washer prior to the peroxide bleach, this additional facility is available from a number of manufacturers. Work has been carried out which shows that savings of 65% over the cost of winch bleaching can be achieved and this method of bleaching can give a 20% reduction in costs compared with a straight J.Box system.

Continuous bleaching could be carried out on low tension machines such as the Colorado - Bruckner West Germany, this machine can be supplied with from 8-12 compartments, depending on available floorspace. Each compartment has a capacity of 50 Kg giving an hourly output of 300-450 Kg of fabric. The fabric is processed in a tensionless state and the cloth run is monitored so that operator intervention is unnecessary. Each compartment has a separate heat exchanger and there is intensive interchange between treating liquor and fabric. Other suppliers of low tension bleaching machines are Jemco of the USA, Bruckner and Goller of West Germany and MCS of Italy.

2.2 Dyeing Machinery

Such as soft flow jet machines can be supplied with four compartments each with a capacity of 150-200 Kg per compartment, dependent on the type of fabric being processed. Fabric speed can be varied from 50-500 metres per minute. The machines minimise energy and resources requirements and claim easy maintenance. These machines can be supplied among others by Theis of West Germany, AYTC of Spain and Longclose of the United Kingdom.

Compact winches designed for dyeing tubular knit goods in short liquor can also be supplied in loading capacities from 200-600 Kg. The 300 Kg model is divided into six compartments each capable of processing from 50-60 Kg of fabrics. The machines offer low floor space requirement with high dyeing capacity. One example of this is the Bruckner Haspleflow machine.

2.3 Detwist, dewater and plait

Recent developments allow the fabric to be removed from the bleaching or dyeing machinery and disentangled, dewatered and plaited all in one operation. The Airtex machine by Calator of Sweden has been designed to carry out these operations so that circular knit fabrics retain a relaxed loose structure with wales and courses in alignment and after shrinkage effects reduced. Air jets are used to slightly balloon and untangle the fabric prior to the passage over the internal stretcher and plaiting units. The dried fabric can then be transported in plaited form to the making up unit. Heliot of France, Fabcon of the USA and Pegg Whiteley of the United Kingdom are suppliers of suitable machinery.

2.4 Drying Machines

The current drying machines allow the fabric to be conveyed through the drying area on air pervious stainless steel wire mesh reels. The speeds of the reels can be adjusted to permit tension free movement of the fabric through the drying chamber. High velocity heated air is blown against the fabric by a series of nozzles installed around the outer circumference of the reels. The fabric whilst being supported is further relaxed by the air flow. Drying machines are supplied by Fleissner and Keiffer of West Germany and Tubetex of USA.

2.5 Steam Calenders

Steam calenders such as supplied by Bitema of West Germany offer felt sleeved calender rolls which are easily replaceable, and surface rising batch rolling eliminates diagonal distortion. Speed control is infinitely variable and tensioning can be adjusted as required. Overfeed adjustment of 0.30% is available and the plaiting facility would allow further relaxation to occur in the fabric

3. CONCLUSIONS

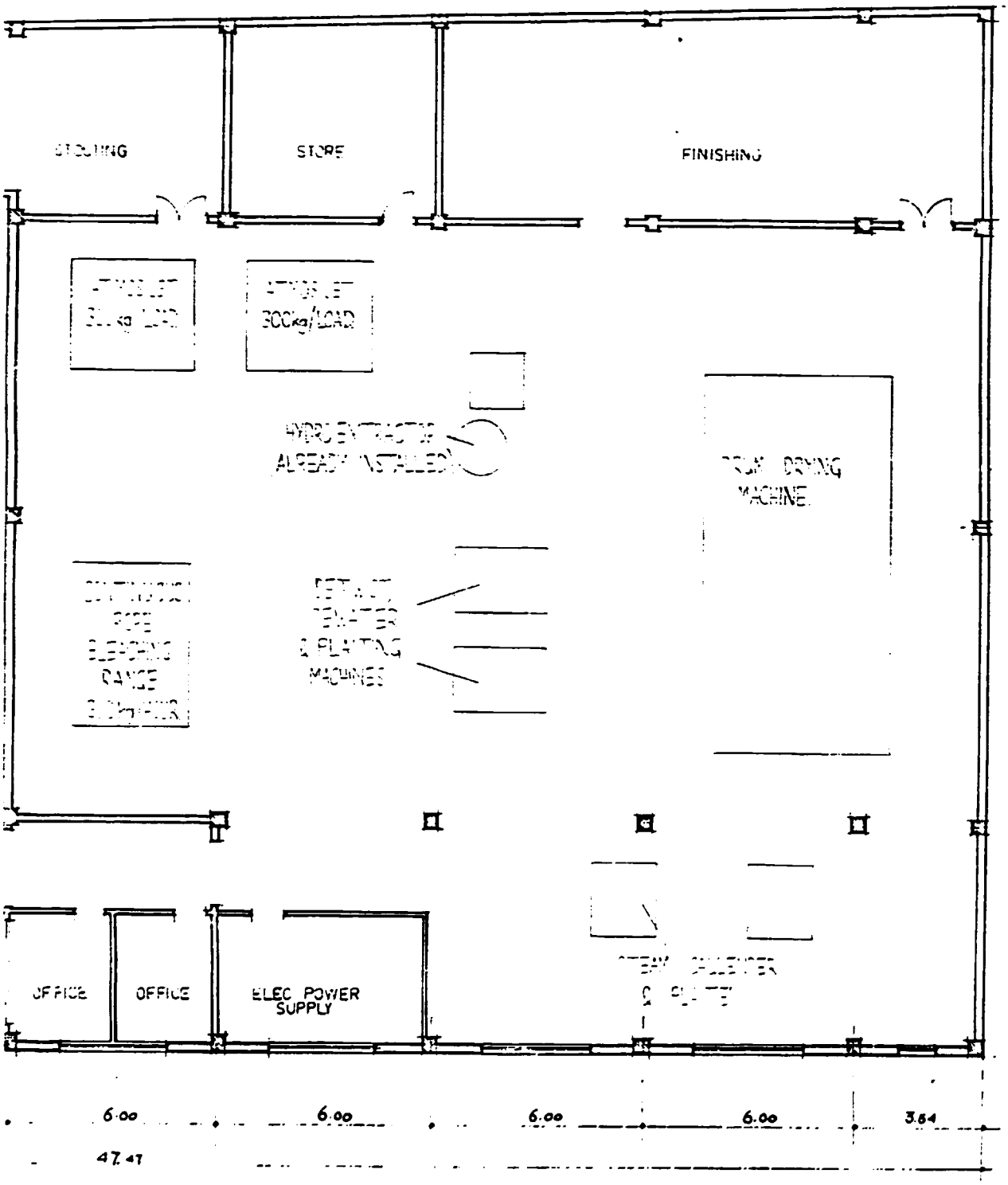
The attached two schematic plans have been drawn up for the re-equipment. The first covers the production figure quoted by the chairman of 3 tons per day. The second plan assesses what is the maximum production possible for the space available taking into account the general increase in the use of polyester cotton.

The mill at present includes a small stenter equivalent to one chamber, this requires a lot of maintenance and is very slow. It would probably be more cost effective to scrap this piece of machinery and put the space to better use.

The site plans show that with the replacement of machinery there is sufficient space to allow the production targets to be achieved. The plans have been drawn to maximise utilisation of space with a minimum number of cross overs in working procedures.

PLAN 1.

3,000 Kg per day of 100% cotton 80% White
20% Piece Dyed

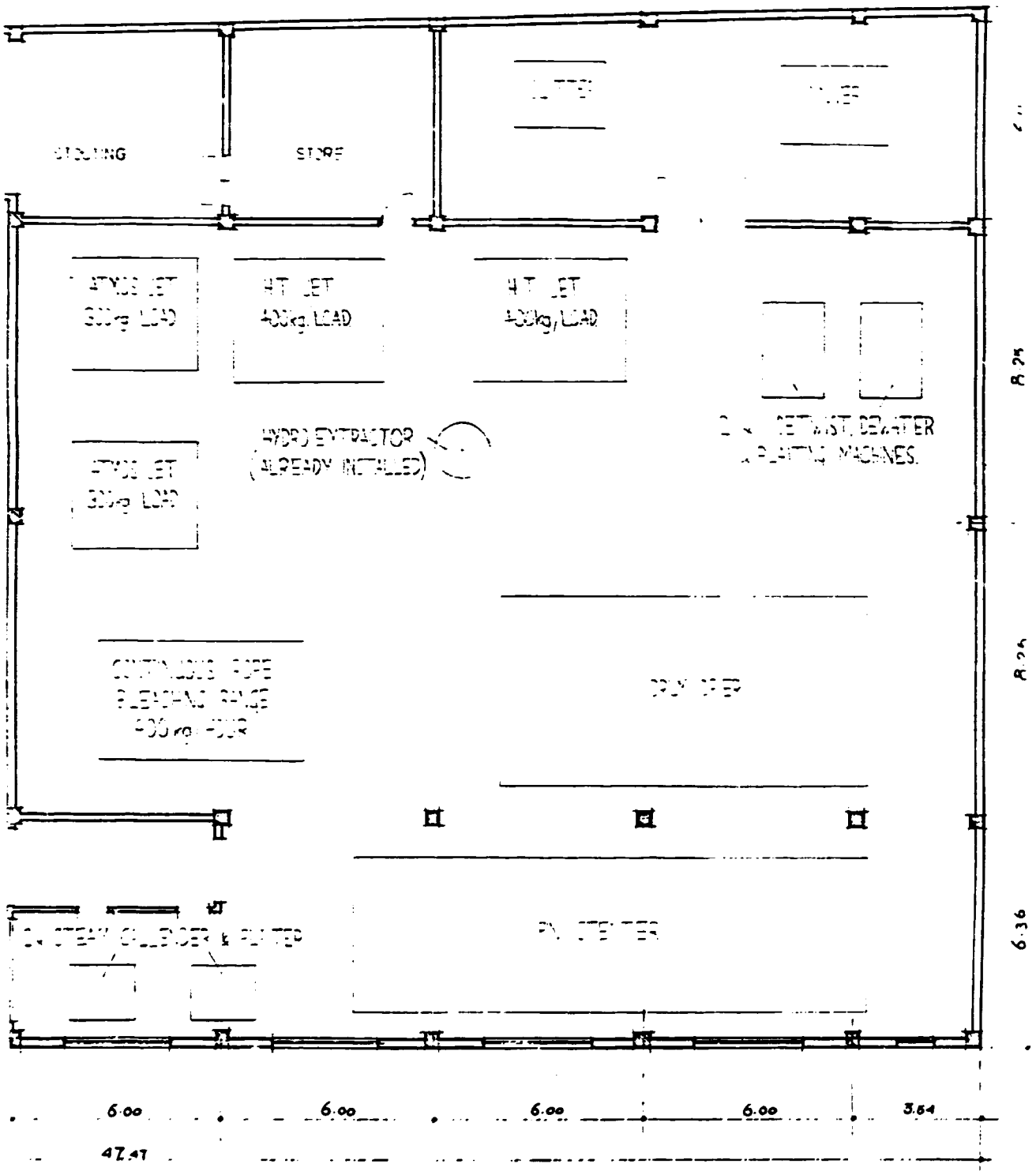


N FOR KNITTING DYE HOUSE

SCALE 1 100
DIMS metre

PLAN 2.

3-4,000 Kg per day 100% cotton 80% White 20% Piece Dyed
1-1,500 Kg per day Polyester Cotton 50% White 50% Piece Dyed



FOR KNITTING DYE HOUSE

SCALE 1 100
DIMS metre

RECOMMENDATIONS FOR MACHINES

Continuous low tension bleaching range

3. Bruckner	(West Germany)
Jemco	(U.S.A.)
Goller	(West Germany)
M.C.S.	(Italy)

Combined detwist, hydroextract, plait

4. Calator	(sweden)
Heliot	(France)
Fab-con	(U.S.A.)
Pegg Whiteley	(United Kingdom)

Dyeing Machine

1. ATYC	(Spain)
Bruckner	(West Germany)
Longclose	(United Kingdom)
Thies	(West Germany)

Drying Machines

6. Fleissner	(West Germany)
Keifer	(West Germany)
Tubetex	(U.S.A.)

Steam Calender

2. Bitexma	(West Germany)
Heliot	(France)
Tubetex	(U.S.A.)

ATYC	Argelich Termes Y Cia SA PO Box 76 Terrassa - Barcelona, E Telex 56121 ATYC.E.
BITEXMA	Bitexma Maschinen-Und Anlagenbau GmbH Espanstrasse 2. 7944 Herbertigen BRD Telex 732260
BRUCKNER	Bruckner Apparatebau GmbH Postfach 1109 6120 Erbach BRD Telex 04191634 Bam D
CALATOR	AB Calator Box 137 501 03 Boras Sweden Telex 36212
FABCON	Fab-Con Machinery Development Corp. 103 Harbor Road POB 591 Port Washington New York 11050 USA Telex 640334 Fabcon PTWN
FLEISSNER	Fleissner GmbH & Co Wolfgartenstr 6. 6073 Egelsbach Bel Frankfurt Main BRD Telex 415021 - 415069
GOLLER	Maschinen Pabrik Goller MAX Hammeranger 1 Postfach 0143 8676 Schwarzenbach/ Saale BRD Telex 064837
HELIOT	Etablissements Maurice Heliot SA BP9 10600 LA Chapelle St. LUC F. Telex 840701
JEMCO U.S.A.	C/o Tubular Textile Machinery Corporation 33-61 54th Street Woodside New York 11377 U.S.A. Telex 235987 Rca and 66458 Wu
KEIFFER W.G.	C/o Kleinewefers Jaeggli AG Postfach 1560 4150 Krefeld 1 BRD Telex 085 3872 IKSM D
LONGCLOSE	Longclose Ltd Dewsbury Road LEEDS LS11 West Yorkshire Great Britain Telex 557477

MCS	Via Provinciale 17 24059 Urgano (Bergamo)I Telex 300277 MCS 1
PEGG WHITELEY	Pegg Whiteley Ltd New Star Road Works Leicester LEA4 7LP Great Britain Telex 34311 Sampeg G
THIES	Thies GmbH & Co Postfach 1740 4420 Coesfeld BRD Telex 892312
TUBE-TEX	Tubular Textile Machinery Corporation 33-61 54th Street Woodside New York 11377 U.S.A. Telex 235987 Rca and 66458 Wu.