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STRENGTHENING OF THE CHINA RAMIE TECHNOLOGY DEVELOPMENT CENTRE

DG/CPR/85/057/11-01

PEOPLE'S REPUBLIC OF CHINA

Technical report: Recommendations regarding the  
implementation of the project\*

Prepared for the Government  
of the People's Republic of China  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Mortimer O'Shea  
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United Nations Industrial Development Organization

Vienna

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\* This document has not been edited.

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**Project in the People's Republic of China**

**DG/CPR/85/057/11-01/A/J13102**

**1.0 Abstract**

The consulting work as outlined in Annex 1 was undertaken in accordance - as far as possible - with the guidelines.

The position now is that all potential experts have been identified, in some instances more than one candidate being available.

All Fellowships have been discussed with the most appropriate Universities/Colleges of Technology and Industry back-up and are now fully covered with alternatives where possible.

Machinery and equipment which was proving difficult to source has been discussed with appropriate manufacturers and recommendations can now be made.

Although quotations have been obtained, this area of detail should, I feel, be further dealt with by the specific expert when appointed.

Some difficulties have arisen in connection with item 4.2 (Waxing as an alternative to sizing of warp sheets). The identified firm is unwilling, without a Technology Transfer agreement, to supply or reveal the formulation of their product.

Although a proposed contact with the British Council is mentioned at 2.4, the feeling in British university circles is that their usefulness is highly questionable and that much faster progress could be made without their participation. I therefore, decided not to meet with the British Council who had in fact failed to make any recommendations or contact me following Mr McPherson's telephone conversation with me on 14 January 1988.

## 2.0 Fellowships

### 2.1.0 University of Manchester Institute of Science and Technology.

Professor John Hearle, former Head of the Department of Textiles, UMIST, introduced me to the current head, Professor P W Foster B.Sc, Ph.D, FTI, who was most helpful and would adapt various courses of study to offer realistic programmes for Chinese Fellowship candidates.

The requirements for candidates Liu Jiyin, Zong Xiangyuan and Huang Shaoshi were specifically discussed, but the other Fellowships for which nominations are not yet available were also discussed. UMIST would be able to undertake all Fellowships.

However, in the case of Huang Shaoshi, I am recommending Leicester Polytechnic for a number of reasons and in the case of the Degumming Fellowship, the Imperial College of London is recommended.

See Annex 2 - Fellowships.

### 2.1.1 Leicester Polytechnic.

Following a telephone discussion with Mr J K Parkinson B.Sc, M.Sc, C Text, FTI, FIQA, whom I had known through the Textile Institute, I visited the School of Textile and Knitwear Technology, Leicester Polytechnic and met Acting Head, Dr Bob Wheatley, PhD, C Text. FTI.

I discussed the requirements of Huang Shaoshi and saw the college training facilities with particular emphasis on jacquard circular single jersey. I was impressed by the excellence of the facilities which cover all aspects of textile technology but with emphasis on knitting and clothing.

Bearing in mind that the manufacturer of circular jacquard single jersey machinery - Camber International - is located in Leicester and has a good relationship with the college, I am confident that the Leicester Fellowship would be of greatest benefit to Mr Huang.

See Annex 2 - Fellowships

### 2.1.2 Imperial College, London.

During my first meeting with Dr David Cowan of Novo Industri, Denmark, I enquired about the possibility of an English language course in enzymology which would be of particular benefit and relevance to a China Ramie Fellowship candidate. Dr Cowan recommended Imperial College, London. I contacted Dr Charles Phelps, Pro Rector, who put me in touch with Dr David Leak whom I met when I visited the college.

I also met with a Dr Ma, a Chinese national, who is on the college staff and who has visited Changsha. An excellent course of study would be offered to a Fellowship candidate.

See Annex 2 - Fellowships

### 2.1.3 Accomodation.

Assistance with accomodation will be provided by all three colleges and this in their own Halls of Residence if application is made as early as possible.

### 3.0 Experts

3.1 See Annex 3 for job descriptions for experts in :-

Degumming  
Spinning  
Weaving  
Knitting  
Dyeing/Finishing  
Training  
Product Development  
Quality Control

3.2 See Annex 4 for full CVs of potential candidates

#### 3.2.1 Degumming

Novo Industri A/S, Denmark. See section 5.0

3.2.2 Spinning . Two candidates have been identified.

Dr C A Lawrence, UMIST, Manchester, UK.

Mr Christopher Ffrench-Mullen, Mullen Yarns Ltd, Saintfield,  
Belfast, Northern Ireland.

#### 3.2.3 Weaving

Dr K Greenwood, UMIST, Manchester, UK.

3.2.4 Knitting. Three potential candidates with the possibility of a fourth have been identified.

Mr James Christopher O'Sullivan, 12 Saint Fintans Park, Sutton,  
Dublin 13, Ireland.

Dr W D Cooke of UMIST, Manchester, UK.

Professor J Porat of UMIST, Manchester, UK.

Dr Bob Wheatley, Leicester Polytechnic, UK.

#### 3.2.5 Dyeing / Finishing

Dr L W C Miles, UMIST, Manchester, UK.

#### 3.2.6 Training

Mr S R Beech, UMIST, Manchester, UK.

#### 3.2.7 Product Development

Dr C E Cusick, UMIST, Manchester, UK.

### 3.2.8 Quality Control

In the Project Document Part IV the budget allows for "unspecified consultants" (ref. item 11-50) - three man months.

The CTA believes that one of these consultants should be a Quality Control Expert. The title might alternatively be "Textile Testing/Quality Control Expert".

A Job Specification is, therefore, provided for this position at Annex 3.

4.0 Machinery and equipment: sourcing and assesment

4.1 The sources of single jersey circular jacquard knitting machines are:

Albi - Germany  
Camber - Britain  
Jumberca - Spain  
Mayer - Germany  
Barchisio - Italy  
Monarch - USA  
Bayer Wildman - USA  
Onzio - Italy  
Textima - DDR  
Terrot - Germany

Because Camber are specialists in single jersey machines, and because of their proximity to Leicester Polytechnic, I am concentrating on this firm but when the knitting expert has been appointed, his views must be given close attention.

A representative set of fabric samples was obtained from Camber by the consultant and these will be taken to the PRC by the CTA on his next mission. Photocopies of the samples appear in Annex 10 and list the following information:

Model  
Diameter  
Gauge  
Weight of fabric  
Finished open width  
Production at 100% efficiency in kilos/hr  
RPM  
Metres/hr  
Construction (yarn counts and type)  
Finishing details  
Fabric reference number

4.2 Waxing as an alternative to sizing of warp sheets.

Stephenson Thompson Textile Chemicals Ltd, PO Box 305, Listerhills Road, Bradford, West Yorkshire, BD7 IHY, England has been identified as being advanced in this type of treatment but they insist upon a Technology Transfer Agreement before being prepared to supply their product to the PRC.

See Annex 5 for further information.

4.3 Laboratory-scale resin-finish application and baking machine.

Werner Mathis A G, CH-8155, Niederhashei-Zurich has been identified as the leader in this field. The CTA had a full day's discussion and factory visits in consultation with their textiles expert, Mr Albert Hauser. Their full range of equipment



was dealt with and appropriate units were viewed in operation at Alusuisse and Triatex International A G. The latter is a testing and finish development organisation owned by five Swiss textile mills. They operate Werner Mathis equipment but have also developed their own production scale machines.

See Annex 5 for detailed information on Werner Mathis and Triatex.

4.4 Aktiengesellschaft Ernest H Fischer Sohne, CHH-5605, Dottikon.

This firm began at the end of 19th century by processing ramie in flat ribbon form and making "straw" hats. It developed from that into the production of pure ramie and ramie/cotton, ramie/synthetic-fibre yarns. Today, by way of their own technology development, this firm has a sophisticated ramie-fibre degumming plant, softening machinery, carding and combing, dyeing, ring spinning and winding equipment all adapted as necessary to suit ramie production.

Although early in the field of bio-degumming (they planned and installed equipment at the Philippines plant of Ramitex) they were not aware of the modern enzyme developments by Novo Industri and had been inclined to dismiss bio methods in favour of their own purely chemical and mechanical process. They visit the People's Republic of China regularly and have sold equipment to Naning Ramie Mills.

4.4.1 Mr Kurt H Fischer is critical of the Chinese ramie technology which he claims has the following major flaws for which his own technology has the answers:

Degumming methods and equipment are antiquated. Some Chinese mills process ramie without cutting off the stem or "feet" part of the stalk.

Spinning draft is too low.

Processing waste figures in combing are excessive.

Production figures of only 4 kg/hr are the norm in China

Chinese long staple spinning is based on the old silk system but is the equivalent of Fischer's medium staple spinning.

4.4.2 Among the improvements claimed to be possible through the use of Fischer's technology are:

Degumming system as used by Ramitex \* (Philippines)

Scientific grading of the ramie crop and removal of "feet"  
Improved combing through the use of Fischer's adaptation of the Schlumberger equipment which gives 20 kg/hr compared with 4kg in China. They produced figures to demonstrate that one such machine would provide such savings as to give a 15 month pay back on the investment.

(See Annex 7 for Schlumberger agent in Hong Kong dealing with the PRC.)

After combing, high draft spinning should be introduced. Rieter no longer make the long staple spinning machinery currently used in Fischer's mill but the Italian firm, Delpiano are able to make such machinery.

- 4.4.3 Fischer's approach to all ramie processing is the preservation of the fibre length. They are highly critical of the Chinese technology in this aspect, noting that much fibre length loss occurs as a result of the degumming process, not only through chemical damage but also by physical entanglement due to the inadequacy of the fibre cage and liquor circulation.

Fischers do not add oil until the hydro extraction stage. Their fibre is retained in a special net when placed in the special "floating" hydro extraction centrifuge and removed within the net for further drying. Fischers use asynthetic oil in emulsion form. They do not use a softner as in China. The aim is to avoid fibre to fibre adhesion or clinging - the main cause of yarn unevenness - and help subsequent processing with as little waste as possible.

- 4.4.4 Until recently, it was proving impossible to perform air splicing on ramie yarns. Now Schlafhorst's Autoconer can perform this function.

- 4.4.5 Mr Guido Huber - formerly with the Saurer loom makers of Arbon and now employed by Fischers - strongly recommends that the Chinese, instead of importing new rapier looms should look at the possibility of converting their shuttle looms to rapier. Saurer, although no longer making their own looms, are continuing in business providing customised conversion kits for such shuttle looms as their own Saurer 350, Ruti C and the Picanol President.

The contact at Saurer is Mr Max Hofer (Technical).

It must be emphasised that a conversion kit will not be available "off the shelf" but would have to be specifically dedicated to the Chinese loom make.

- 4.4.6 Although Fischers make their own design washing machine, they will not offer this for sale in China until certain difficulties with a Chinese customer have been resolved. The machine must be used in conjunction with Fischers own processing system and not as a "stand alone". Apparently a Chinese ramie mill is in dispute with Fischers concerning the efficiency of this machine but Fischers maintain that it is not being used within the correct processing regime.

- 4.4.7 Mr Fischer mentioned a new Chinese Ramie National Standard Document No UDC 677 151 GB 7699 87 Ramie. This was issued in March 1988. A copy should be obtained.

\* Although Fischers installed the Ramitex Degumming Plant, they have not been allowed enter the factory in recent years due to processing secrets. This information is consistent with

the experience of Novo Industri, who although supplying large quantities of their "Ramizyme" product are denied access to the plant, nor will the plant management divulge how they are using the product although Novo are satisfied that this must be in combination with Fischers technology of a combined bio and chemical process.

Note: Fischer inadvertently divulged that through the blending of a small percentage of PVA (water soluble fibre) with ramie, far more satisfactory spinning was possible. This, apparently, is the normal practice in Japanese ramie mills who use kuralon fibre in a slightly under-sett finished fabric. I am aware that in Northern Ireland, a small percentage of viscose fibre is blended with flax to help spin the finer counts.

#### 4.5 Laboratory-scale cone winding machine with various provisions.

Following my enquiries of a number of winding machine manufacturers it would appear that it is not usually possible to have the one machine capable of winding:

- hank to hard cone
- hank to soft cone for dyeing
- soft cone to hard cone
- cop (ring frame) to cone
- assembly winding

Hirschburger who specialise in winding machinery for the knitting industry are able to provide the best options. The Corghi machine is used for ramie winding by Fischer and is recommended by them. Further information has been requested from both of these manufacturers in order to fully clarify the situation.

See Annex 8 for Hirschburger fax dated 12/7/88.

#### 5.0 Novo Industri A/S

The CTA visited the Novo Headquarters at Bagsvaerd at the invitation of Dr David Cowan, Products Manager and met with him and his colleagues Mr Pierre Biedermann, Director Marketing Operations; Mr Jens Lund Pedersen, Export Manager Operations, Bioindustrial Group; Mr Lars Saaby Pedersen MSc, Research Chemist, Process Development Pilot Plant, Enzyme Process Division; and Mr H Alexander Hamilton, Technical Manager, Gerente Tecnico (Novo Industri, Brazil).

Discussions were held at this decision-making level and it was decided by Novo, regardless of the outcome with UNIDO/PRC that they would immediately start a specific course of instruction for a selected MSc graduate of the Danish Technical University to become fully conversant with degumming technology with particular emphasis on enzymatic degumming. The services of this graduate when trained, will be offered to UNIDO under the terms of appointment of a Degumming Expert to undertake work in PRC to strengthen the Ramie Technical Development Centre at Changsha. He would also be available to help in the training of any Chinese Fellowship Candidates, in conjunction with the proposed course at

Imperial College, London, by way of advice and organisation of intensive training both at Changsha and Bagsvaerd.

See Annex 9.

- Note 1      Also at Annex 9 please see the 1898 British Patent Specification for the chemical degumming of Ramie, the technology for which does not appear to have advanced significantly in the interim.
- Note 2      Mr H Alexander Hamilton, of Novo, Brazil showed an interesting Ramie/Polyester fibre/fibre blend fabric in both loomstate and after desizing enzyme treatment. The result was a dramatic improvement in appearance and handle which was very much softer than that of a conventionally desized and finished fabric.
- Note 3      Contrary to my earlier discussions in London with Dr Cowan, Novo now confirm that they are not prepared to undertake a "joint venture" for the production of Ramizyme in PRC but would be prepared to undertake a "Technology Transfer" agreement.

ANNEX 1.0 - PROJECT DOCUMENT FOR CTA: INTERIM MISSION/EUROPE



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

3 May 1988

PROJECT IN THE PEOPLE'S REPUBLIC OF CHINA

**JOB DESCRIPTION**

DG/CPR/85/057/11-01/J13102

<b>Post title</b>	<b>Senior Technical Adviser (STA)</b>
<b>Juration</b>	<b>One man-month</b>
<b>Date required</b>	<b>As soon as possible</b>
<b>Duty station</b>	<b>Ireland with travel within Europe</b>
<b>Purpose of project</b>	<b>Strengthening the Ramie Technical Development Centre by assisting the research institutes in developing and applying modern processing technologies in the manufacture of quality textile from ramie fibre.</b>
<b>Duties</b>	<b>The STA will</b> <ul style="list-style-type: none"><li>- identify, assess and, if necessary, supervise testruns single jersey circular knitting machines, waxing devices for warps and resin finish application and baking machines;</li><li>- identify institutes capable of executing fellowships for degumming, spinning, weaving, knitting, finishing and testing of ramie;</li><li>- identify and contact experts in the field of degumming, spinning, weaving, knitting, dyeing and finishing, training and product development for ramie products.</li></ul>
<b>Qualifications</b>	<b>Textile technologist with extensive industrial and R-D experience.</b>
<b>Language</b>	<b>English</b>
<b>Background information</b>	<b>See separate sheets</b>

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Applications and communications regarding this Job Description should be sent to:

Project Personnel Recruitment Section, Industrial Operations Division  
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria

Background  
Information

Ramie has been a fibre crop for thousands of years in China. The fibre is distinguished for its durability and comfort for summer wear. China produces around 75%-80% of the world's ramie fibre output, which is estimated to be close to 70,000 tons yearly. Other significant ramie producing countries are Brazil and the Philippines. The Hunan province is China's largest ramie producer, accounting for over 25% of the national production.

Ramie is a perennial crop. In Hunan three crops are annually harvested at intervals of 60-80 days from May to November. At present most of China's ramie is exported (close to 90%). A rough estimate shows the following breakdown:

tops	25% )	
yarn	15% )	
grey fabric	50% )	of the total production
domestic	10% )	

The target is to increase the export of products with a high value added (finished fabrics and even clothing) and to reduce the exports of tops and yarn. By further increasing the fibre production more ramie products should become available for the domestic market in particular in blends with other fibres.

The ramie textile industry still uses the traditional long and expensive technological process cycle, with outdated machinery, low production efficiency, poor working conditions and considerable amounts of effluent wastes. Finishing techniques are outdated, resulting in frequent quality deficiencies of fabrics. To date no ramie processing technology institutes exist to support the industry in overcoming its fundamental problems on a national basis. In view of the importance of ramie for several of its provinces and for its contribution to the balance of payment the Government of China, through its Scientific and Technological Committee decided by Decree of 21 December 1984, to create a national "Ramie Technological Development Centre" in order to provide a professional organ for applied research for modernizing the processing technology of the national ramie textile industry. The decision to establish this Centre, initially using the premises and facilities of the provincial "Hunan Ramie Textile Research Institute" and later moving into its own buildings in 1987, is the first attempt for a concerted action to modernise the national industry and to improve diversification and quality of ramie textile products.

The Centre's new building, to be located in the town of Shangsha the capital of the Hunan Province, will have an area of 5,000 sq.m. for pilot equipment and another 5,000 sq.m. for research and offices.

At present the Centre has a staff of 120, of which 40 are qualified technicians. Once established in the new premises in Shangsha, the Centre will have a staff of 270, including 130 technicians for which graduates from the textile college will be recruited.

The Centre's activities will cover all steps of the ramie trade, from plantations to consumer products. Although important for the fibre quality, the project will not include the agronomical part of the process. The proposed activities in agronomic development and marketing studies are outlined in Annex V.\* The project's scope of activities will be concentrating on industrial processing, to begin with degumming of the ramie fibre, developing modern processing methods and demonstrating these to the enterprises and train their staff.

#### Description of the project (duration 4 years)

As a consequence of the development objective of this project a National Ramie Research and Development Centre will be established to support the ramie industry in the People's Republic of China. This institution will become the national Centre for applied research and development of modern processing technology, experimental work on conventional and modern processing equipment, training and extension services to industry. Its work on agronomic development and marketing studies, carried out simultaneously with the project activities on development for industrial processing, will be interlinked by a co-ordinating body in the managerial structure as shown in Annex VI.\* It will also co-ordinate development work carried out in provincial institutions.

As reflected in the input list the Government will provide buildings, local staff, locally manufactured equipment, public utilities and raw material for test-runs. UNDP will provide specialized expertise, training and modern machinery which are not available in China. The expenditure for machinery will be financed by the Government of China under a cost sharing arrangement. The Centre will be equipped with a processing plant for carrying out applied research on degumming, spinning, weaving, knitting and dyeing/finishing complete with a physical and chemical testing laboratory, and an automation research group. An organization chart is attached under the Government inputs (cost sharing \$ 700,000, equipment \$ 750,000).

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\* Refer to project document.

Attachment 1

Project Equipment List

1. Friction Spinning Frame	\$ 80,000
2. Fancy Yarn Doubling Frame	\$ 180,000
3. Large Diameter Jacquard Weft Knitting Machine	\$ 60,000
4. Ravier Loom	\$ 70,000
5. Package Dyeing Machine (HT)	\$ 100,000
6. Laboratory Dyeing and Finishing Machine	\$ 30,000
7. Single-end Sizing Machine	\$ 30,000
8. Infrared Spectrum Tester	\$ 30,000
9. Hairiness Meter	\$ 13,000
10. Colour-fastness tester to sunlight and weathering	\$ 60,000
11. Fabric Style Tester	\$ 27,000
12. Instron Tensile Tester	\$ 70,000
	<hr/>
Total:	\$ 750,000
	*****



Justification of the Equipment Component

In order to fully comply with the immediate objectives the list of existing equipment (see Annex I)\* will be complemented with specialized machinery which is not available in China, is listed as Annex II.\*

Friction spinning frame

will be needed for converting ramie noils and waste, ranging between 27X-42X into a diversified range of yarn types with high values added. Currently these noils and wastes are only partly utilized in low quality yarns.

Friction spinning is regarded as the most suitable system to process wastes into low count yarns. A doubling frame for fancy yarns is needed for development of new varieties of ramie products and also for completing the line for noils and waste processing. Fancy yarns are used for structural fabric surfaces as often applied in upholstery and tapestry.

A jacquard knitting machine is required to develop a range of innovative jacquard knitted outerwear fabrics. By using various yarn compositions containing ramie and blends with acrylics; viscose or polyester, attractive jacquard patterns for ladies's dresses and skirts can be launched as samples for the country's important circular knitting industry. Modern computer controlled circular jacquard knitting machines are not manufactured in China.

A rapier loom is required to demonstrate modern weaving technology to the industry, currently equipped with outdated and narrow looms. The rapier loom will also be used for testing yarns, developed on the Centre's medium staple and long staple spinning equipment, as well as for the development of a large range of cloth constructions at high efficiencies. A rapier loom is regarded as the most suitable weaving machine to meet both market requirements and mill efficiencies. Rapier looms are not manufactured in China.

A single-end sizing machine is needed for appropriate warp preparation for high speed rapier looms.

Laboratory dyeing and finishing machines will be needed to develop reproducible recipes ensuring dye evenness at internationally accepted fastness levels and to develop reproducible finishing techniques eliminating the negative characteristics of ramie (hairiness and roughness).

A modern package dyeing machine, capable of handling a wide range of fabrics in small lots and with low liquor ratios for reducing water consumption is to be introduced. This jet dyeing machine will be used to test reproducible recipes ensuring dye evenness at internationally accepted fastness levels (which are higher than the national standards) at a semi-industrial scale.

Laboratory testing machinery (items 8-12 of proposed equipment list, Annex II) is relevant to yarn testing and testing of dyeing results. For a small scale laboratory the list is not complete, but part of elementary laboratory equipment of the Hunan Ramie Textile Research Institute, where the Ramie Technical Development Centre will be located until its transfer to its new premises in Shanghai in mid 1986, will be included in the transfer as part of the equipment, item 3 of the Government inputs.

Annex 2.0 - Job Descriptions for experts

Annex 2.1 - Degumming Expert

- Post title** : Degumming expert
- Duration** : Four months (four split missions of one month each, spread over four years)
- Date required** : First mission April/May 1989  
Second mission 1990  
Third mission 1991  
Fourth mission 1992
- Duty station** : Hunan Ramie Technology and Research Centre, Changsha, Hunan Province with some travel within the country
- Purpose of project** : Strengthen the Ramie Technical Development Centre by assisting the research activities in developing and supplying modern bio and inorganic processing technologies in the manufacture of quality textile fibre, yarn and fabric from ramie and ramie/cotton, ramie/synthetic fibre
- Duties** : In close cooperation with the National Project Director (NPD) and the Centre's staff, responsible for agronomical development and the spinning department, the expert is expected to draft a work programme for each of his missions which should cover the following duties:
- A. Technology**
- to review the current practices of collection of dried fibre, including the methods of sorting, bundling and packing into bales;
- to review the traditional process of degumming crude ramie fibre and propose a full research programme for the Centre to develop more efficient processing methods for producing fine pure ramie tops suitable for spinning fine count ramie and ramie/blends yarns.
- Objectives of the research programme are:
- a) increased fibre yield of degummed ramie harvested in the region (reduced amount of noils);
- b) decreased cost of the degumming process by at least 25%;

- c) an established fibre grading system allowing an increase in the output of fine pure ramie tops;
- d) develop new additives for an improved and efficient degumming processing technology.

**B. Training**

to assist in providing training courses, lectures and seminars for industry staff, organised by the Training Unit of the Centre on subjects such as:

degumming technology  
bio-degumming  
new additives/oils for accelerated degumming  
fibre preparation for industrial processing  
cost comparisons of alternative degumming methods

**C. Dissemination**

to suggest a mechanism for effective dissemination of research developments to industry and for consultancy service to industry in degumming.

The expert will also be expected to prepare a technical report setting out the findings (after each of the missions) and recommendations to the Government on further action which might be taken.

**Qualifications** : Textile technologist/chemist with extensive experience in degumming of vegetable fibres, with particular emphasis on ramie degumming technology

**Language** : English

**Background information** : See sheets 14 and 15

Annex 2.2 - Spinning Expert

**Job Description**

**Post title** : Ramie Spinning Expert

**Duration** : One month (first of two missions)

**Date required** : Before the end of 1988

**Duty station** : Ramie Technological Development Centre  
Changsha, Hunan Province, with travel within  
the province.

**Purpose of project** : To assist in the development of the present  
ramie spinning technology.

**Duties** : The expert will specially be expected to:

assist in the development of new ramie yarns  
which could raise demand for them in the  
international market, development work to  
include novelty yarns and machinery  
recommendations;

familiarise the staff of the Ramie Technical  
Development Centre (RTDC) in advanced  
spinning technology, including methods of  
testing textile yarns;

recommend new equipment to improve present  
ramie spinning and testing methods;

introduce preventive maintenance procedures.

The expert will also be expected to prepare a  
technical report setting out the findings and  
recommendations to the Government through  
UNIDO/UNDP on further action which might be  
taken.

**Qualifications** : 1 Practical experience in flax, cotton and  
wool worsted spinning.

2 Sound knowledge of testing methods and  
quality levels of bast fibre

3 Knowledge and working experience of the  
fancy twisters

4 Knowledge of and end-use, market and  
equipment for ramie spinning

**Language** : English

**Background  
information** : See sheets 14 and 15

Annex 2.3 - Weaving Expert

**Job Description**

**Post title** : Weaving Expert  
**Duration** : One month (first of two missions)  
**Date required** : Before end of 1988  
**Duty station** : Ramie Technological Development Centre Changsha, Hunan Province with travel within the province

**Purpose of project** : To assist in the development of the most suitable weaving equipment and procedures for ramie fabrics using yarns in counts range 6's to 60's nm on rapier looms with a gradual phasing out of shuttle looms.

The expert will specially be expected to:

advise on the most suitable loom/s including the feasibility of converting existing shuttle looms to rapier weaving;

familiarise the staff of the Ramie Technological Development Centre (RTDC) with the best modern weaving shed practises, including use of warp tying machines, loom monitoring preventive maintenance;

recommend new equipment to improve present ramie fabric testing methods.

The expert will also be expected to prepare a technical report setting out the findings and recommendations to Government through UNIDO/UNDP on further action which might be taken.

**Qualifications** :

- 1 Practical experience in the weaving on rapier looms of bast fibre yarns, especially flax.
- 2 Sound knowledge of testing methods and quality levels of flax, ramie, hemp-yarn fibres and blends of these with cotton and/or fabrics made from synthetic fibres.
- 3 Knowledge and working experience of loom allocation per weaver and production and fault monitoring
- 4 Knowledge and working experience of preventive maintenance schedules and the application of this knowledge to suit the local situation.
- 5 Experienced in all aspects of weaving warping and preparation and fully understand the practical aspects of weaving and beaming to specification and design

**Language** : English

**Background information** : See sheets 14 and 15

Annex 2.4 - Knitting Expert

**Job Description**

**Post title** : Ramie Knitting Expert  
**Duration** : One month (first of two missions)  
**Date required** : Early 1989  
**Duty station** : Ramie Technological Development Centre Changsha, Hunan Province, with travel within the province.

**Purpose of project** : To assist in the development of the most suitable knitting equipment and procedures for the production of pure ramie fabrics and blends of ramie with other natural fibres such as silk and cotton as well as man-made fibres. Yarn counts range from 6s to 60s nm. Preferred machine is single jersey circular jacquard.

**Duties** : The expert will specially be expected to:

- make recommendations on the most suitable make/s gauges of machine, taking into consideration such factors as cost, delivery, spares, reliability;
- undertake machinery works assessment trials using typical yarns from the RTDC and making provision for later yarn developments;
- recommend any necessary machine modifications, eg hard wearing yarn guides and needles, removal of fibre fly;
- recommend new equipment as necessary to improve present testing methods;
- introduce the best modern practices for preventive maintenance;
- introduce the best modern practises for fault monitoring and machine monitoring;
- make recommendations on the most suitable ancillary equipment such as cone winders, waxing devices and slub catches;

The expert will also be expected to prepare a technical report setting out the findings and recommendations to the Government through UNIDO and UNDP on further action which might be taken.

**Qualifications** : 1 Practical experience in knitting jacquard pattern fabrics of single jersey in particular but also general practical knowledge of all

knitting equipment, patterning systems and the special problems of ramie-fibre and blend yarns (fairly similar to those of flax-fibre and blends) and in the counts range 6s to 60s nm.

2 Practical experience of cone winding machines

3 Practical experience in the use of effect yarns

4 A good knowledge of the expectations of the garment making-up industry with particular reference to the utilisation of single jersey fabric.

**Language** : English

**Background information** : See sheets 14 and 15

Annex 2.5 - Dyeing/Finishing Expert

**Job Description**

- Post title** : Dyeing/Finishing Expert
- Duration** : Two man months (split mission over 2 years)
- Date required** : First mission April/May 1989
- Duty station** : Ramie Technological Development Centre Changsha, Hunan Province with travel within the province.
- Purpose of project** : To assist in the application and development of modern dyeing and finishing technology to ramie fibre and blended products including tops and woven and knitted piece goods.
- Duties** : The expert will be expected to :
- assist in the selection of dyestuffs and auxiliaries to improve the quality and the consistency of standards of reproducibility of colours and fastness properties of yarns and piece goods;
  - assist in the development and/or application of finishing chemicals/auxiliaries; the removal of processing oils, soluble fibre or yarn; desizing.
  - He should be experienced in the application of resin finishes and coatings to fabrics. A knowledge of textile screen engraving, printing, colour fixation and finishing would be advantageous.
  - He should be experienced in using vat, dispersed and reactive dyes in the dyeing of tops, yarn and fabric (woven and knitted) and apply his knowledge as required by the HRTRC
  - He should apply his experience gained in dyeing of weft knitted and woven fabrics of flax (if not ramie) and blends containing cotton, silk and man made fibre, particularly polyester.
  - He should apply his knowledge of colour measuring instruments and of colour computerisation.
  - He should be aware of the best modern practices in energy management in dyeing and finishing and make recommendations.
  - He should have a basic knowledge of the making-up room and the effects of fabric finish in that context, and generally be aware of what the garment manufacturer expects. A good knowledge



of garment dyeing would be an advantage though not essential.

He should advise the Centre's staff in developing an in-process quality control system

He should provide additional training in textile testing to 6-10 laboratory assistants

He should advise on the implementation of computerised process control in degumming, dyeing and finishing

Knowledge and experience of state-of-the-art dyehouse machinery and equipment are essential and he should be able to make recommendations for new equipment

He must be able to set up preventive maintenance procedures.

The expert will also be expected to prepare a technical report setting out the findings and recommendations to the Government through UNIDO/UNDP on further action which might be taken.

- Qualifications** :
- 1 Practical experience in a modern dyehouse, handling cellulosic and man-made fibres, yarns and fabrics woven and knitted.
  - 2 Practical experience in modern textile bleaching and finishing procedures and equipment.
  - 3 Sound knowledge of testing methods for dystuffs strength; colour fastness of dyed product
  - 4 Be able to conduct laboratory-scale dyeings and prepare recipes.
  - 5 Knowledge of the end-use market and equipment for ramie (or flax) dyeing.
  - 6 Knowledge of modern dyehouse finishing department effluent treatment procedures
- Language** : English
- Background information** : See sheets 14 and 15

Annex 2.6 - Training Expert

**Job Description**

- Post title** : Training Expert
- Duration** : One month
- Date required** : April 1989
- Duty station** : Ramie Technological Development Centre,  
Changsha, Hunan Province, with travel within the  
province.
- Purpose of project** : To assist the staff of the Ramie Technological  
Development Centre (RTDC) in the setting up of  
training procedures for the full complement of  
functions aimed at strengthening the Centre's  
usefulness to the industry but in particular,  
to expand and improve the expertise of the  
Centre's own Training Officers.
- Duties** : The expert will specially be expected to train  
counterpart staff at the Centre in the best  
modern training methodology including:
- 1 How a Training Manager reports to the Centre's  
Manager/Plant Manager and keeps him informed  
on all matters related to training.
  - 2 The responsibility for the initial training of  
all new employees in such matters as:  
  
orientation  
skill  
knowledge-training
  - 3 How to select and designate full-time  
instructors, direct their work assignments and  
follow up with the on-the-job instructors.
  - 4 How to develop training outlines, manuals or  
checklists for each job in the centre/plant.
  - 5 How to plan and schedule work assignments for  
trainees; establish work schedules and  
performance standards; evaluate work of  
trainees and assist supervisors in training  
evaluations.
  - 6 How to maintain appropriate records and see  
that instructors maintain such records as  
necessary.
- These to include a system of documentation for  
secondary reporting and evaluating training  
activities.

7 How to establish proficiency training programmes for difficult-to-train employees.

8 The means of reporting to divisional and plant management to provide them with informative monthly reports on the status of plant training activities; consulting and advising management of training needs and keeping them informed concerning all changes taking place within the plant involving technical training methods, procedures and personnel.

The expert will also be expected to prepare a technical report setting out the findings and recommendations to the Government, through UNIDO/UNDP on further action which might be taken.

**Qualifications** : **Textile mill management experience**

Substantial practical experience as a Training Manager or equivalent academic record of teaching/lecturing in the area of Training for the Textile Industries.

Experience of analytical and statistical techniques/methods as applied to training needs and jobs.

Conversant with safety at work requirements

Familiar with management theories and styles.

Effective communication skills (presentation, writing, speaking).

Experience of design and up-dating of training manuals/booklets.

Experience in training aids, training equipment and training room organisation.

Experience in training assessment.

**Language** : **English**

**Background information** : **See sheets 14 and 15**

Annex 2.7 - Product Development Expert

**Job Description**

- Post title** : Product Development Expert
- Duration** : One month only
- Date required** : April 1989
- Duty station** : Ramie Technological Development Centre, Changsha, Hunan Province with travel within the province.
- Purpose of project** : To assist in the development of a range of ramie products of added value using state-of-the-art technology and advise the National Project Director (NPD) and his technical staff on a programme for product development based on the marketing survey as outlined in Annex of the project document (copy attached).
- Duties** : The expert will specially be expected to:
- advise on the rationalisation of yarn counts, qualities, types (plain and fancy) and the most cost and market effective properties (eg percentage of cotton, silk or man-made fibre in blends with ramie);
  - rationalise on fabric construction, setts weights and colours, always with the objectives of improving productivity, quality and end-product value as well as market acceptability;
  - advise on international colour and style and set up an ongoing monitoring/subscription arrangement for both fashion and home interior furnishings, table tops;
  - assist in the production of new yarns and fabrics by way of advice and samples from the markets;
  - develop value-added end products such as woven and knitted fabric garments, furnishing fabrics and table linens;
  - develop correct specifications such as dimensions, weight, special finishes (eg crease resist, stain repellent, flame retardant, water repellent/proof);
  - specify correct use of cutting and sewing equipment;
  - specify sewing threads;

establish an international group of informed new product assessors (eg department store buyers) and arrange for their services on an ongoing basis;

Advise on how to initiate and implement such a system, eg by way of local agent. It is assumed that such buyers would have the opportunity of placing orders for any products deemed satisfactory;

install a costing and pricing system for new products;

provide information on tariffs for new products and develop products according to the most favourable rates for the various markets;

advise on product labelling and mandatory information for target markets;

advise on attractive and practical graphics and packaging, including sales leaflets and brochures;

advise on point of sale printed matter;

source best graphics and packaging in PRC by assessing samples (to be provided by Centre's staff);

The expert will also be expected to prepare a report setting out the findings and recommendations to the Government, through UNIDO/UNDP on further action which might be taken.

- Qualifications** : 1 Practical experience in textile product development relevant to ramie applications.
- 2 Sound marketing expertise
- 3 Sound textile technical knowledge with particular emphasis on clothing both woven and knitted as well as table linens and interior furnishings.
- 4 A proven ability for innovative product development.
- Language** : English
- Background information** : See sheets 14 and 15

Annex 2.8 - Quality Control Expert

**Job Description**

- Post title** : Quality Control Expert
- Durartion** : One month
- Date required** : April 1989
- Duty station** : Ramie Technological Development Centre, Changsha Hunan Province, with travel within the province.
- Purpose of project** : To assist the staff of the Ramie Technological Development Centre (RTDC) in the setting up of Quality Control procedures to be transferred via the Centre to the Ramie Textile Industry (with several large mills) in Hunan province. The expert must be able to complement and improve the training already received in PRC by the Centre's own experts.
- Duties** :
- 1 Establish the quality policy that is needed to make all products from the ramie textile industry - tops, yarns, woven and knitted fabrics and knitted garments - consistently acceptable in the market place by virtue of their suitability through performance and generally their "fitness for purpose".
  - 2 Translate the industry's quality policy into objectives involving the work of those departments which contributes to the final product quality and provide all levels of management with information on quality achievement against programme targets.
  - 3 Instruct the Centre's counterpart staff on how to establish and maintain adequate quality assurance documentation, especially for customer legislative requirements, and to prepare a Quality Manual setting out the general quality policy and practices, a rule book for the organisation of quality functions.
  - 4 Instruct on how to operate a production Quality Control system to effectively monitor product quality from raw materials through to finished product.
  - 5 Instruct on how to investigate causes of inadequate or inconsistent quality and how to undertake corrective action jointly with Production and Design departments.
  - 6 Introduce monitoring systems for all aspects of quality performance and costs so as to provide management with essential information.

7 See that routine calibration checks are carried out on all measuring and test instruments.

8 Instruct on requisite record keeping

9 Introduce a sample audit system to ensure that the system is working consistently.

The expert will also be expected to prepare a technical report setting out the findings and recommendations to the Government, through UNIDO/UNDP on any further action which might be taken.

**Qualifications** : The expert should have experience of the development, introduction and maintenance of systems to produce accurate and timely data on quality performance for use by line management.

The development of a complete set of written specifications for all products - eg fabric specification (yarn, sett, weave, weight, abrasion test, colour fastness, etc).

Fabric inspection criteria, sewing thread specification, garment measurements with tolerances, garment appearance, seam types and stitch density.

He should have first class experience of the design and installation of quality management information systems to include the sampling and testing of bought-in processing chemicals and auxiliaries, in-process sampling and testing systems, 100% inspection systems, data analysis and reporting.

**Language** : English

**Background information** : See sheets 14 and 15

ANNEX 3.0 - CVs of potential candidates

Annex 3.1 - Degumming Candidate(s)

CURRICULUM VITAE

<b>Name</b>	James A Henshall
<b>Date of Birth</b>	12 th April 1926
<b>Home Address</b>	'Lonsdale' 743 Shore Road Newtownabbey Co Antrim BT37 OPY
<b>Telephone</b>	0232 862242 (Home) 0846 682671 (Business) 74484 (Telex)
<b>Schools &amp; Colleges attended</b>	Castle Park Dalkey (1936-1940) Oundle Northamptonshire (1940-1944) Belfast Technical College (1945-1947)
<b>Accademic Qualifications</b>	'O' level School Certificate Credits:- Mathematics, Chemistry, Physics City of Guilds 1 st Class Flax Spinning
<b>Business Experience</b>	Management Trainee 1944/47 Philip Johnston & Sons Ltd Flax Spinners Assistant Manager 1947/1952 Henry Campbell & Co Ltd Company Director 1952/1981 Past Chairman Flax Spinners Assoc.



RESUMEE OF CAREER WITH HENRY CAMPBELL & CO LTD  
MOSSLEY MILLS CARNMONEY CO ANTRIM

Following my appointment I spent three months in the U.S.A. to gain experience and worked with Barnes Textile Associates, Consultants in Boston.

On my return I spent several years mainly employed on a major modernisation programme including the installation of new Flax Spinning Plant; this was combined with Labour redeployment working in conjunction with Associated Industrial Consultants.

In 1952 our Company became partners in a newly formed Thread Manufacturing Company in Philadelphia; being its supplier of Linen yarns, regular visits were made to negotiate supplies and monitor progress in subsequent years up to my resignation.

In 1956 the Company purchased the Island Spinning Co in Lisburn; shortly afterwards followed the purchase of York Street Flax Spinning Co's Thread Manufacturing business. Part of the manufacturing of these companies was consolidated into Mossley Mills and a new Synthetic Thread Mill at Mossley, as a subsiday - G C Ltd.

In 1960 the company, to strengthen its base, diversified into vehicle distribution, by the purchase of W H Alexander Ltd & W H Reay Ltd. These two companies held the sole distribution of both Morris Cars and Commercial Vehicles in Northern Ireland. I had no direct involvement in the management of these businesses.

Further diversification took place in 1965/66 with the purchase of Robert Kirk Ltd and Aerocrete Ltd, Builders suppliers and later R R Browne Ltd, Printers & Bookmakers.

In 1976/77 the Company undertook a major structure reorganisation by the formation of a Holding Company, Henry Campbell Group Ltd; by this time the Group had 1200 employees with annual profits in excess of £1 m.

Due to a very close spread of Shareholders it became prudent to seek additional holders of the equity, however this was not possible, and the sale of the whole Group was concluded in 1979 to Hanson Trust.

After two years working with the new owners I offered my resignation, this was mainly due to constrictions imposed and actions Management were forced to take regards the disposal of certain subsidiaries.

Shortly after Hansons take-over, they obtained control of Barbour Threads Ltd and the two companies were consolidated under a new Holding Company - Barbour Campbell Group Ltd.

RESUME OF CAREER WITH HENRY CAMPBELL & CO LTD  
MOSSLEY MILLS CARRMONEY CO ANTRIM

(contd.)

DIRECTORSHIPS HELD

Henry Campbell Group Ltd  
Henry Campbell Co Ltd  
Island Spinning Co Ltd  
York Street Threads Ltd  
G C Ltd  
Garrett & Lloyd (France) SA  
Robert Kirk Ltd  
Aerocrete Ltd  
R R Browne Ltd

Throughout my career with Campbells I was responsible for the purchasing of the raw material which necessitated regular visits to Belgium, France & Holland. From this activity I gained extensive knowledge of Flax Cultivation and Processing.

Also included in my responsibilities was the sale of the Company's Linen yarn production, this necessitated travelling throughout Europe, U.S.A., Australia and Japan.

Following my retirement I had a break in employment for approximately 12 months and took part in a trans-Atlantic Yachting voyage for relaxation; Yachting being my main sporting activity.

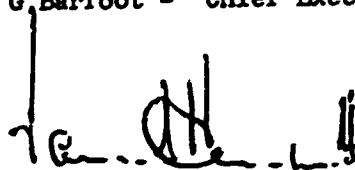
In 1983 I was appointed by the Central Council of the Linen Trade as co-ordinator of Flax growing trials, working closely with Lambeg Industrial Association, The Department of Agriculture and the Flax Spinning Trade. Over three years I gained considerable additional experience in the cultivation of Flax. The Project included selection of fields and negotiation with Farmers; monitoring crop progress through to harvesting and finally the scutching of the straw, the latter necessitated working in a Belgian Mill for several months monitoring each individual crop through the Scutching process. In 1986 these experiments were abandoned as uneconomic and I took up part time employment with John Preston & Co (Belfast) Ltd to revitalise their Flax sales to the Northern Ireland Spinning Industry.

This being a seasonal task I am virtually free to offer my services for periods between the months of June to October inclusive.

REFEREES

P W Larmor - Chairman Ulster Weaving Co Ltd

F G Barfoot - Chief Executive Barbour Campbell Group Ltd

 A Henshall

26/7/88.

Annex 3.2 - Spinning Candidate(s)

Curriculum Vitae - Dr C Lawrence - B.Sc. Ph.D.

Name : C.A. Lawrence

Age : 42

Date of Birth : 11.9.46

Address : Delph End Farm  
Wadsworth  
Hobden Bridge,  
W.Yorks.

Education : 'O' Levels: Physics, Pure Maths, Additional  
Maths, Applied Maths, English,  
Geography, Metalwork, Woodwork,  
Engineering Drawing, R.E.

'A' Levels: Pure Maths, Pure and Applied Maths,  
Physics.

Degrees: B.Sc. Applied Physics (Upper Second  
Class) Lanchester; Ph.D. (Textile  
Machinery) Bradford.

Employment

February 1968 - September 1968:

British Iron Steel Research Association  
Sheffield.

Work in Crystallography  
Sandwich student.

February 1969 - September 1969:

Ruston and Paxman Diesel Ltd  
Lincoln

Development of a technique for the measurement  
of piston ring wear.

Stress Analysis  
Sandwich student.

1970 - 1973 :

~~Allen Clarke Research Centre,~~  
Plessey Co. Ltd  
Caswell, Northants.

Research and Development in semiconductor  
devices and integrated circuits.  
Scientist

1972 - The static footprint, Textile Manufacturer, November.

### Yarn Texturing

- 1974 - The high speed texturing of polyester yarns, Shirley conference, Oct.
- 1975 - La fausse torsion et son avenir, Industrie Textile, November.
- 1975 - Die Zukunft des Falschzwirnverfahrens, Neue Zurcher Zeitung, 17th Dec.
- 1975 - The present situation and future prospects of the false twist process, JTI, December.
- 1976 - The future of false-twisting, Textile Asia, March.
- 1976 - The properties of production of purpose-built false-twist yarns, (The yarn revolution) Textile Institute conference, May.
- 1976 - The control of yarn quality in friction texturing, Chemiefasern und Textil-Industrie, W.Germany, May.
- 1976 - Modern Friktionsaggregate und ihre Zukunft, Textil-Praxis, July .
- 1976 - Tension ratio and slip in friction twisting, JTI, October.
- 1977 - An apparent friction paradox, J.Applied Physics.
- 1977 - The future of false-twist texturing, Textile Month, January.
- 1985 - The friction twisting of continuous filament yarns, Tribology International, June.
- 1985 - The development of twist in a false twist machine using a friction twister, J.T.I. August.

### Flammability

1981 - The flammability of textiles for bedding, Textile Month, February.

### Ballistic Penetration

1985 - Ballistic impact resistance: Conference on High Performance Fibres - UMIST, June.

- 1964 - Recent developments in weaving machines, Textile Recorder, November.
- 1964 - Die Weberei und Vorbereitung synthetischer Fasern. (Synthetische Fasern) Wissenschaftliche Verlagsgesellschaft, Stuttgart, W.Germany.
- 1966 - Review of British looms, Textile Recorder edition for British Trade Fair in Moscow.
- 1967 - Neue Tendenzen in der Technologie der Weberei, Textile Praxis, Jan.
- 1967 - Die Chemiefasern als Quelle des Fortschrittes in der Weberei, Lenzinger Berichte, Austria.
- 1975 - Weaving: The control of fabric structure, Merrow Publishing Co.
- 1980 - The weft insertion rate of multi-section looms with flying shuttles, JTI June.
- 1981 - The products and productivity of modern weaving machines, Textile Inst.Conf. March.
- 1981 - The twist loss of open-end and ring-spun yarn in air-jet weaving, Textile Month, June.
- 1986 - The scope for fabric engineering by means of the weave. J.T.I. July.

#### Cloth Formation (general)

- 1964 - Novel fabrics by a novel technique (the Phily machine) Shirley Bulletin, August.
- 1965 - Mechanical bonding of fibres and yarns, Journal of the Bradford Textile Society.

#### Comfort in Textiles

- 1970 - Problems of comfort and protection in modern apparel fabrics (Studies in modern fabrics) Textile Institute Jubilee Conference.
- 1971 - The language of comfort, (Textiles for comfort), 3rd Shirley International Seminar.
- 1971 - Film about new type of sleeping bag developed by the Ministry of Defence, 'Tomorrows World', BBC Television.

#### Electrostatic Footprints

- 1972 - Footprints on the rug, Time magazine, USA 20th Nov.

1965 - Woven stretch fabrics from false-twist yarns, Shirley Bulletin, Aug.

1968 - A computer technique for analysing the causes of irregular pickspacing in woven fabrics, JTI, May.

#### Shuttleless Weaving

1959 - Weft insertion by water jet, Textile Recorder, November, December

1959 - Der hydraulische Dusenwebstuhl, Textil-Praxis, December.

1959 - Water-jet weaving, Manchester Guardian, 30th December.

1960 - Practical Application of the air-jet loom, Textile Recorder, January.

1961 - Weft insertion by water jet, (Modern developments in weaving machinery), Columbine Press.

1962 - Harnessing the air jet in the P105, Skinners, October.

1963 - Some observations on shuttleless weaving, Textile Institute and Industry, May.

1964 - The new looms, New Scientist, 6th February.

1964 - A comparison of some new weaving machines, Textile Weekly, 17 April.

1966 - Water-jet weaving - a technologists evaluation, Skinners, Jan.-March.

1966 - L'insertion de la trame par jet d'eau, Industrie Textile, May.

1975 - The general theory of multi-section weaving machines, (completed but not yet published).

#### Weaving (general)

1955 - The preparation and weaving of man-made fibres and blended yarns, Textile Weekly, 22nd and 19th April, 6th May.

1960 - Re-equipment alternatives for the weaver, Textile Recorder, March.

1963 - At Hanover - Weaving machinery - cotton and man-made fibres, Textile Institute & Industry, October.

1963 - Lots of life yet for conventional looms, Skinners, November.

Annex 3.3 - Weaving Candidate(s)

Curriculum Vitae - Kurt Greenwood D.Sc., M.Sc., B.Sc., F.T.I.F.Inst.P

1. General

I was born on the 18th December 1918 in Vienna and came to the UK in the 1938. I have lived here ever since except for the years 1973-77 when I lived and worked in Switzerland. I was first married in 1942 and had one daughter. My first wife died in 1967 and married again in 1973. I have now two daughters aged 10 and 19 living with me. I became a naturalised British subject in 1948.

2. Studies and Qualifications

I attended primary and grammar school in Vienna and then took a one-year course at the local Textile School between 1924 and 1937. I resumed my studies after the war in 1947 as an external student of London University and obtained my first degree, B.Sc. (special) in Physics in 1951. My various other academic and professional qualifications followed in the following order:- A.T.I.-1955, A.Inst.P.-1956; M.Sc. (by thesis on 'The forces acting on the cloth fell during beat-up')-1957, F.T.I.-1958, F.Inst.P.-1960, D.Sc. (for published work on the Physics of Weaving)-1967.

3. Employment

Before leaving Austria and after finishing my schooling, I worked for a short time during the winter of 1937/8 as an apprentice weaver with an Austrian Cotton firm.

After my arrival in the UK I worked as a cotton weaver with Sir Alkanah Armitage in Pendleton, Salford.

In 1948, I joined Courtaulds Chemicals Division, Manchester as a laboratory assistant in their process control laboratory. After graduating, I took charge of that laboratory.

In 1952, I joined British Rayon Research Association as a research physicist in the weaving department. I was transferred to Shirley Institute in 1960 as a Principal Research Officer in the weaving department. In 1963, I became head of that department.

My work between 1952 and 1966 when I left Shirley Institute was concerned with some fundamental aspects of weaving, with quality control and with shuttleless weaving. I brought the first water-jet loom to the UK.

In 1968, I became head of the Physics Department which was soon afterwards merged with the Chemistry Department to form the Textile Products Division. As head of this division, I became involved in work on comfort (clothing and sleeping bags for the army), static electricity (electrostatic footprints for the police), and clothing for the disabled.

In 1973, I became Head of the basic research department of Heberlein Maschinenfabrik AG in Switzerland where my work was concerned with

twisting, heating, and cooling systems for high-speed false-twist texturing machines.

In 1977, I returned to the UK and took up my present part-time appointment as senior research fellow in the Department of Textiles at UMIST. In the course of my work at UMIST, I completed an analysis of multi-phase and multi-section weaving and then worked on a flammability project for the BSI. In addition, I have done some lecturing, tutorials and supervision of projects at various levels from 3rd year undergraduate to Ph.D. Since 1982, I have conducted research into the ballistic penetration of textiles for the Ministry of Defence.

#### 4. Prizes & Awards

In 1977 I was awarded the Warner Memorial Medal of the Textile Institute.

In 1985, I was awarded the Prize and Medal of the Worshipful Company of Weavers.



K.Greenwood - List of Publications

Chemical Engineering

1953 - The removal of carbon dioxide from atmospheric air by scrubbing in packed towers, Transactions of the Inst. of Chemical Engineers, March.

Weaving Research

1956 - The position of the cloth fell in power looms, JTI, May (also published as a booklet in Russian in the USSR).

1956 - Warp tension in the looms, Textile Mercury, 29th June.

1956 - The theory of pickspacing in woven fabrics, Skinners, November.

1957 - Tracking down the causes of repping, Man-made Textiles, January.

1957 - The beat-up force and pickspacing, JTI, February.

1957 - Relaxation phenomena in weaving, JTI, March.

1957 - Probleme der Schussdichte, Textile-Praxis, November, December.

1958 - Unerwünschter Ripseffekt und Seine Vermeidung, Text.Praxis, Jan.

1958 - Weft tension during weaving, JTI, May.

1959 - The effect of yarn irregularity on pickspacing and weft cover factor, JTI, May.

1959 The lease rod as a tension indicator, Textile Recorder, February.

1959 - Irregular pickspacing - loom fault or yarn fault. Text. Rec., July.

1960 - Weaving resistance - its nature and its effect on fabric construction, Textile Mercury, 14th October.

1961 - La resistance au tissage et ses effets sur la structure du'un tissu, Industrie Textile, January.

1961 - Der Webewiderstand und sein Einfluss auf die Gewebekonstruktion, Textil-Praxis, September.

1965 - The design and operation of a loom with negative beat-up, JTI, June.

Annex 3.4 - Knitting Candidate(s)

CURRICULUM VITAE. WILLIAM D. COOKE. 1983.

1. Educational Background

Prince Henrys Grammar School, Evesham School	1953-61
Courtaulds Ltd., Student scholarship	1961-66
Department of Textile Technology, UMIST	1962-65
1964 Course Prize 1965, 2/1 B.Sc. Textile Technology	
Department of Textile Technology, UMIST	1971- To date
M.Sc. "The Stitch-Locking of Stitch-Bonded Fabrics"	1975
Ph.D. "The Attrition Mechanisms of Knitted Fabrics"	1982

2. Employment to Date

Courtaulds Ltd. (British Celanese)	
Development Manager	1965-1968
Group Sales Manager	1968-1970
Huddersfield Polytechnic	
Lecturer in Textile Science	1970-1971
Department of Textiles, UMIST	
Lecturer in Knitting Technology	1971- To date

3. Teaching Responsibilities

April 1971	Joined Department of Textile Technology
October 1971	Given responsibility for full lecture and laboratory programme of Dr. Burnip.

a) M.Sc. Textile Technology.

1) Knitting Technology (1971/71-To date)

A general course in knitting technology including the mechanics and economics of the knitting process.

Lectures 15 hrs. Labs. 10 hrs.

2) Advanced Knitting Core Option (1971/2-To date)

A course based on the most up-to-date research in knitting technology including the dynamics of knitting elements. The force balance in the knitting zone, non-linear cam design fabric geometry and computer based models.

Lectures 10 hrs. Labs. 10 hrs.

b) Postgraduate Diploma in Textile Design.

1) Knitting Technology (1971-76)

A course in knitting technology for designers.  
Lectures 10 hrs. Labs. 10 hrs.

2) Knitting Design Systems (1971-76)

A survey of knitting design control mechanisms.  
Lectures 10 hrs. Labs. 10 hrs.

c) Undergraduate Teaching.

1) 3rd Year Textile Technology

Special Topics (1971-To date)

A course dealing with the dynamics of warp and weft knitting and the geometry of knitted fabrics.  
Lectures 10 hrs. Labs. 20 hrs. (1977)

2) 3rd Year Textile Design and Design Management

Knitting Design Conversion (1981/82-To date)

A new course dealing with the latest knitting design conversion methods including CAD.  
Lectures 20 hrs.

3) Special Textile Topics (1979-To date)

An introduction to non-woven fabric production methods and a comparative study of the properties of non-woven fabrics and their economics.

Lectures 8 hrs.

4) 3rd Year Textile Chemistry

Fabric Manufacture and Fabric Properties  
(1979-To date)

A survey of fabric manufacturing methods/ economics and a comparative study of fabric properties.

Lectures 5 hrs. Labs. 5 hrs.

5) 2nd Year Textile Technology.

Knitting Technology (1971-To date)

A course dealing with the mechanical and economic limitations to the application of knitting techniques.

Lectures 20 hrs. Labs. 16 hrs.

6) 2nd Year Combined Hours Textile Technology/ Management (1971-1975)

A course based on industrial work study data to discuss the economics of the knitting process.

Lectures 10 hrs. Labs. 10 hrs.

7) 2nd Year Textile Economics and Management  
(1979-To date)

A course developed from 6. To include case studies of the double jersey industry and the warp knitting industry and comparative process economics.

Lectures 10 hrs. Labs. 10 hrs.

2nd Year Textile Design and Design Management.

8) Knitting Design Conversion (1978/80-To date)

A study of the main knitting design control systems including basic electromagnetic selection.

Lectures 20 hrs. Labs. 10 hrs.

- 9) Costing of Knitted Fabrics/Garments (1980/81-  
To date)

Methods of costing knitted products.  
Lectures 10 hrs.

- 10) Advanced Knitted Fabric Structures (1979/80-  
1982/3)

A study of complex knitted fabric structures.  
Lectures 10 hrs.

1st Year Courses.

- 11) Knitting Technology (1971/2-1976/77)

A broad introductory course in knitting  
technology.  
Lectures 10 hrs. Labs. 20 hrs.

- 12) Textile Processing (1977/78-To date)

Following student criticism of the course given  
by 5 members of staff, I took on responsibility for  
teaching a new integrated textile processing course  
in the first year.

Lectures 45 hrs. Labs. 10 hrs.

In 1980/81 Mr. Beech took on the spinning  
section, reducing my hours to:  
Lectures 35 hrs. Labs. 10 hrs.

In 1981/82 Mrs. Catlow took on the preparation  
section, reducing my hours to:  
Lectures 25 hrs. Labs. 10 hrs.

1st Year Textile Design and Design Management.

- 13) Knitted Fabric Structures (1979/80-1981/82)

A broad introduction to the structures used in  
the knitting industry and their analysis.  
Lectures 10 hrs.

- 14) Knitting Design Methods (1978/80-To date)

A project based course to initiate the design  
process using knitting technology.  
Lectures/Labs. 40 hrs.

Present Lecture/Contact Load:

Lectures 182 hrs. Labs. 92 hrs. Tutorials 30 hrs.

Course development has included working with the University/UMIST Audio Visual Department to produce an animated teaching film. This film has been transferred to Video Casette and is held in the UMIST Library.

#### 4. Research

Research activities and interests are concerned primarily with the properties of knitted fabrics and their behaviour in use. Of necessity the main thrust of the research activity was directed to completing an M.Sc (1975) and subsequently a Ph.D (1982) whilst developing and sustaining a very substantial teaching programme.

#### Research Activities, Main Projects.

##### a) The improvement of the Aesthetics of Stitch-Bonded Fabrics - 1972-74.

This research was funded by a grant of £15,000 over two years on a joint basis to Cooke (UMIST)/Foulds (RCA). The work was sponsored by G and R. Dewhurst Ltd., Manchester, and 8 quarterly reports were submitted on a confidential basis. Several new techniques were developed which substantially increased the design flexibility of stitch-bonding.

##### b) The improvement of the Physical Properties of Stitch-Bonded Fabrics 1975-76.

Externally funded research by ICI Fibres/Portways Ltd., a total of £14,000 on a joint basis to Cooke (UMIST)/Foulds (RCA), resulted in considerable progress being made in improving the tensile and abrasive properties of stitch-bonded fabrics. As a direct result of this work, stitch-bonded fabrics were successfully marketed as primary upholstery products in the U.K. and the high tensile fabrics were developed as a basis for tarpauline manufacture.

At UMIST this funding sponsored an RA who completed an M.Sc. Thesis - "The Abrasion Properties of Stitch-Bonded Fabrics".

c) The Stitch-Locking of Stitch-Bonded Fabrics 1974-75.

This research resulted from a discussion with several textile converters experiencing problems in printing stitch-bonded fabrics. The results were incorporated in an M.Sc. Thesis submitted in 1975 and the expertise resulting from projects a), b) and c) resulted in my being called as an expert witness in the High Court patent case between Cosmopolitan Textiles Ltd., and A. Wills (Manchester) Ltd.

d) The Attrition Mechanisms of Knitted Fabrics 1976-1982.

This complex problem was selected as a Ph.D. topic and the work involved extensive co-operation with ICI Fibres of Harrogate and the IWS Technical Centre at Ilkley. The work completed during the period 1978-82 has been successfully presented as a Ph.D. thesis in 1982. Novel aspects of this work have been written-up in a series of papers from 1981-To date.

e) A joint research proposal Cooke/Lawrence on the spinning and evaluation of hollow spindle wool yarns has been awarded a grant of £30,000 ECU's in the EEC Third Textile Programme. A request for equal funding has been accepted by the TOMRB committee of the DOI. This research due to commence in August, 1983 will examine the mechanism and controlling parameters of hollow-spindle spinning and the yarns will be evaluated in knitted fabrics and garments using the micro and macro techniques developed in d).

f) Thesis/Dissertation Supervision.

M.Sc. Supervision

Mr. R. Mier

Miss J. Fearon

Mr. F. Sefeik

Mr. I. H. Abdelgadir

Degrees Awarded

M.Sc. 1973

M.Sc. 1976

M.Sc. 1974

M.Sc. 1977

M.Sc. Dissertation

Mr. M. Agawall

Mr. C. Jobanputra

Mr. S. Yiannakakis

M.Sc. 1973

M.Sc. 1976

M.Sc. 1981

<u>Continuing Students</u>	<u>Degrees Awarded</u>
Mr. G. Assimakopoulos	M.Sc. (1982 - )
Mr. S. Soong	M.Sc. (1983 - )

5.

a) Conference - Knitted Suits for Men, UMIST. June 8-9, 1973

A conference organised jointly with Dr. Cusick. A timely topical conference which raised the department's reputation in the Knitting Industry.

b) Conference - Textured Yarns Symposium, UMIST. 24-26 June, 1975

A successful 2-day conference organised jointly with Dr. Cusick. A paper was presented on "The Knitting of Textured Yarns".

c) Conference - The Non-Woven Symposium, UMIST. 22-24 June, 1976

This highly successful conference was organised jointly with Dr. Cusick and Dr. Newton. A paper was presented on the Attrition of Stitch-Bonded Fabrics.

d) Conference - British Knitwear Export Council - November, 1982.

A paper was presented entitled "Computers and Knit Design".

6. M.C.T. etc.

a) The Courtaulds Course - 1975-1980.

Undertook the sole responsibility for organising the last five years of this very important annual four week course for Courtaulds' management staff. This involved considerable planning and discussion with the departmental staff concerned and regular contact with the Courtaulds personnel staff. The course was revised each year and the lecturing staff subjected to a critical assessment procedure. The process of passing on the results of this assessment and endeavouring to generate an improvement in individual lecture courses involved delicate negotiations with several members of the academic staff.



- b) Between 1972-1980, various other contributions to special courses including courses run for Portways Ltd, Courtaulds Ltd., and Raychem Ltd.
- c) 1981-82, Special course given to Courtaulds Ltd on "Knitted Fabric Faults". 2 days in house.  
1981-82, M.C.T. course on Fabric Structures and Knitting Mechanisms. 16 hours lectures and labs.
- d) 1982-83, M.C.T course Introduction to Fabric Production and Fabric Structure. 10 hours lectures and labs.  
M.C.T. course for Raychem Ltd. Introduction to Knitting. 2 x 8 hours lectures and labs.

7. Departmental Administration.

- a) Admissions Tutor for B.Sc. courses in Textile Technology -(1977-To date).
- b) Senior Admissions Tutor for B.Sc. courses - (1980-To date).
- c) Member of Special Working Party on New Courses - (1973-74).

This has involved all the detailed preparation necessary to bring a proposal for a new course to Undergraduate Courses Committee. The course in question, Textile Economics and Management, has played a key role in the regeneration of the department.

- d) Chairman of Special Working Party on New Courses - (1974-75).

The second course prepared by this working party was the Textile Design and Design Management course. As Chairman of this working party I carried out most of the work necessary to present this course to the Undergraduate Courses Committee.

- e) Chairman of the Departmental Undergraduate Committee - (1979-To date).

As Chairman of this committee I have been responsible for reshaping the Textile Technology course and introducing the two new courses in Textile Materials Engineering and Product Management, and Textile Engineering and Textile Chemistry.

f) Secretary and Tutor to the Marks and Spencer Group Sponsorship Scheme - (1982-To date).

Have played a key role in the negotiations leading to the establishment of the UMIST/Marks and Spencer Group Scheme. As secretary to the Sponsorship Committee I am responsible for negotiations with each of the six sponsoring companies to establish a satisfactory garment manufacture course, for the organisation of quarterly meetings of the committee and for the interviewing and selection of the sponsored students.

8. Institute Committees.

Member of the Faculty Undergraduate Courses Committee - (1974-77).

9. Professional Membership.

Associate of the Textile Institute.

10. External Activities.

a) Visiting Lecturer at the University of Strathclyde - (1981-To date).

Responsible for running the lecture and laboratory knitting programme on the M.Sc. course in the Department of Chemistry.

Lectures 20 Hrs. Labs. 20 Hrs.

b) Visiting Lecturer University of Minho Guimaraes, Portugal - (1983- ).

Invited to present a course on knitted fabric properties during the 1983-84 session.

c) Member of the Hosiery and Allied Trades Research Association Research Committee - (1982-To date).

Jointly responsible for generating new ideas for sponsored research in the knitting industry.

d) Member of the Textile Institute Membership Committee

Quarterly meetings on membership and finance.

e) Knitting International Reviewer/Contributor.

In order to improve the recognition of UMIST as an active participant in the education of knitting technologists, have contributed regularly to Knitting International - (more than 20 articles since 1971 including two major ITMA reviews).

11. Consultancy and Industrial Links.

The following consultancies have been undertaken.

a) Turner Brothers Ltd., - (1972).

The knitting of Forten yarns.

b) G. and R. Dewhurst Ltd., - (1972-74).

Improving the efficiency of a stitch-bonding factory.

c) Portways Ltd., - (1974-75).

The establishment of a stitch-bonding unit and the initial product specification.

d) W.K. Lowe Ltd., - (1975-77).

The design and specification of a CAD system to be custom manufactured for W.K. Lowe.

e) Reiter-Scragg Ltd., - (1982-83).

The design of a digital counting system for measured length packages.

f) Seton Products Ltd., - (1983).

The improvement of the plant efficiency and re-specification of the quality control process.

g) Meiners Electronics Ltd., - (1975-83).

Consultant on the application of electronic counting techniques to the knitting industry. A considerable programme of design and development has resulted in the manufacture and sale of five different instruments for quality control in the textile industry.

PUBLICATIONS

1) Refereed Papers.

- Cooke/Arthur J.Text.Inst. Vol.72, No.3, 1981,  
p.111-120. A Simulation Model of the  
Pilling Process.
- Cooke J.Text.Inst. Vol.73, No.1, 1982,  
p.13-19. The Influence of Fibre  
Fatigue on the Pilling Cycle, Part I:  
Fuzz Fatigue.
- Cooke J.Text.Inst. Vol.73, No.2, 1982,  
p.90-93. The Geometry of Presser-Foot  
Fabrics.
- Cooke J.Text.Inst. Vol.74, No.3, 1983,  
p.101-108. The Influence of Fibre  
Fatigue on the Pilling Cycle, Part II:  
Pill Growth.
- Cooke Text.Res.J., Vol.51, No.5, May 1981,  
p.364-365. Torsional Fatigue and the  
Initiation Mechanism of Pilling.
- Cooke J.Text.Inst. The Influence of Fibre  
Fatigue on the Pilling Cycle,  
Part III: Pill Wear-off and Attrition.  
Accepted for Publication.
- Cooke and Lomas Ancient Textiles Modern Technology.  
Arch.Today, March 1987, page 21.

2) Non-refereed Papers

- Konopasek/Cooke Textile Institute & Industry.  
March 1976, Vol. 14, No. 3, p.92  
Computer Aided Design of Double Jersey  
Fabrics.
- Cooke/Sefcik Textile Institute & Industry.  
Sept. 1976, Vol. 14, No. 9.  
Factors affecting the Physical  
Properties of Stitch-bonded Fabrics.
- Cooke Textile Institute Industry. March  
1977, Vol. 15, No. 3. The Knitting  
of Textured Polyester.

- Cooke Textile Institute & Industry.  
May 1980, Vol. 18, No. 5, p. 128.  
Stitch bonding - A decade of success  
in the U.K.
- Cooke Knitting International. June 1974.  
p. 76, Needle Scanners.
- Cooke Knitting International. Dec. 1975.  
p. 63-73, ITMA Review.
- Cooke Textile Asia. Jan. 1976. Vol. VII.  
No. 11. p. 40. ITMA Review.
- Cooke Textile Asia. Feb. 1976. Vol. VII  
No. 2. p. 48. ITMA Review.
- Cooke Ciba-Geigy Journal 2/27,, March 1975.  
p. 19. Computer Aided Design.
- Cooke Knitting International. April 1978.  
p. 67, Kell/P.P.S. Symposium.
- Cooke Knitting International, May 1978.  
p. 82. Computers in Knitting.
- Cooke Knitting International. June 1978.  
p. 101, Titus Database.
- Cooke Knitting International, Dec 1979.  
p. 39. ITMA Review.
- Cooke Knitting International. Aug. 1980.  
p. 46. Cadratex Take-down
- Cooke Knitting International. Nov. 1980.  
p. 58. Dubied Jet 2.

3) Conference Papers.

- a) Dr.W.D.Cooke, Miss B.Lomas:  
'The S.E.M. in the study of Ancient Textiles'  
The E.T.S.C. Conference, Manchester, September 1986.
- b) Dr.W.D.Cooke, Miss B.Lomas:  
'Fibre fracture morphology and Archaeological Textiles'  
Study seminar at the Victoria and Albert Museum, London,  
December, 1986.
- c) Dr.W.D.Cooke:  
'Fibre degradation in Ancient Textiles'  
N.E.S.A.T. Conference, York, May, 1987.

- d) W.D.Cooke, Ms.J.Wilson, A.Bahadori:  
'The Representation of Knitted Structures Using  
Microprocessors'  
Textile Institute Annual Conference, Como, 1987.

4) Books

Modern Non-wovens Technology, Chapter 9, Stitch Bonded  
Webs.

CURRICULUM VITAE

Name: ITZCHAK PORAT  
Date of Birth: 19th January 1954  
Nationality: Israeli  
Address: 43 Brooklands Drive, Gosport, Cheshire.  
Marital Status: Single

EDUCATION

1968-1972 Kugel High School, Israel  
1972-1980 Shenkar College of Textile Technology  
1980 Shenkar College Ph.D Scholarship for Leeds University  
1980-1982 Department of Textile Industries, Leeds University

QUALIFICATIONS

1980 B.Tech(Textiles) with distinction, Shenkar College, Israel.  
1982 Ph.D., Leeds. Thesis on Hydraulic Positioning on a Multiple Guide Bar Warp Knitting Machine.  
1987 Fellow of the Textile Institute

CAREER

1982-1983 Visiting Research Fellow, Leeds University.  
1983-1987 Head of newly established Advanced Textile & Clothing Machinery R. & D. unit, Leeds.  
1987- Professor of Clothing Engineering, Department of Textiles, U.M.I.S.T.

PATENT AND PATENT APPLICATIONS

1. "Fabric Picking Device" U.K. Patent Application 8414636.
2. "Fabric Handling Device" U.K. Patent Application.
3. "Mechanism for Affecting Movement", U.K. Patent Application 8406466.

4. "Method and Apparatus for Operating Warp Knitting Machines"  
U.K. Patent Application 8406570.

#### PUBLICATIONS

My work is usually commercially sensitive. For some of this work which is now reaching its final stages, clearance for publication has been given recently. These papers include:

1. "Computerised Hydraulically Assisted Patterning System for Warp Knitting Machine", by I. Porat, P. Grosberg and M.N. Moghaddassi - Knitting International December 1985.
2. "Automatic Separation of Fabric from a Stack", by I. Porat, P. Grosberg and M.N. Moghaddassi. J. Text, Inst. (submitted).

#### RESEARCH INTERESTS

The development of Textile Clothing Machinery especially in integrating so called new technology. Textile properties and garment assembly and performance. Interactive teaching systems and the application of Expert Systems to textiles.

#### RESEARCH

For the past six years I specialised in the development of advanced textile and clothing machinery.

With new technologies emerging it is possible to replace traditional mechanical linkages with computer controlled actuators resulting in more flexible and potentially cheaper and more reliable machines. These developments have resulted in seven different prototypes, four of which are at different stages of industrial evaluation. Four international patents are at different stages of approval with a further three patents to be applied for shortly.

Research in modern textile and clothing machinery requires multidisciplinary expertise which includes Textile and Clothing Engineering, Mechanical Engineering, Electrical and Electronic Engineering, Microcomputer control, Control Systems, Transducers, and Robotics. In the past six years I have played a crucial role in introducing these techniques into the Department of Textile Industries at Leeds University virtually from scratch. For the past four years I have been heading a multidisciplinary team which comprises of four full time staff and three Ph.D research students.

The research into clothing engineering has been applied in the following areas in collaboration with industry.

- a) Design and construction of a fabric handling device for separation of individual fabric sheets from a stack. Although many attempts have been



made already, we believe that this is the most versatile yet to be achieved. The device can be fitted to a dedicated mechanism for fabric separation, which has also been developed, or it can be mounted as an end effector to a robot. Commercial realization of the ply separator and effector is under progress.

b) A vision system has been developed for the alignment of fabrics where precise positioning of fabric is required. A system prototype has been implemented with A Puma 560 Robot.

c) Research into the use of real time path control for the sewing by a robot. Vision systems and sensory feedback systems have been applied. The system can sew a curved fabric edge, and rotate fabrics around corners. Further work is still needed before commercial realization is achieved.

Research in Textile Engineering has been applied in the following areas: (Items a, b, c, d in collaboration with industry).

a) Design and construction of a computer-controlled pattern mechanism for warp knitting machines. This device is by far the most advanced of its kind. The device has been working in industry since January 1985. Another prototype has been installed in the United States recently.

b) Research into advanced warp let-off systems for warp knitting machines. A prototype has been recently completed and is running successfully at the University. It is the most advanced let-off for warp knitting machines available today with probable applications to weaving as well. Industrial evaluation is expected shortly.

c) Research into the use of different types of yarn tension devices for warp knitting machines. A prototype of an intelligent self-adaptive faller bar has been completed and is working successfully. Industrial evaluation is underway.

d) A novel Autoleveller for the cotton card is under development. A prototype has been constructed and is working with promising results. Further work is still needed.

e) Research into On-Line monitoring in spinning and fancy yarn production are in progress.

Those developments which are not subjected to commercial restriction can be viewed at Leeds University.

#### EXPERIENCE OF TEACHING

The supervision of PhD. students and teaching at the Department of Textile Industries Leeds University.

CONFERENCES

1. "Clothing Automation at Leeds University" by I. Porat, C. Iype, D. Gershon, M.N. Moghaddassi and P. Grosberg, presented at the ACME conference on clothing automation Leeds July 1986.
2. "Robotic Sewing using Multi-Sensory Feedback" by D. Gershon and I. Porat, presented at the 16th International Symposium on Industrial Robots September 1986.
3. "Some Aspects of Control in the Textile Industry", by P. Grosberg, C. Iype and I. Porat, presented at the International seminar on Distributed Digital Controls for Process Industries. Organised by UNIDO at New Delhi, India, September 1986.
4. "Line Tension Control in Warp Knitting" by P. Grosberg, I. Porat, presented at the IMechE Engineering Sciences Division Seminar on 'High Speed Machinery' in London 12th March 1987.
5. "Multi-Feedback Controlled Robotic Sewing" by I. Porat, D. Gershon, presented at the Textile Institute Annual World Conference in Sydney 10-13 July 1988.

Annex 3.5 - Dyeing/Finishing Candidate(s)

CURRICULUM VITAE

L.W.C.MILES

Date of Birth: 29.6.1928

Education: Brentwood School,  
Imperial College (1945-50)

Qualifications: B.Sc., Ph.D.(Chemistry)

Employment: 1950-61 - Technical Management in  
dyeing, printing, finishing for  
Tootal.

1961 to date - Lecturer in Textile  
Chemistry at UMIST with  
responsibility for the Dyehouse  
staff, machinery and courses.

**Publications:**

1. McDowell and Miles, JSDC, 82, (1966) 414.
2. McDowell and Miles, JSDC, 82, (1966) 447.
3. Aboul-Fetouh and Miles, Text.Res.J., 38, (1968) 176.
4. Maheshwari and Miles, Inst.Text.France, 1, (1969) 558.
5. Textile Printing, Merrow, 1971. A Monograph.
6. Hearle and Miles (ed.), The Setting of Fibres and Fabrics, 1971.
7. Textile Printing, Rev.Prog.in Coloration, 4, (1973) 44
8. Chavan and Miles, JSDC, 92, (1976) 59.
9. Chavan and Miles, Text.Res.J., 53, (1983) 347.
10. Miles, Ciba-Geigy Review, 1974/2.
11. Miles, JSDC, 93, (1977) 161.
12. Peters and Miles, Synthetic Dyes VIII, 1978, Chapter 4, ed. Venkataramen.
13. Miles, Textile Printing, Dyers Company 1981.
14. Dave and Miles, JSDC, 98, (1982) 340.

15. Abdullah and Miles, Text.Res.J., 54, (1984) 415.
16. Abdullah and Miles, J.Text.Inst., 76, (1985) 415.
17. Miles, Rev.Prog.in Coloration, 13, (1983) 27.
18. Miles, Rev.Prog.in Coloration, 15, (1895) 21.

**Teaching:**

1. Seven Ph.D. students and fifteen M.Sc by Research students.
2. I planned and tutored the short-lived but highly successful degree in Textile and Colour Chemistry with Management.
3. I contributed an option course for the Chemistry Dept., MACS 2nd Year.
4. I planned and initiated the major Chemistry option in the Textile Technology Course.
5. Regular MCT courses in the dyeing, printing and finishing area.
6. The practical teaching in the Dyehouse has been my responsibility since 1961 and has been developed in a totally different, more analytical fashion than pre-1961.

**Administration:**

1. Dyehouse staffing and machinery.
2. Chairman of UMIST Liberal Studies Committee 1974-77.
3. Chairman of Dept. U.G. Courses committee, with responsibility for major course revisions.

- 1973 - 1978 : Shirley Institute, Manchester  
Development of Textile Machinery and Processing.  
N.B. Work involved the designing and building  
of prototype equipment.  
Senior Scientist
- 1978 - 1980 : Turner + Newall Ltd  
Rochdale  
Development of new materials and processes  
for the replacement of asbestos products.  
N.B. The work involved the design and building  
of prototype machinery and the evaluation  
of the products made with the prototype  
equipment.  
Section Leader
- 1980 - 1981 : R.K. Textiles composite Fibres Ltd.  
Building of process plant for carbon fibres  
and heat resistant fibres.  
R + D Manager
- 1981 to date : UMIST, Department of Textiles, Manchester.  
Lecturer in Textile Technology



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Telex 666094

**CURRICULUM VITAE OF SAMUEL ROBERT BEECH MSc AKC AMCT CText FTI**

**22 Hurst Lane, Bollington, Macclesfield, Cheshire SK10 5LP**

<b>Personal History</b>	<b>Born 20th January 1924</b>
	<b>Married, four children</b>
<b>Education</b>	<b>1935 Scholarship to Longton High School, Stoke-on-Trent President of school Scientific Society</b>
	<b>1940 School Certificate</b>
	<b>1943 Medallist in Advanced Ceramics</b>
	<b>1946 Intermediate BSc (Pure and Applied Maths)</b>
	<b>1950 College Associateship and BSc in Maths, Physics and Chemistry, Kings College, London University</b>
	<b>1952 HNC in Textile Chemistry</b>
	<b>1953 Associateship of Manchester Municipal College of Technology</b>
	<b>1955 Chartered Textile Technologist</b>
	<b>1956 Corporate Member, Society of Dyers and Colourists</b>
	<b>1958-62 Studied History and Philosophy of Science, University College, London</b>
	<b>1976 Fellowship of Textile Institute</b>
	<b>1976-77 Public Speaking Course</b>
	<b>1980 MSc in Textile Technology, UMIST</b>
<b>Military Service</b>	<b>1943-47 R.A.F. - Trained as Pilot then took charge of Educational and Vocational Training Centre</b>
	<b>1946 R.A.F. Teachers' Training Course, leading to Teaching Certificate</b>

**Career**

1940-43 Assistant to General Manager,  
and 47 Colclough China Ltd, Stoke-on-Trent

1943-47 R.A.F. as above

1947-50 University as above

1950-58 Chief Chemist and Development Officer,  
Fine Spinners and Doublers Ltd. (Yarn  
Throwsters)

1955 Sole inventor of British patent 784 004,  
used as basic principle of machines with  
sales totalling £2 000 000 (1960's  
prices)

1958-63 Research Manager, Combined Optical  
Industries Ltd, Slough

1963-77 Group Textiles Consultant, Ernest Scragg  
& Sons Ltd. (Manufacturers of Textile  
Machinery)

1966 Responsible for all textile aspects of  
the first textile machine to gain a  
Council of Industrial Design Award

1977-79 Independent Textiles and Management  
Consultant

1979 on Lecturer, University of Manchester  
Institute of Science & Technology

**Personal Interests**

Diophantine mathematics

Astronomy - sometime member, British Astronomical  
Association

Highest-fidelity sound reproduction

Life member of MENSA

Music, especially in cooperation with others

Problem solving

Walking and camping

Qualified member, British Red Cross Society

Progress of General Science

**Experience**

30 years general industrial management, always  
directing research, and including 14 years as  
Textile and Management Consultant in England and  
about thirty other countries

**Main Languages**

English (first)  
French, German, Spanish

**Committees**

Past: Textile Institute Section Committee  
Present: Member, University of Manchester Senate  
Member, Board of Faculty, UMIST  
Member of Council of the Textile Institute  
Chairman, Textile Institute Textile Terms and Definitions Committee  
Deputy Editor, Journal of the Textile Institute  
Member, Textile Institute Technical Committee  
Member, British Standards Institution Technical Committees 22 and 24  
Secretary UMIST Textile Departmental Academic Board

**Patents Granted**

BP 784 004 Finishing Yarns; Thread Guides and Tensioning Arrangements  
BP 909 711 Photo-Electric Curve-Followers  
BP 915 523 Moulding Lenses  
BP 916 377 Moulding Optical Lenses  
BP 920 608 Polymeric Optical Elements  
BP 920 609 Polymerization Moulding of Transparent Synthetic Resin Lenses  
BP 925 821 Moulding Lenses  
BP 1 196 904 Post-Treating Crimped Yarn  
(Sole inventor in each case)

**Other Publications**

A career in industry has denied opportunity for publication of most research results, and all but the first of the following have been published after leaving industry:

'Plastic Lenses with Abrasion-Resistant Surfaces'  
The Optician (Hatton Press) 1962, 143, 637



- Other Publications (continued)
- 'Studies in Friction-Twisting - The Positive Mode'  
J.Text.Inst., 1980, 71, 5, 225  
(with J W S Hearle)
  - 'Dimensional Problems in Twist and Cover Factors'  
Text. Horizons, 1981, 1, 3, 37
  - 'Fibres: Innovation and Development'  
Proceedings of a Symposium presented at UMIST,  
June 1981  
Editor
  - 'Proposed Definitions of Textile Terms'  
Text. Horizons, 1982, 2, 2  
(with M J Denton)
  - 'The Coarseness or Fineness of Textile Material'  
Text. Horizons, 1982, 3, 38
  - 'Textile Finishes and Friction'  
Proceedings of a Symposium presented at UMIST,  
March 1982
  - 'Tyre Mechanics' - Proceedings of a Symposium  
presented at UMIST, November 1982  
Editor
  - 'The Behaviour of Twisted Yarn in Passing Over a  
Heater'  
J.Text,Inst., 1983, 74, 2, 97
  - 'Textile Finishes and Friction'  
Proceedings of a Symposium presented at UMIST,  
1983
  - 'Asbestos Replacement'  
Text. Horizons, 1984, 4, 7
  - 'Textile Terms and Definitions'  
Edition 9, 1986 (reprinted 1987 and 1988)  
Technical Editor

In preparation:

- 'Non-Equilibrium False-Twisting Levels'
- 'Orientation of the Frictional Force in the  
Rolling Mode'
- 'A Chiral Phenomenon in Pin-Twisting'
- 'False-Twisting with a Rotatable Pin'
- 'Further Aspects of Twisted Yarn Geometry'
- 'Computer Modelling of Twisted Yarns'

Annex 3.7 - Product Development Candidate(s)

CURRICULUM VITAE

Name: Gordon Edward Cusick  
Date of Birth: 22nd November, 1931  
Nationality: British  
Address: Greenbarn Farm, Langley, Macclesfield,  
Cheshire, SK11 0NF  
Marital Status: Married, three children (now adult)

EDUCATION, SCHOLARSHIPS & QUALIFICATIONS

1943-1950 William Hulme's Grammar School, Manchester  
1950-1955 Department of Textile Industries,  
Faculty of Technology, Manchester University  
1950-1953 Manchester City Scholarship  
1953 B.Sc Tech. in Textile Industries,  
Manchester  
1953-1955 Courtaulds Research Scholarship  
1955 M.Sc.Tech. Manchester. Thesis on Electrical  
Resistance of Textile Materials  
1962 Ph.D. Manchester. Thesis on Fabric Drape

NATIONAL SERVICE

1955-1957 2nd Lieutenant, Royal Army Ordnance Corps.

CAREER

1957 - Department of Textiles, UMIST  
1957-72 Lecturer  
1972 - Senior Lecturer  
1975 - Assistant Director of Laboratories  
1964-1965 Department of Textiles & Clothing,  
University of California, Davis.  
Visiting Assistant Professor and Textile  
Scientist in the Experiment Station.

## PROFESSIONAL BODIES

Fellow of the Textile Institute

Member of the Clothing and Footwear Institute

## PATENTS

- 1969 British Patent Provisional Specification No. 2039/69, Filed 14 Jan. 1969. Improvements in Instruments for Testing the Drape of Fabrics. G.E. Cusick.
- 1970 British Patent 1214281, Improvements in the Bonding together of Fabrics. Published 2 Dec. 1970 G.E. Cusick with Johnson & Johnson.
- 1977 British Patent Application No. 52616/77 Flexible Pipelines. Filed on 17 Dec. 1977. G.E. Cusick with Cosmopolitan Textiles.
- 1985 UK Patent Application GB 2166166A. Filed 2 Aug. 1985. Production of Yarns. G.E. Cusick and Y.A.M. Susutoglu with UMIST. GB 2166166 and US 4,662,169 granted 1987. Also applications in Germany and Japan. Option to Sussen.

## CUSICK DRAPE TESTER

- 1959 - 1962 Instrument developed to measure fabric drape
- 1967 Commercial instrument introduced.
- 1973 Method adopted as British Standard 5058
- 1979 Method adopted as West German Standard DIN 54306

## CURRENT RESEARCH

- 1) Investigation of the manufacture of staple fibre yarns by friction spinning. The effect of fibre orientation, delivery angle, delivery velocity and yarn velocity on the geometry of deposition of fibres in the yarn. The mechanism of twist insertion by friction with regard to change in the diameter of the yarn and the effect of local normal forces on the radial distribution of twist in the yarn. This work has been supported by the Draper's Company. Patent option sold to Industry.

- 2) Investigation of the properties of fibre assemblies for surgical dressing and hygiene applications. The development of meaningful tests for such products and their components. Support for this work has been received from Chicopee Manufacturing Company.

### RESEARCH GRANTS

Research has been supported by grants from Du Pont, Drapers Company (3) and Chicopee Manufacturing Company.

### POSTGRADUATE STUDENT SUPERVISION.

1962

M.Sc. Thesis, G.N. Chatterji, 'The Subjective and Objective Investigation of Some Fabric Properties'

1965

M.Sc. Thesis, S.K. Bhatia, 'Carpet Wear Testing'.

1968

M.Sc. Dissertation, C.S. John, 'Fusible Interlinings : Press Variables and some Fabric Properties'.

M.Sc. Dissertation, S, Kanthmathinathan, 'The Physical Properties of Continuous Filament Yarns'.

1970

M.Sc. Thesis, N.N. Merchant, 'A Comparative Study on Ring and Drum Spun Blended Yarns'.

M.Sc. Thesis, L.J. Cooke, 'Fusible Interlinings : Effect of Fusing Method on Laminate Properties'.

1971

M.Sc. Dissertation, A. Padmanaban, 'A Comparative Study of Fabric Stiffness Testers'.

1973

M.Sc. Dissertation, C.S. Yeung, 'The Effect of Stitch Density, Stitch Type and Fabric Structure on Seam Strength, Seam Slippage and Sewing Thread Consumption'.

M.Sc. Dissertation, M. Veluswamy, 'Test Methods for False Twist Stretch Yarns'.

1974

Ph.D. Thesis, V.T. Cheung, 'The Properties and Cost of Production of Fabrics Woven from Monofilament Warps'.

M.Sc. Thesis, M.A. Taylor, 'The Properties of Water Repellant Fabrics and Clothing In Laboratory Tests and Simulated Rain'.

M.Sc. Dissertation, E.A. Asante, 'Comparison of Various Methods of Measuring Woven Fabric Tear Strength'.

M.Sc. Dissertation, A. Haseeb, 'The Effect of Compression on the Thickness and Thermal Insulation Properties of Various Fabrics'.

M.Sc. Thesis, M. Iqbal, 'Study of Slippage of Bare Elastomeric Yarns in Stretch Fabrics'.

M.Sc. Thesis, F. Sefcik, 'Factors Affecting the Physical Properties of Stitch Bonded Fabrics'.

1975

Ph.D. Thesis, M.M. El Gaiar, 'A Study of the Functional Properties of Textile Fabrics'.

M.Sc. Thesis, A. Chindatat, 'Cotton Fabric Fluidity and Loss of Strength on Laundering'.

M.Sc. Dissertation, A.A.H. El Zanfaly, 'Study of the Behaviour of Polyester/Cotton Garments in Commercial Laundries'.

M.Sc. Dissertation, B.E. Makki, 'The Effect of Barb Protrusion Variation on Needle Punched Fabric'.

Ph.D. Thesis, J.R. Caldwell-Nichols, 'Factors Affecting the Properties of Fused Fabric Lamintes'.

M.Sc. Dissertation, J.K. Das, 'Relationship between Bursting and Tensile Properties of Fabrics'.

1976

M.Sc. Thesis, Wu Shin Hung, 'Testing Methods for Stitch Bonded Fabrics'.

1977

M.Sc. Dissertation, O.E. Ahmed, 'The Assessment of Polyester/Cotton Workwear Garments after Laundering and Finishing'.

M.Sc. Thesis, I.A. Mohamed, 'Tensile Strength and Fluidity of Breakage and Laundered Cotton'.

M.Sc. Dissertation, M.A. Musa, 'Physical Testing of Staple Yarn'.

M.Sc. Thesis, R. Nakasatis, 'Absorbancy Tests for Textile Materials'.

M.Sc. Dissertation, E.A.G. Zeidon, 'Comparison of Automatic Strength Testing Machines'.

1979

M.Sc. Dissertation, W. Tuntiwattanapun, 'Comparison of Ring and Open-end Spun Polyester Yarns'.

1980

M.Sc. Dissertation, I. Tjahjadi, 'Deposits in Rotors of Spinning Machines'.

1981

M.Sc. Thesis, B.I. Lu, 'Drying Fibre Materials in a Microwave Oven'.

M.Sc. Dissertation, R. Madhivanan, 'Recco-wrapped Core-Spun Yarns'.

M.Sc. Thesis, Y.A.M. Susutoglu, 'Structure and Properties of DREF 2 Spun Yarns'.

1982

Ph.D. Thesis, A. Colbert, 'Self-twist Air-Vortex Spinning'.

M.Sc. Dissertation, O.Ozbarut, 'Pultruded Fibre Assemblies'.

1983

M.Sc. Thesis, R. Berktin, 'Wrapped Yarn Spinning of Plain Yarns'.

M.Sc. Dissertation, A. Vryonis, 'DREF Spun Carpet Yarns'.

1984

M.Sc. Thesis, T. Hopkins, 'Interactions of Liquids with Fibre Assemblies'.

M.Sc. Dissertation, E.A. Khadem, 'Cotton Fibre Fineness and Maturity'.

1985

Ph.D. Thesis, Y.A.M. Susutoglu, 'A Study of Friction Spinning'.

M.Sc. Thesis, A.D.Kinik, 'A Study of Friction Spinning'.

1986

M.Sc. Thesis, M.Ghaemi, 'Multicomponent Yarns with Low-Melt Fibres'.

Ph.D. Thesis, K.P.Norris, 'A Study of the Lancashire Textile Industry in the 1970s and early 1980s'.

1987

M.Sc. Thesis, P.Khatibi-Sarabi, 'Measurement of Yarn Diameter Variability'.

M.Sc. Thesis, L.Dadgar, 'Test Method for Absorbent Hygiene Products'.

PUBLICATIONS:

1. The Electrical Resistance of Two Protein Fibres. G.E. Cusick and J.W.S. Hearle, J. Text Inst., 1955, 46, T369.
2. The Effect of Voltage and Time on the Electrical Resistance of Cotton. G.E. Cusick and J.W.S. Hearle, Text. Res. J. 1955, 25, 563.
3. The Electrical Resistance of Synthetic and Cellulose Acetate Fibres. G.E. Cusick and J.W.S. Hearle, J. Text. Inst., 1955, 46, T699.
4. The Resistance of Fabrics to Shearing Forces. G.E. Cusick, J. Text. Inst., 1961, 52, T395.
5. A Suggested Use of the Tex System in Fabric Measurements. G.E. Cusick, J.W.S. Hearle and P.J. Stevenson, J. Text. Inst., 1962, 53, P718.
6. Physical Properties of Some Commercial Non-woven Fabrics. G.E. Cusick, J.W.S. Hearle, R.I.C. Michie, R.H. Peters and P.J. Stevenson, J. Text. Inst., 1963, 54, P52.
7. Loss of Thickness of Carpets in Floor Trials. G.E. Cusick and S.R.K. Dawber, J. Text. Inst., 1964, 55, T531.
8. Model to Explain Fabric Shearing Hysteresis Diagrams. G.E. Cusick, Text. Res. J., 1964, 34, 1102.
9. How Stiff is a Fabric? G.E. Cusick, Skinner's Record, March 1965, 192 and April 1965, 288.
10. The Dependence of Fabric Drape on Bending and Shear Stiffness. G.E. Cusick, J. Text. Inst., 1965, 56, T596.
11. The Tetrapod Walker Carpet-Testing Machine. E.A. Ainsworth and G.E. Cusick, J. Text. Inst., 1965, 56, T159.

12. Loss of Thickness of Carpets in the Tetrapod Walker Carpet-Testing Machine. Elizabeth A. Ainsworth and G.E. Cusick, J. Text. Inst., 1966, 57, T24.
13. Carpet Testing: The Influence of Construction and Fibre Types. G.E. Cusick, Skinner's Record, June 1966, 429.
14. Carpet Performance Evaluation. Part I: The Tetrapod Walker Test. Kenneth C. Laughlin and Gordon E. Cusick, Text. Res. J., 1967, 37, 608.
15. Carpet Performance Evaluation. Part II: Stress-strain behaviour. Kenneth C. Laughlin and Gordon E. Cusick, Text. Res. J., 1968, 38, 72.
16. Measurement of Fabric Drape. G.E. Cusick, J. Text. Inst., 1968, 59, 253.
17. Factors Concerning the Use of Fusible Interlinings in Garment Construction. G.E. Cusick and L. J. Cooke, Journal of Applied Polymer Science, Applied Polymer Symposium No. 18 (1971), John Wiley & Sons, Inc.
18. Materials and Methods Used in the Production and Application of Fusible Interlinings. G.E. Cusick, Journal of Textile Institute & Industry, March 1971, 67.
19. A Study of Various Mechanisms of Attrition of Fibres as a Result of Abrasion. G.E. Cusick and M.N. El Gaiar, J. Text. Inst., 1975, 66, 426.
20. A Study of the Morphology of Cotton Fibre Fracture in Abrasion Tests in Relation to the Coefficient of Friction between the Fabric Tested and the Abradant. G.E. Cusick and M.N. El Gaiar, J. Text. Inst., 1976, 67, 41.
21. The Surface of the Attrition of Some Abradants with the Scanning Electron Microscope. N.E. Dweltz, J.W.S. Hearle, G.E. Cusick and Brenda Lomas. J. Text. Inst., 1978, 69, 250.
22. A Study of the Attrition of Some Abradants with the Scanning Electron Microscope. N.E. Dweltz, J.W.S. Hearle, G.E. Cusick and Brenda Lomas. J. Text. Inst., 1978, 69, 294.
23. Dref II Method of Spinning. G.E. Cusick and Y.A.M. Susutoglu, Papers published from International Textile Symposium in Honour of 100th Anniversary of Ataturk. Izmir, Turkey, November 1981.



24. Index 84. G.E. Cusick, Textile Horizons, 1984, Vol. 4, No. 7, 23.
25. Friction Spinning: The Effect of Fibre Delivery Parameters on the Geometry of Fibre Deposition in the Yarn. G.E. Cusick and Y.A.M. Susutoglu, Lenzinger Berichte, Heft 60/1986, 52.

#### EXPERIENCE OF INDUSTRY

- 1951            Vacation job in cotton spinning mill, Stockport.
- 1952            Vacation job in vertical mill, Austria.
- 1960 -           PRIVATE CONSULTING WORK carried out for many companies, including Chicopee (Johnson & Johnson, U.S.A.), I.C.I., Unilever, Chisso Corporation (Japan), British Precision Engineering, Queensland Government, Raychem, Clough Mill, Edward Pickering, Du Pont, Colgate, H.M. Customs, Low and Bonar.
- UMIST CONSULTING WORK via Textile Industrial Services - Responsibility for Textile Testing Service to Industry on a daily basis and other areas including spinning of yarn and production of nonwoven fabrics.
- 1987 -           Formed Manchester Nonwovens Engineering Ltd.

#### ARBITRATOR

- 1976 - 1980    Textile Arbitrator, Manchester Arbitration Scheme for Small Claims.

#### EXPERIENCE OF TEACHING

- 1957 -           Lecture and laboratory courses in Textile Testing and lecture courses in Textile Fibres, Nonwovens, Textile Physics and Fabric Properties.

#### OVERSEAS PRESENTATIONS

- 1964, 1969, 1970, 1982,    U.S.A.
- 1970 - 1975, Ghana.
- 1982            Thailand, Taiwan, Japan.

1984 West Germany.

1985 Austria.

EXTERNAL EXAMINER

1965 - Many Postgraduate Theses at Leeds & Strathclyde Universities and Leicester, Huddersfield and Manchester Polytechnics.

1970 - 1975 B.A. Course in Textiles, University of Science & Technology, Kumasi, Ghana.

1979 - 1982 B.Sc. Course in Textile & Knitwear Technology, Leicester Polytechnic.

1981 - 1986 University of Manchester Affiliated Colleges. Advisor in Home Economics, B.Sc. and B.Ed. Courses, City of Manchester College of Higher Education.

1988 - B.Sc. Textiles with Clothing Studies, Scottish College of Textiles.

ORGANISER OR JOINT ORGANISER OF UMIST COURSES, CONFERENCES OR SYMPOSIA.

		<u>Duration</u>
1965-75	Annual Background Course for Courtaulds	4 weeks
1968	Fusible Interlining Conference	1 Day
1969	Orientation Course in Textile Technology	3 weeks
1971	Fusible Interlining Conference	1 Day
1971	Shirt Manufacture Conference	1 Day
1973	Men's Suits & Slacks from Knitted Fabrics Symposium	2 Day
1975	Polyester/Cotton Fabrics Symposium	2 Day
1975	Textured Yarns Symposium	3 Day
1976	Nonwovens Conference	3 Day
1977	Flammability of Textiles Conference	2 Day
1978	Textiles in Civil Engineering Conference	3 Day
1979	Yarns and Yarn Manufacture Symposium	3 Day

1980	Nonwoven Fabrics Conference	3 Day
1983	Textile Fabric Structure & Analysis	10 Evenings
1983	Special Courses for Raychem	2 Day
1983	Nonwoven Fabrics Conference	3 Day
1984	Tomorrow's Yarns Conference	3 Day
1984	St. Pancras Hospital Course on Fibres	1 Day
1985	High Performance Fibres, Yarns & Fabrics	3 Day
1986	Technology Course for Courtaulds Managers	1 week
1987	Technology Course for Courtaulds Managers	1 week

#### EDITOR OF UMIST CONFERENCE PAPERS

1978	Textiles in Civil Engineering
1979	Yarns and Yarn Manufacture
1980	Nonwoven Fabrics
1983	Nonwoven Fabrics.
1985	High Performance Fibres, Yarns and Fabrics.

#### ADMINISTRATION

1951 - 1952	Secretary, Departmental Textile Society.
1952 - 1953	Member Student Union Council.
1956 - 1957	Officer Commanding Army Unit.
1969 - 1979	Departmental Postgraduate Admissions Officer.
1972 - 1975	Member Postgraduate Panel.
1975 -	Assistant Director of Laboratories of Department; responsible to Head of Department for non-academic staff, requisitioning, accounts, equipment and Textile Industrial Services.
1984 -	Member Continuing Education and Space Allocation Sub-Committees.

- 1985 Acting Head of Department August - December.  
1985 Chairman of the Joint Board with Manchester Polytechnic for the Clothing Engineering B.Sc. Course.

EXTERNAL COMMITTEES

Textile Institute

- 1957 - 1961 Manchester & District Section.  
1963 - 1968 " " " " " " "  
1961 - 1965 Technical Committee - Fibre Testing  
1963 - 1971 Textbook Sub-committee.  
1963 - 1965 Carpet Testing Working Party  
1983 - United Kingdom National Sub-Committee of Professional and Educational Affairs Committee  
1984 - 1985 Nonwovens Panel, Textile Terms and Definitions Committee.  
1986 - Manchester & District Section.

British Standards Institution

- 1971 - 1972 Assessment of Drape Characteristics Sub-Committee.  
1965 - 1970 Tests for Textile Floor Coverings Sub-Committee and delegate to ISO Conference on Carpet Testing.

Carpet Industry Training Board

- 1969 - 1970 Education Committee

Annex 3.8 - General potential candidate suitable for any position

Curriculum Vitae of Peter William Foster B.Sc.Ph.D.C.Text.F.T.I.

6 Aldford Place, Alderley Edge, Cheshire, SK9 7RQ

Personal History : Born 6th December 1930  
Married, four children

Education :      1941    Scholarship to Leeds Modern School, Leeds  
                         1945    School Certificate  
                         1947    Higher School Certificate  
                         1948    State Scholarship  
                         1950    Ramsey Memorial Prize (best student)  
   University College London, Chemical  
   & Physical Society.  
                         1951    B.Sc. (special) in Chemistry.  
   University College, London.  
                         1954    Ph.D. in Physical Organic Chemistry  
   Thesis title 'Tertiary Nitramines'.  
                         1969    Fellowship of the Textile Institute.

Career :

1954-57      Technical Officer ICI (Nobel) Division  
                         Ardeer, Scotland, Polymer research.

1957-58      Associate Professor, University of Nebraska,  
                         Lincoln, Nebraska, U.S.A. Discovered new chemical  
                         reaction.

1958-63      Research Chemist, Carothers Laboratory, E.I. du  
                         Pont de Nemours, Wilmington, Delaware, U.S.A.

1963-66      Manager, Filament Technical Service, Du Pont  
                         International S.A. Geneva, Switzerland.  
                         Polyamide, polyesters and spandex.

1966-68      Technical Director, Heathcoat Yarns & Fibres Ltd,  
                         Devon.

1968-70      Commercial Director,    "    "    "    "    "    "

1969-79      Inventor of the 'Fibre M' high speed jet texturing  
                         processor. Licensed to major companies around the  
                         world.

1970          Managing Director, Heathcoat Yarns & Fibres Ltd.,  
                         Devon.

PUBLICATIONS OF PROFESSOR P. W. FOSTER

1. Catalysis of the Reaction between Carbon tetrachloride and Piperidine. Chem. & Ind. 1959, 226.
2. Elimination reactions of  $\alpha$ -Halogenated Ketones. Dehydrobromination of 2-Benzyl-2-bromo-4,4'-dimethyl-1-tetralone. J. Amer. Chem. Soc. 82, 130. (1960).
3. Elimination Reactions of  $\alpha$ -Halogenated Ketones. Kinetics of several dehydrobromination reactions of 4-Biphenyl-1-Bromocyclohexyl ketone. J. Amer. Chem. Soc. 64, 983 (1962).
4. U.S. Patent 3,325,536. Process for the Thermal Isomerisation of Alicyclic Dicarboxylic Acids.
5. " " 3,418,297 Condensation Polymers from 1,2-Cyclopropane dicarboxylic acid.
6. " " 3,432,477 Poly (trans-1,2-cyclobutylone adipamide) and polymers thereof.
7. " " 3,468,850 Polyamide containing recurring saturated Fluorene rings.
8. "Fibre M". Non Isothermal texturing at High Speed. Textile Institute & Industry, July 1975, 172.
9. U.K. Patent, 1,519,587. Improved Bulked Yarn.
10. " " 1,546,070. Improvements in the production of Bulked and/or Crimped Yarn.
11. " " 1,551,883. Improvements in the production of Multifilament Synthetic Yarn.
12. " " 1,566,955. Improvements relating to the heating and drawing of synthetic filaments.
13. Thermobonding behaviour of polypropylene and other fibres. Plastics and Rubber Institute 4th International Conference. Sept. 1987
14. Thermal Analysis and Observations of Middle Endotherm on Free Annealed Poly(ethylene terephthalate) filaments. Institute of Physics Conference, Sept. 1987.
15. Deformation Yield and Fracture of Polymers. Plastics and Rubber Institute Conference, April 1988.
16. A New Test Method for Thermobonding Behaviour of Synthetic Fibre. Journal Textile Institute (in press).

- 1971 - 1984 : Group Director, John Heathcoat + Co. Ltd.
- 1976 : Founded the Focus Electronics Division of John Heathcoat for sales to the visually handicapped.
- 1978 - 1985 : Development Director, Coats Patons Plc.
- 1981 - 1986 : Founding Director, Axiom Electronics Ltd, High Wycombe.
- 1982 - 1985 : Managing Director, Universal Carbon Fibres Ltd. Cleckheaton, Yorkshire. Developed fire blocking fabrics.
- 1976 - 1988 : Chairman, Steam Storage Company Ltd.
- 1986 - 1988 : Professor and Head of Textile Department, UMIST.

Personal Interests:

Music, choral  
Literature  
Travel  
Walking

Experience:

31 years general industrial management, primarily in the textile industry, in both technical, commercial and production capacities.  
For 22 years Director, Managing Director or Chairman of public companies.

Main Languages:

English (first)  
German  
French

Committees:

Present: Member, Academic Board, UMIST  
" Board of Faculty, UMIST  
" Academic Establishment Committee, UMIST  
" Non Academic Establishment Committee, UMIST  
Chairman, Safety + Security Committee, UMIST  
Member, Activities Committee, Textile Institute  
" Professional + Educational Affairs Committee, Textile Institute.