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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: Second mission\*

Prepared for the Government  
of the People's Republic of China  
by the United Nations Industrial Development Organization

Based on the work of Mortimer O'Shea, senior technical adviser

Backstopping officer: J. P. Moll, Agro-based Industries Branch

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\* This document has not been edited.

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## **ABSTRACT**

### **Objectives**

The objectives of this report are:

- to highlight progress from 1986 to date
- to underline problems and reason for delays
- to recommend the most effective procedures for the future of the project.

### **Major Recommendations**

The completion date for the project should be extended by two years.

The next study tour should be of a significantly different and positive nature, designed to phase-in the work of some of the key experts, initially from their home bases.

### **Desired Action for 1989**

- Completion of new centre so that it becomes as fully operational as possible by March 1989.
- Placement of fellows as put forward by the NPD.
- Commencement of inputs by experts in Desizing, Spinning and Dyeing/Finishing.

## CONTENTS

	PAGE	
1.0	PROGRESS FROM 1986 TO DATE	3
2.0	PROPOSED SPECIAL IN-DEPTH STUDY TOUR	14
3.0	CTA'S PROPOSAL FOR TECHNOLOGICAL AND MARKETING DEVELOPMENT STRATEGY	17

### ANNEXES

1. ITINERARY
2. LIST OF DOCUMENTS, SAMPLES, BROCHURES  
PRODUCED BY CTA ON BEHALF OF RTDC STAFF
3. VISIT TO YIYANG RAMIE TEXTILE PRINTING  
AND DYEING MILL
4. VISIT TO AGRICULTURAL DEPARTMENT OF HRTDC
5. FINANCIAL INPUTS - NEW EQUIPMENT
6. THE RAMIE INDUSTRY SYSTEM IN PRC FOR  
MEDIUM STAPLE SPINNING - FLOW CHART
7. THE HUNAN HUASHANG RAMIE TEXTILE  
ENTERPRISE GROUP CORPORATION
8. FELLOWSHIPS
9. PEOPLE MET
10. EXPLANATION OF ABBREVIATIONS USED

**SUMMARY**

The report deals with the positive achievements and normal work of the RTDC and the unavoidable delays and frustrations which were and continue to be outside the control of the team. It points out the positive steps that should now be taken to recover lost progress and for the implementation of a plan for significant and tangible results. Because of lost time for a number of stated reasons, the CTA is recommending an extension of two years to the completion date of the programme.

**1.0 PROGRESS FROM 1986 TO DATE**

Although officially the programme commenced in September 1986 and is currently scheduled to run until August 1990, some work was undertaken prior to September 1986, including negotiations with the late Mr. Minke, prior to Mr. Moll's involvement.

**1.1 Financial Inputs**

The Government of the PRC have to date spent Y10,800,000 and will continue to invest in the project.

The UNIDO input amounts so far to US\$70,000 which was spent largely on study tours, fellowships and overseas visits. The PRC's investment has largely been in the building of the new centre but they have now provided \$700,000 for the purpose of importing equipment not yet manufactured to the required standard in the PRC.

The first expenditure of UNIDO was in providing the services of the US degumming expert, Dr. Chien during October 1986 (see Dr. Chien's report).

**1.2 Degumming Expert**

The NPD confirms that Dr. Chien carried out seven small-scale experiments but does not regard the results as satisfactory, particularly since the boiling time is still too long and there is a residue of gum on the fibre. The RTDC had planned to undertake a medium-scale test to follow the laboratory test but decided against this because the lab results were unpromising.

It is however, acknowledged by the NPD that they did in fact gain something from Dr. Chien, among which was that he provided them with several degumming agents from overseas suppliers. He gave a lecture to the RTDC staff and Human provincial leaders and presented a report. The RTDC technical staff acknowledge Dr. Chien's help as valuable in introducing to them some chemical agents including the use of Hydrogen Peroxide (H<sub>2</sub> O<sub>2</sub>)

**1.3 Revision of Project Document**

From October 15 to 18th, 1986, a UN official and officials from the Ministry of the Textile Industry of PRC visited Changsha to revise the project document.

**1.4 Review Meeting**

From August 24th - 27th, 1987, Mr. John P. Moll and Ms. Caterina Benardelli representing UNIDO and an official from the China Economic and Technical Exchange Centre as well as officials from the Ministry of the Textile Industry visited Changsha to review the work of the team and check procedures.

## **1.5 European Study Tour**

From May 16th to June 17th, 1987, the RTDC sent their experts on a study tour of European machinery and equipment manufacturers, textile laboratories, chemical manufacturers and universities and colleges of technology. This visit was considered very useful and enlightening by the participants who were deeply impressed by the advanced level of textile science and technology as well as education in Europe.

### **1.5.1 Positive Outputs from Study Tour**

During the study tour and subsequent to it, some significant contacts were made, notably with:

- GDM Ltd. - Fancy yarn machine
- James Mackie and Sons - Fancy yarn machine
- Shirley Institute - textile testing

Fancy yarns were developed from a sliver provided by the RTDC both during the study tour and subsequent to it. The result is that the GDM Mark 3 Machine is considered very suitable, particularly drafting results which were not nearly as good on the Mackie machine.

They also have a strong belief that European circular knitting machinery is very advanced in design and performance.

The team was also impressed with dyeing and finishing equipment.

Although very impressed with the Shirley Institute, their equipment is not regarded as very suited to Ramie problem solving.

The big problem with all European equipment is that prices are very high and rising rapidly. The RTDC, therefore, require to raise money in various ways. To illustrate this rapid hike in prices they installed the GDM machine which was \$12,000 in 1987 but was priced at \$25,000 in the Beijing International Textile Machinery Exhibition in May this year.

China has already imported twelve of these machines but not for Ramie.

The CTA will be asked later on to check the price of this machine with GDM.

## **1.6 Imported Equipment**

RTDC has been obliged, due to urgent needs, to import several pieces of equipment through the Ministry of the Textile Industry. See Annex 5 for details.

**Note:** RTDC's laboratory test results are officially recognised both nationally and in Hong Kong as well as Japan.

### **1.7 Fellowships**

The NPD reports satisfaction with the now very positive and improved prospect for Fellowships and expresses his gratitude to Mr. Moll and the CTA for their efforts in bringing about this much better situation.

At this stage there should have been four Fellowships established. However, they have sent Ms. Zhong Xiangyuan, now studying at Leeds University, UK and it is intended to send two to the USA in the near future, or failing that to the UK.

Mr. Moll's recommendation regarding Hong Kong as a place to send Fellows is accepted as a good, practical arrangement, particularly for older staff members who have production experience whose contribution would be valuable and who would greatly benefit from such study but who do not have any language other than Chinese.

Mr. Xu expressed confidence that the Fellowship programme will be completed according to plan. There will be a total of 18 fellows. Mr. Xu stated that he has no particular preference for any country for Fellowships but would like a good mix between the USA and UK and any other English-speaking country whose textile education is of a modern, high standard.

**Note:** The CTA's personal observation is that the USA is preferred by the candidates because there are more opportunities for them in that country to earn extra money in part-time employment. Hong Kong is certainly another preferred option having close ties with British educational establishments.

### **1.8 Work Undertaken by the RTDC**

The research work as recommended by Dr. Chien Chu was made available to the entire Ramie industry.

The centre maintains up-to-date information on degumming technology and passes this onto the industry.

Experiments on the use of Vortex spinning for a blend of cotton with Ramie noils are being carried out on a machine - the PL1000 by a West German machinery manufacturer. The machine is installed in a Chinese mill and the RTDC are allowed to do experimental work on it.

They report very good knitting results from yarn produced on this machine. These machines could utilise



the noils and waste fibre for all the mills. Yarn strength is, however, very low.

#### 1.8.1 Other Activities

- Researching new oils used in Ramie degumming.
- Testing some middle staple fibre spinning systems to produce fine Ramie yarns of 30Nm.
- Developing new products including a fine Ramie shirt, made up from single jersey knitted fabric.
- Evaluating by tests, a wide range of softening agents to be used on Ramie yarns.

**Note:** The CTA reminded the NPD that an enzyme developed by NOVO Industri had produced an excellent soft handle on an otherwise very harsh-handling Ramie fabric as produced in Brazil.

Have sent samples to two European chemical manufacturers with a view to having softening agents specially developed to suit Ramie. The firms were visited during the European Study Tour of May 1987.

Quality control and testing of raw Ramie is a routine operation for the whole country. There is the only Government-approved laboratory.

Frequently assist the PRC Ministry of the Textile Industry to check fabric quality and act as referees in disputes with foreign countries.

Carry out experimental and test procedures on behalf of the customs authorities on import and export products.

Frequently exchange information with the Hong Kong testing centre in order to confirm their results.

In order to help the factories' own testing labs they have undertaken two measuring (calibration) checks.

Provide a course of study in their labs. This is to ensure that there is total coordination of methods and standards between laboratories and mills. They have trained more than 20 people.

Are able to provide testing for the factories, especially any new factories. More than 20 people are employed in physical and chemical testing.

Provide training in processing procedures and have trained 25 people. Training is arranged as necessary. These are all Lab Technicians but with the help of UNIDO they hope to train more advanced technicians.

### **1.8.2 Other Aspects of RTDC'S Activities**

Advise the Provincial Government of Hunan on all aspects of the Ramie industry.

Advise the PRC Ministry of the Textile Industry on planning and technological development (Mr. Xu Kui had just returned from such a mission to Hangzhou).

Provide interpreters for several factories, covering English, Japanese, German and Russian languages.

Arrange their own exchanges with foreign experts - e.g. they had a visit by the leader of the Brazil Service and Technical Commission, Sao Paulo - Mr. Jose Roberto A. Cunha junior, Ministerio Do Trabalho, Conselho Regional De Economia 2a Regrao - S.P., Brazil.

Systematically disseminate information to many factories.

**Note:** Currently their staff are (sic) overworked by the demands for Ramie testing and the disruption caused by the building programme, causing them to work in poor working conditions but all are very willing workers. They are very appreciative of all help given to them by UNIDO and look forward to a brighter future.

An important recent development was the setting up of the Hunan Huashang Ramie Textile Enterprise Corporation (see Annex No. 7).

#### **1.8.2.1 Information Department**

The first function of this department is to acquire, sort and pass on up-to-date information by way of a service to the whole province and including not only the Ramie industry but also the cotton, wool, silk and synthetic-fibre industries.

#### **1.8.2.2 Research Reports**

The second function is to produce research work reports for the RTDC technicians, the Hunan provincial industry technicians as well as technicians in other provinces. Mr. Xiang Ce Xuan, Vice-Chief Engineer is a Director of this department, the Chief Director being Mr. Zhang who is a Graduate of the China Textile University.

#### **1.8.2.3 Newsletter**

The third function is to publish a newsletter-style information booklet twice a month. This service is available to the whole country. Its main function is that of information exchange. Information is simple and concise with not more than 10 pages per issue. It is warmly welcomed by the factory directors. It is edited

with the objective of keeping these people up-to-date on developments of particular interest to them. All of the information is derived from other magazines but it saves much time for its readers. Only very occasionally is a paper contributed by the RTDC's own staff.

#### **1.8.2.4 Technology Services**

The fourth function is to provide a technology service, especially consultancy work. An example is when a new factory is about to be established, the RTDC will be requested to supply certain information which they will do very quickly.

#### **1.8.2.5 Translations**

They provide translations of important papers from foreign publications and generally are responsible for translation services for the industry.

#### **1.8.2.6 International Conferences**

They arrange international conferences. In October 1989 they plan to hold an important conference covering a wide range of topics including agriculture. It will be attended by the directors of Ramie mills and textiles experts from the PRC in general. A letter of invitation has been sent to a number of potential speakers from overseas who are expected to meet all their own expenses.

**Note 1:** The NPD stated that although their information services are readily accepted by the factories, some of the factories' directors are (sic) backward and short-sighted about accepting and implementing the results of R & D. It is very difficult to persuade them of the benefits which would ensue from such implementation.

**Note 2:** The factories carry out their own routine tests and experiments but not R & D.

#### **1.8.3 Special Production**

It is intended that when all the machinery has been installed in the new unit, a small production of exemplary products including woven and knitted made-up articles will be sold as a means of helping the finances of the RTDC. Already they are producing a pure Ramie sports shirt of a nice quality which is comfortable to wear. The eventual expected income is Y1,500,000 per year.

#### **1.8.4 Equipment**

They are now finding it more difficult to import equipment for the following reasons:

**1.8.4.1 Working Conditions at the New Centre**

These are not yet suitable but are expected to be excellent around March 1989.

**1.8.4.2 The Most Suitable Equipment**

They have not yet been able to identify the most suitable equipment both from a production and a price viewpoint.

**1.8.4.3 Postponement of Plans**

They have been obliged to postpone the entire plan to import equipment.

**1.8.4.4 Use of Equipment in Factories by RTDC**

They are now allowed the use of certain items of imported equipment already installed in some factories and some useful items such as Friction Spinning machines are now being manufactured in Hangzhou, a Single End Sizing machine in Guanzhou, the TP500 Rapier Weaving machine by the CTMMW and Fabric Handle equipment at Shanghai.

**1.8.4.5 Now Obligated to Earn Money for New Equipment**

The RTDC are now obliged to earn any money to be spent on new machinery and equipment. This is difficult under the present circumstances as the new building programme has absorbed more money than originally budgeted for. This was to have been Y10,800,000 but already they have spent Y15,000,000. The increase has been caused by inflation.

**1.8.5 New Buildings**

The accommodation block is now complete and has been occupied for the past two months. The remainder of the building is scheduled to be completed by March/April 1989.

**1.8.5.1 Causes of Delays**

Delays are caused by three main factors:

- An average of one day without electricity per week.
- Building workers taking time off to help with farming.
- Weather in Hunan Province is too hot and wet during the summer.

#### **1.8.5.2 Handing Over New Buildings**

The new buildings will be officially handed over by the contractor in January 1989.

#### **1.8.5.3 Installation of Equipment**

The RTDC will then start to move in equipment on a planned stage by stage basis.

#### **1.8.6 Experts and Special Problems to be Faced**

The first UNIDO-appointed expert should be able to commence work in PRC during May 1989 but it is suggested that key experts such as in degumming, dyeing and finishing should be appointed ahead of time and instructed to do some experiments in their own countries so as to be well prepared for their working missions in PRC. They would be provided with Ramie for experiments by RTDC. Another good reason is that the working conditions in Changsha will have been made ready before the experts visit China (see 2.3).

##### **1.8.6.1 Other Expectations**

Experts will be expected to not only work at the centre but also advise in many of the factories.

##### **1.8.6.2 Quality of Experts**

They must have a high level of technological attainment.

##### **1.8.6.3 The NPD'S Expectations Re. Experts**

Mr. Xu had been hoping that UNIDO would have been able to recruit Ramie-experienced experts in Japan, the Philippines and Brazil. The CTA stated that such an expectation was both unrealistic and flawed because:

- Such experts were not available
- Even if they were available for service in PRC they would be unlikely to divulge any of the closely-guarded processing secrets that they might know.

The CTA further recommended that as China produces far more Ramie fibre than those countries - 500,000 tonnes in 1987 - they should endeavour, with the help of the UNIDO-appointed independent experts to develop their own excellence in Ramie technology. I believe this is completely feasible and the correct direction.

##### **1.8.6.4 Novo Industri Proposal**

The proposal by Novo Industri (see CTA's interim mission report) to make available the services of their own excellent laboratories and nominate a Danish science

graduate who would use his special experience on the project as a degumming expert in preparation for his higher degree is I believe in the best interests of the RTDC and should be accepted by them.

#### **1.8.6.5 Agro-Experts**

The NPD categorically stated that they do not require an agricultural expert.

#### **1.8.6.6 Dyeing and Finishing Expert**

Because dyeing and finishing are among their biggest problems, they would like to have the services of an expert in these areas as soon as possible. Softening of the fabric is one of the main objectives in finishing. They are unable to achieve deep, even shades on Ramie. Most dyeing is in the piece. Desizing is another big problem with residues tending to remain on the material.

#### **1.8.6.7 Market Intelligence**

They are also concerned that their market intelligence on fashion colours and colour trends is inadequate; not only is this the case but even if they were able to secure regular, accurate and reliable colour information, the turn round time for their dyeing is too long and consequently, colours become dated even before products reach the market.

#### **1.8.6.8 Research Work on Ramie Dyeing**

Because most fabric produced in the PRC is cotton or polyester/cotton, there has been little or no research work done on the dyeing of Ramie fabric. The industry sells mainly loomstate fabrics to Hong Kong.

#### **1.8.6.9 Dyeing (Auxiliaries)**

Special dyeing auxiliaries are required for Ramie and neither dye stuffs nor auxiliaries are produced in PRC although there now is a proposal by a Japanese manufacturer to set-up a joint promotion venture for dyestuffs and related products in the PRC. The NPD expressed the wish that a European chemical manufacturer might set up a joint venture in China. The CTA is requested to look into this possibility.

#### **1.8.6.10 Energy Problems**

Because of the shortage of energy in the factories, all experts should pay special attention to developing improved efficiency on the use of energy. Degumming in its present form is very demanding on energy. The CTA stressed the need for scientific waste heat recovery practices and the urgent need also for waste water treatment\*. The NPD is fully aware of these needs and

it would be most desirable that the degumming and dyeing/finishing experts should be able to apply their knowledge and experience to address these very important problems.

#### **1.8.6.11 Faster Raw Ramie Test**

Another problem which they would like the degumming expert to deal with is that of devising a much faster raw Ramie test.

This test establishes quantitative analysis of the raw Ramie under the headings:

- Pectins
- Haemocellulose
- Lignin
- Wax and Fat
- Ash

The current testing method is very time-consuming and this can cause production delays and subsequent financial losses in the factories.

#### **1.8.6.12 Faulty Spinning**

There are many unnecessary weaving faults that are attributed to spinning. The spinning expert should be aware of these and try to suggest means of eliminating or greatly reducing them. He should concentrate on long fibre spinning.

This aspect was emphasised by Mr. Yang Shou Ling, Deputy Director of the Yiyang Ramie Textile Industry and Dyeing Mill who also believes that the existing shuttle-changing looms as made in the PRC will continue to be used for many years as he claimed they produce good work and cost only \$5,000 each as compared with \$80,000 for a rapier loom.

In contrast, the NPD observed that there are too many fabric faults attributable to weaving and that weaving efficiency was too low. This was given as 70 - 75% and the speed on 140cm wide fabric is 165 ppm. The main weaving faults are:

- Tight weft
- Shrunken ends
- Weft bars
- Skewed weft
- Ropy weft
- Crossed ends

#### 1.8.6.13 Preventive Maintenance

The term preventive maintenance had not been understood by the counterpart team. This was carefully explained with examples, by the CTA.

- \* In Ramie processing, the waste water from boiling is very difficult to dispose of and the PRC authorities are becoming increasingly concerned about water pollution. COD rather than BOD is the problem. The RTDC have already carried out some tests.



**2.0 PROPOSED SPECIAL IN-DEPTH STUDY TOUR**

**2.1 The Previous Study Tour**

The study tour which took place during May/June 1987, although useful, was too ambitious in visiting such a large number of institutions and manufacturers. Much of the time was dissipated in travel and through language difficulties and fatigue, it could be said that the whole operation was much less productive than a greatly reduced, more selective itinerary would have been.

**2.2 New Approach**

Following discussion with the NPD, the CTA is now recommending a fresh approach to the next study tour. In fact "Study Tour" is not quite an accurate title for what is proposed. It should be less of a tour and more of a study.

**2.3 Role of Experts**

My proposal is that some of the experts should be appointed on the basis that they would make their own home-base facilities available to the PRC Group for in-depth study and experimental work with only appropriate RTDC staff participating in specific parts of the programme - e.g. only members directly involved in degumming work at the Centre should be allowed attend the proposed degumming study.

**2.4 Part Missions**

The time spent by the UNIDO-appointed expert would be part of his official appointment mission (say, possibly as long as two weeks per expert).

**2.5 Benefits**

This operation would have many benefits and might even be the model for other UNIDO Study Tours.

**2.6 Some Logistics**

This special "study tour" would have simultaneous studies taking place under the direction of different experts, therefore, in two weeks the RTDC participants could be split up into (say) five groups, e.g., covering:

- Degumming
- Spinning
- Dyeing/Finishing
- Weaving
- Knitting

**2.7 Overlap**

In the case of degumming and spinning there may be an overlap and with two venues involved; possibly Northern Ireland and Switzerland.

**2.8 Detailed Arrangements**

The logistics of the arrangements can be worked out following appraisal by UNIDO and RTDC of the CTA's proposal.

**2.9 Tentative Proposal - Northern Ireland**

However, tentatively, it is proposed that if Mr. Christopher French Mullen is appointed as the spinning expert he would very probably be agreeable to undertaking spinning and novelty yarn experiments in his own plant. He would also be in a position to have some laboratory in depth study undertaken at the nearby Lambeg Institute (LIRA). Possibly a thorough visit to James Mackie and also, possibly a very useful visit to one of the Northern Ireland spinning and weaving mills such as, for example, the Linfield Group which is involved in all aspects of textile manufacturing particularly linen, including bleaching, dyeing, finishing and printing as well as PVC-coating.

**2.10 Denmark & Switzerland**

In the event that a degumming expert from NOVO Industri is appointed, the RTDC appropriate members could spend (say) one week in Denmark and if the agreement of Ernest Fischer and Sons of Dottikon, Zürich is possible, this group could join with the spinning group from Northern Ireland to spend a week in Switzerland.

**2.11 UMIST**

Should any of the identified experts of UMIST be appointed, I believe that a thoroughly useful in-depth study could be undertaken, both at the University and in local industry, with of course the possibility of spending some time at the Shirley Institute.

**2.12 Other Possibilities**

These can be explored as soon as this novel approach to this most important element in the programme to help the China Ramie Industry has received the approval of UNIDO, RTDC and the Ministry of the Textiles Industry.

**2.13 Timing**

This special in-depth study tour must be postponed until early 1989, as a consequence, the third study tour must also be postponed. Timing can be arranged when the

revised working plan is developed through an up-dating of the project document. The proposed Study Tour of Japan, Philippines and Hong Kong should be regarded as cancelled if the foregoing proposal can be implemented instead.

**2.14 Time Extension**

The overall China Ramie project should be extended for a further two years. This recommendation is made because of the delays in the effective commencement of the original programme.

**3.0 CTA'S PROPOSAL FOR TECHNOLOGICAL AND MARKETING DEVELOPMENT STRATEGY**

The proposal is that the RTDC should look into the possibility of acquiring a base within the European Community. Such a base might, initially, include a modern weaving and finishing unit using yarn from PRC and using the most modern European equipment. This base would also have a sophisticated modern marketing office. The production facility could eventually be expanded to deal with imported raw Ramie and all onward processes. The NPD is very enthusiastic about such a development and was not aware that very favourable incentives are on offer in some EEC countries. Pakistan uses a similar strategy. The CTA has been requested to obtain appropriate information from industrial development organisations in areas of the EEC that welcome such industrial development.

**3.1 Feedback of Information**

Information about technological advances, machine performance, dyeing and finishing and marketing would be available to the Ramie industry in the PRC as a valuable aid to its modernisation and development.

**3.2 The CTA's Role**

It is clearly understood that UNIDO may be unable to support this proposal and in that event the CTA would not be available to help in such a development but would merely introduce the NPD to the appropriate development agencies without any further involvement.

**ANNEX 1 - ITINERARY**

<b>13 October 1988</b>	<b>Arrival in Beijing</b>
<b>17 October 1988</b>	<b>Arrival in Changsha</b>
<b>18 - 24 October 1988</b>	<b>Discussion with counterpart team and visit the building site for new Centre.</b>
<b>25 October 1988</b>	<b>Visit Yiyang Ramie Textile Mill</b>
<b>26 October 1988</b>	<b>Further discussions with counterpart team and assistance with preparation of Project Performance Evaluation Report for UNDP/UNIDO and visit Agricultural Research Station.</b>
<b>31 October - 4 November 1988</b>	<b>Review discussion notes, clarify any matters requiring further discussion and write mission report.</b>
<b>5 November 1988</b>	<b>Return Beijing and debriefing at UNDP</b>
<b>7 November 1988</b>	<b>Leave for Vienna</b>
<b>8 - 9 November 1988</b>	<b>Debriefing at UNIDO Vienna</b>
<b>10 November 1988</b>	<b>Return to Dublin</b>

**ANNEX 2 - LIST OF DOCUMENTS, SAMPLES, BROCHURES PRODUCED BY  
CTA ON BEHALF OF CTDC STAFF**

- o Sizing preparation
- o Sizing calculations
- o Slashing prepares for shuttleless weaving
- o Singeing - essential - often neglected
- o Noise control can increase production - report of USA mill experiment
- o Keeping the lid on weaving quality
- o ITT develops tester to kill sliver slub makers
- o How to cut loom parts costs
- o Simple electronic monitoring for cone winding
- o Wear testing - an appraisal of the more significant methods and related equipment
- o Letter from Dr. Th. Böhme KG concerning cold sizing agent CERAT 4493.
- o Nuovo Pignone brochures
- o IIRS Draft Standard Specification for sewing thread.
- o IIRS Abrasion Resistance test results for two upholstery fabrics
- o ITS announcement concerning Dr. Richard Schutz - a research achievement in sizing and desizing.
- o E and B Software Limited - Fault Loggers
- o 1987 ITS Report - Technomatex grants licence to Weinan Textile Machine Manufacturing Works to produce the "Omega" weft storage/feed unit.
- o International Linen - general information
- o ITS 1/86 announcement re. Nuovo Pignone on the PRC market
- o Benninger Supertronic Warps
- o Indian research into fibre from Pineapple Leaf
- o Italian Texafluid continuous Hydro Extractor
- o Fischer Poege warp tying machine
- o Control Charts for yarn Q.C.
- o Yarn Hairiness - Textile Progress vol. 13 no. 1 (abstract)
- o Yarn Hairiness - JTI, 1988 no. 2 (full photocopy)
- o Leaflet on automation and monitoring for the textile industry.
- o Bettini Thread Guides
- o Mathis Chinese Language brochure
- o Schlafhorst - Paper by Gregor Gebald and Jacob Leven as given at the XXVII Kongress der IFWS 3 - 16 Oct. 1982, Zürich.
- o Knot-free yarns in knitting
- o J.T.I. 1985 No. 3 "Staple Fibre Spinning Systems" - Krause.
- o Fabric samples and specifications for linen apparel and furnishing fabrics; shade cards
- o The ICI Textile Centre
- o The Montedison - formerly Monsanto-Technical Centre

**ANNEX 3 - VISIT TO YIYANG RAMIE TEXTILE PRINTING & DYEING MILL**

**A.3.1** The mill is 90km from Changsha. The CTA met with Mr. Yang Shou Ling - Deputy Director of the mill and also Deputy Manager of Hunan Huashang Ramie Textile Enterprise Group Corporation.

**A.3.2 Statistics**

There are 4,500 employees  
Accommodation including offices totals 150,000 sq.metres  
Production floor area is 70,000 sq.metres

Mr. Yang stated that 100% of production is exported. The market for degummed Ramie Ribbon fibre has now deteriorated. The mill originally did good business with Japan but this market is now virtually lost to other producers of more acceptable quality - producers including Taiwan, Brazil and the Philippines. The mill exports of this fibre peaked in 1986 and maintained this level until March 1987. It has since dropped sharply, 1988 being the worst year so far.

The mill produces three different products:

- Pure Ramie yarn and fabrics
- Cotton/Ramie
- Cotton/Ramie weft fabrics

Piece dyeing, both continuous and intermittent is available.

Total annual production of pure Ramie yarn is 1,800 tonnes.

10M metres of loomstate fabric are produced annually.  
Spinning spindles total is 15,000.  
There are 516 shuttle-changing looms of Chinese make.  
Yarn counts produced are (all in Nm):-

7.5  
9.5  
14.0  
24.0  
32.0  
36.0  
48.0  
60.0

Yarns are sold to Hong Kong weaving mills and Ramie fibre is also sold there.

They also export yarn to Japan but the final destination is the U.S.A.

**A.3.3 Departments Seen**

The CTA was shown degumming, spinning and weaving but not dyeing and finishing. He was permitted to photograph in spinning and weaving, but not in degumming.

**A.3.4 Drainage Problem**

An entire block of buildings had recently collapsed due to undermining of foundations by mill effluent.

**A.3.5 Polluted Atmosphere**

The atmosphere in the degumming department was highly charged with released organic sulphur.



#### **ANNEX 4 - VISIT TO AGRICULTURAL DEPARTMENT OF HRTDC**

##### **A.4.1. Location**

This department is located in the countryside quite close to Changsha and is associated with Hunan Agricultural College.

##### **A.4.2 Head Of Department**

The Head of this Department is Professor Li Zhang Dao who very cordially received the CTA and gave a clear insight into the work of the department which I feel is of high standard and it is clear that Professor Li is well-informed of international developments in the production of higher-yielding Ramie strains and the breeding of lower gum content varieties.

##### **A.4.3 Author Of Books**

Professor Li is author of two books on Ramie and he presented the CTA with copies of these.

##### **A.4.4 Further Information**

The standard information about the work of the department follows as given.

##### **A.4.5 An Introduction to the Ramie Research Institute of Hunan Agricultural College**

"The establishment of Laboratory of Bast Fibers, Hunan Agricultural College was decided by Conference of Ten Years Plan of Agricultural Sciences at 1963, held by the Central Committee of the Communist Party of China. While it was one of the two laboratories of agricultural scientific research established by the Ministry of Agriculture in whole country. Under the development of ramie Profession of Hunan Province, Laboratory of Bast Fibers of Hunan Agricultural College was upgraded to Ramie Research Institute of Hunan Agricultural College and five laboratories were established in the Institute.

In order to promote ramie profession of whole nation, China Ramie Technology Development Center (CRTDC) was approved by the National Scientific and Technical Committee at Dec. 1984, to be established in Changsha, Hunan. This is a new system of agro-industrial research organization to improve and develop the whole ramie profession from ramie raw material to textile products. The main task of the Center is to extend the ramie research work in the field of new ramie variety breeding, rapid propagation of fine varieties, high yield plantation technique and synthetical

utilization of byproducts; the traditional technique of ramie processing and textile products, new technology and new technique and new ramie textile products; compiling of technical development of ramie industry, technique reforming and programme of technique recommendation, draft of technique standard, extension of sample test, information and consultation.

According to the programme of CRTDC, Hunan Ramie Textile Research Institute has been authorized as the base of ramie textile trade and the Ramie Research Institute of Hunan Agricultural College as the base of ramie plantation, to develop the whole ramie trade in cooperation with other units. The research and extension work of Ramie Research Institute of Hunan Agricultural College covers ramie breeding and cultivation, physiology and biochemistry, biological technique, physical tests and chemical analysis, technical service of 9 ramie production bases, national and international academic exchange and technique training of cadres.

Within recent thirty years, under the direction of Professor Li Tsongdao, the scientific research work of ramie has been done extensively and intensively, either in basic or applied research in ramie field, such as plant physiology, biochemistry, genetics, fiber development, plant breeding and rapid propagation of fine varieties, high yield plantation technique and synthetical utilization of by products. All the books, theses and achievements have been praised by specialists and person of same trade. A part of these achievements have been extended to whole province or whole country and greater economic benefits gained by farmers and textiles. For example, 30000 hectares of localized fine variety were established by new rapid vegetative propagation technique in nine ramie plantation bases at 1985-1986. 60 million US \$ of agricultural economic benefits and 250 million US \$ of output value of products were gained by farmers in nine ramie plantation bases at 1985-1986.

Nowadays, our Institute has been working for the strategic scientific research item of seven-five year's plan of Hunan Province and also the stress item of National Scientific and Technical Committee. Up to date, 17 books and 100 thesis and achievements had been published. The staff of the Institute possesses 2 professors, 2 associate professors, 6 lecturers, 1 senior agronomist, 5 technicians and 10 technical workmen. Besides, there are 20 cooperative units in our college (sections of Botany, Physiology, Organic Chemistry, Radiationisotope, Soil, Agricultural

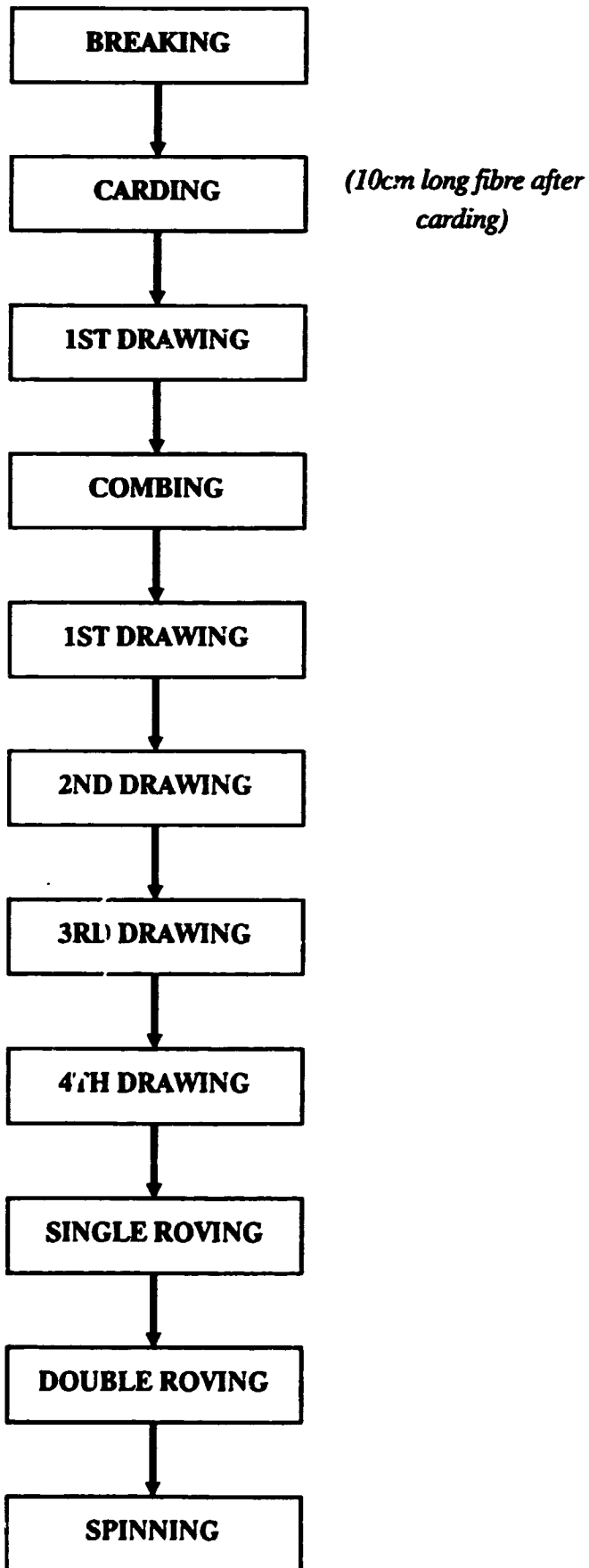
Chemistry, Meteorology, Agricultural Feed, Pig Feed, Animal Biochemistry, Pharmacology and Agricultural Machinery and 25 cooperative units outside of our college in Hunan or other provinces, to form a colleges-institutes-administrative departments, three-in-one key task team and also to form a multibranch of learning to break through strategic problems.)

We are inspired with enthusiasm to promote ramie profession of whole China and other Country of the world."

**ANNEX 5 - FINANCIAL INPUTS - NEW EQUIPMENT**

ITEM		ORIGIN	COST IN US \$
A.5.1	Instron Tensile Tester	U.K	48,000
A.5.2	Fabric Tester	PRC	7,400
A.5.3	Uster	Switzerland	40,000
A.5.4	Uster Cloth Meter	Switzerland	19,820
A.5.5	Shirley Knitting Snag Tester	U.K.	2,000 (estimate)
A.5.6	Shirley Yarn Hairiness Meter	U.K.	11,349
A.5.7	Standard Light Source	BRD	4,200
A.5.8	Uster Tensorapid	Switzerland	5,200

**ANNEX 6 - THE RAMIE INDUSTRY SYSTEM IN PRC FOR MEDIUM STAPLE SPINNING  
- FLOW CHART -**



**ANNEX 7 - THE HUNAN HUASHANG RAMIE TEXTILE ENTERPRISE  
GROUP CORPORATION**

This is a very recent and significant development (August 1988). It is an import/export corporation with a joint board representing the three main Ramie mills. The NPD - Mr. Xu Kui - is on the Board of Management, holding the position of Chief Engineer. Activities include marketing and they are allowed to import and export equipment, machinery, raw materials and products.

The opening ceremony was held in August 88 in Tientsin with the first trade exhibition. Hong Kong newspapers reported that US\$3M was earned at this first exhibition.

The NPD reported that this company is experimental in attempting to combine scientific research and economics. He also emphasised that his main interest is still the RTDC unit.

Mr. Xu was invited onto the Board of the new company following many difficulties. One of his tasks is to organise the most effective way to develop the new company. He will deal with customers' enquiries concerning new products and specifications.

The main objective is to improve operations in the three main Ramie mills and the aim of the RTDC unit is to provide a service for the mills.

Mr. Huang Shao Shi is now employed by the company. (He is a candidate for the knitting Fellowship). He works in the Commercial Affairs Department.

**ANNEX 8 - FELLOWSHIPS**

Four Fellowships have been approved by UNIDO. These are the only Fellowships that have so far been sought by the NPD. They are:

<b>CANDIDATE</b>	<b>DISCIPLINE</b>	<b>COUNTRY/LANGUAGE</b>
1. Ms Zhong Xiang Yuan	Weaving	UK (Leeds)/English
2. Mr. Lin Ji Ying	Dyeing/printing/ finishing	USA or UK/English
3. Mr. Huang Shao Shi	Knitting	USA / English
4. Mr. Chen Xiou Ying	Spinning	Japan / Japanese

**NOTE:** Hong Kong Polytechnic is offering places for PRC Fellows in a wide range of disciplines. English language is essential for those courses but tuition could be provided in Chinese at cost.

**ANNEX 9 - PEOPLE MET**

**Mr. Zhu Xing Ph. D.** Senior Engineer, Department of Foreign Affairs, Ministry of Textile Industry P.R.C.

**Mr. Xu Kui** Director RTDC, Chigangchong Changsha (also National Project Director - NPD)

**Mr. Xu Jixin** Engineer, Department of Science & Technology, Ministry of Textile Industry PRC.

**Mr. Li Tsong Dao** Director Professor Ramie Research Institute, Hunan Agricultural College, Changsha.

**Mr. Yang Shou Ling** Deputy Director, Yiyang Ramie Textile Printing and Dyeing mill; also Deputy Manager, Hunan Huashang Ramie Textile Enterprise Group Corporation.

**Mr. Huang Shao Shi** Commercial Affairs Department, Hunan Huashang Ramie Textile Enterprise Group Corporation, Changsha.

**Mr. Xiang Ce Xuan** Vice-Chief Engineer, HRTDC

**Ms. Li Mei** Textile Design Graduate Shanghai Textile University (Interpreter for this mission)

**Mr. Lin Ji Yin** HRTDC Fellowship Candidate - Dyeing and Printing

**Ms. Caterina Benardelli** Programme Officer, UNDP, Beijing.

**Mr. Bruno Quaranta** Beijing Office Manager for Nuova Pigmone (Italian weaving machine manufacturers with joint enterprise in PRC)

**Mr. John-Peter Moll** (Textile Unit) Agro-based Industries UNIDO

**Mr. Zhou Quan Xi** Section Chief, Hunan Provincial Commission of Foreign Economic Relations and Trade, Foreign Economic Cooperation Department.

**Mr. Xiang Pu Liang** Vice Chairman Foreign Economic Relations and Trade Commission of Hunan Province.

**Mr. Lin Jing** Hunan association of Science and Technology Standing Member of the Committee, Hunan Provincial Planning Committee Science & Technology Department Chief.

**Ms. Du Fin Xin** Vice Chief Manager, Hunan General Textile Industrial Corporation.



**ANNEX 10 - EXPLANATION OF ABBREVIATIONS USED**

<b>(H)RTDC</b>	<b>(Hunan) Ramie Technological Development Centre</b>
<b>CTA</b>	<b>Chief Technical Adviser</b>
<b>PRC</b>	<b>Peoples Republic of China</b>
<b>NPD</b>	<b>National Project Director</b>
<b>UNDP</b>	<b>United Nations Development Programme</b>
<b>UNIDO</b>	<b>United Nations Industrial Development Organisation</b>
<b>Nm</b>	<b>Metric system yarn counts (metres/500 grams)</b>
<b>CTMHW</b>	<b>China Textile Machinery Manufacturing Works</b>
<b>PPM</b>	<b>Picks (weft thread) inserted per minute (weaving)</b>
<b>COD</b>	<b>Chemical oxygen demand</b>
<b>BOD</b>	<b>Biological or Bio-chemical Oxygen Demand</b>
<b>LIRA</b>	<b>Linen Industry Research Association (Lambeg Institute)</b>
<b>PVC</b>	<b>Poly Vinyl Chloride</b>
<b>PVA</b>	<b>Poly Vinyl Alcohol</b>
<b>UMIST</b>	<b>University of Manchester Institute for Science and Technology</b>
<b>(E)EC</b>	<b>(European) Economic Community</b>
<b>ITT</b>	<b>Institute of Textile Technology</b>
<b>IIRS</b>	<b>Institute for Industrial Research &amp; Standards (Irish) (Title now changed to EOLAS)</b>
<b>ITS</b>	<b>International Textile Service</b>
<b>QC</b>	<b>Quality Control</b>
<b>JTI</b>	<b>Journal of the Textile Institute</b>
<b>IFWS</b>	<b>Institute fur Wirtschaftsforschung (Zürich)</b>
<b>ICI</b>	<b>Imperial Chemical Industries</b>