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JUTE RESEARCH AND DEVELOPMENT

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INDIA

Technical report: Fifth mission report*

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

Based on the work of R. R. Atkinson, technical co-ordinator

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United Nations Industrial Development Organization
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* This document has not been edited.

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INTRODUCTION

The project is now roughly at the half-way mark and the core activities in the pilot plants are now about to get under way. The next six months should see the blending, yarn and fabric dyeing and enzyme plants commissioned and ready for use. The lead times for the procurement of these plants have been more protracted than was expected and the arrangements for the provision new premises for some of them have also taken longer than estimated.

Meanwhile, preliminary work has been successfully pursued for most of the activities according to the work plan. Fellowships, under execution or planned, are progressing well but there are still two Study Tours to complete. To derive most benefit from Study Tours they should be made early in the project and it is hoped that the two remaining ones can be undertaken soon otherwise their point will have been lost.

Some difficulty is being encountered in locating certain Experts and it is being found that those who have been identified (many of whom are from the academic world) cannot go to IJIRA for as long a time as was envisaged when the Prodoc was written. It seems, therefore, doubtful that the full Expert programme outlined in the Prodoc will be implemented. However, this will not affect the project significantly and its reduction - in terms of man-months costs - has the advantage of releasing funds for longer Fellowship training and the purchase of more equipment.

Three additional pieces of pilot plant equipment for dyeing have been requisitioned at a cost of \$175000. This will exhaust the current equipment allocation of Budget Revision 'E'.

Budget Mandatory Revision 'F' has been submitted to UNDP for the re-allocation of certain budget lines while at the same time keeping the overall budget at the same level.

The principal changes are a reduction in Budget Line 11-XX (Personnel) and 21-00 (Subcontracts) with consequent increases in 3X-XX (Training) and 4X-XX (Equipment). By means of these revisions, funds were made available for extending the Fellowship programme and buying pilot plant. With the requisition of the additional items of pilot plant there will be a shortfall of \$79000. This can be taken from the Personnel budget by reducing the man-months of Experts by 12. These changes will be reflected in Revised Manrev 'F'.

EQUIPMENT

1. Laboratory equipment

The only instrument still to be ordered is the thermal analysis system for the Applied Chemistry Division (Purchase Requisition 88/9). The lowest tender which is technically acceptable is that from Mettler and this has been endorsed and the order for it is now being placed.

2. Pilot plant

High-pressure package dyeing plant

The yarn dyer and drier is being bought from an Indian manufacturer, Dalal Engineering, and delivery was promised for the end of May but during a visit from the local agent it was clear that this date will not be met. In a way this is fortunate since the construction of the new dye-house by Birla Jute and Industries Ltd has fallen badly behind (see BUILDINGS) and it will be some months yet before the plant can be installed. It is essential that the Applied Chemistry Division keeps in close touch with Birla and Dalal to co-ordinate the delivery schedule. Dalal indicated that they could only hold dispatch for a time so it may prove necessary to accept delivery of some of the plant for storage in some location in Birla's mill until the dye-house is ready.

Certain steam traps, valves, strainers and air vents are not included in the purchase but will be provided by Dalal and paid for by the GOI.

The associated soft cheese winder for the plant is to be located inside the mill and space is ready for it.

The method for winding the cheeses needs to be settled; there is a choice between dye-springs, perforated centres (steel or plastic) or centreless for packing in the dyer. This, and the numbers required, should be decided as soon as possible.

Intersecting gill-box

The gill-box was due to arrive in Calcutta during the first week of June. It too is to be sited at Birla. A meeting was held on 17 May to discuss the detailed operation of the machine. It was attended by the local agent of James Mackie (the makers of the machine), the Chief Engineer of Birla, the CTA and the concerned project staff and a course of action was agreed upon. Initially, the machine will be fed from the first drawing frame and later from the finisher card.

Enzyme plant

The enzyme plant designed by CFTRI, Mysore, and to be installed on a turn-key basis by an Indian company called Murhopye will be bought under a local purchase for which authority has been passed from UNIDO to IJIRA. Funds for the purchase and the system guarantee have been approved and IJIRA will withhold the payment of the latter in accordance with the agreement with the manufacturer. Delivery is expected in six months, by which time the buildings will be complete (see BUILDINGS).

Atmospheric pressure package dyer and drier

New purchase, no. 2/89, estimated cost \$100,000.

This equipment will be installed at India Jute Mills Ltd and there it will be used for development work on carpet yarns made from jute and jute blends.

Padding mangle

New purchase, no. 3/89, estimated cost \$ 23000

This will be used at Anglo-India where work on novel fabrics from jute and jute blends is being undertaken

Drying range

New purchase, no 4/89, estimated cost \$ 52000

This too will be installed at Anglo-India to work in conjunction with the padding mangle.

These last three Purchase Requisitions are now with UNIDO so that bids can be obtained against the neutral specifications drawn up for the equipment.

After the purchase of the enzyme plant and the Mettler analyser, the present equipment allocation (Rev. E) will be exhausted.

At the project Review meeting in November 1989 it was recommended that the Equipment budget be increased by \$96000 but even with this Purchases 2, 3 and 4/89 will result in an overspend of about \$79000. Without increasing the overall project budget, this sum could be got from the Experts budget line by reducing the man-months of Experts' time by 12 man-months. This small reduction in Experts time will not have a significant effect upon the operation of the project. These changes will be incorporated in a revised Manrev 'F'.

FELLOWSHIPS

During 1989, the following Fellowship programme is in progress-

<u>Subject</u>	<u>Fellow</u>	<u>Location</u>	<u>Duration</u>
Reinforced plastics	Pal	Harwell	6 months (1)
Biosoftening	Sinha	Oak Ridge	6 (2)
Blending	Chattopadhyaya	Clemson	6
Fab. engineering	Chatterjee	Clemson	6
Instrumentation	Mukherjee	N Carolina	3
Instrumentation	Bandyopadhyaya	N Carolina	3
Chem. softening	Das	Personal Products	3 (3)

Notes;

1) Pal's Fellowship will be extended by 15 days so that he may attend the Harwell sub-contract evaluation meeting on 10 July

2) Sinha's Fellowship will be extended by 15 days so that he may attend a course on enzymes in Pennsylvania State University.

3) The tutor/supervisor of Das's Fellowship has requested that the time be extended from 3 months to 6 so that a more complete Fellowship may be accomplished.

The National Project Director must formally request that these extensions be incorporated into the Fellowship programme.

STUDY TOURS

The tours of the Head, Physics Division, and the Head of the Centre for Machine Development and Design, are still to be executed and it is strongly recommended that these two candidates should organise and effect their tours as soon as possible.

It is disappointing to note that the same remarks were made during the CTA's last Mission Report.

EXPERTS

The programme for visiting Experts for the remainder of 1989 (with some spill-over into 1990) is shown below.

11-01 CTA R R Atkinson

11 weeks (5 already used); one week for Harwell meetings and home office work and 5 weeks for Nov/Dec mission to IJIRA

11-02 Enzymes Dr Wood, Strathclyde University, Glasgow, UK

1½ months Oct/Dec

Alternate candidate is Dr A Kilara, Pennsylvania State U.

11-03 Chemical softening Dr P K Chatterjee, Personal Products, USA

5.5 weeks over Dec 1989/Jan 1990

11-04 Instrumentation

Mr A Campbell, Napier College, Edinburgh, UK is one candidate but the Physics Division has two others who they wish to consider as well. The Expert is wanted for 2 months Oct/Dec

11-05 Fabric Engineering Dr B C Gowswami, Clemson U. USA

1m/m Dec

11-06 Marketing

No candidate has been identified and the assistance of UNIDO/ITC has been sought. The Expert is wanted for 2 months in the last quarter of the year.

11-09 Jute reinforced plastics

A candidate will be sought from Harwell Laboratories at the meeting between IJIRA/UNIDO/Harwell on 10 July. The Expert is wanted for 1 month. The CTA has spoken to Mr Bowen of

Harwell to give him time to formulate some suggestions on 10 July.

11-10 Industrial engineering.

The original candidate, Mr Blyth, has dropped out and the alternate is Mr Haines, a British consultant. The CTA has spoken to him and explained a little about the post. Mr Haines is available for two months towards the end of the year. He has also suggested a location for Fellowships in industrial engineering and the CTA is pursuing this and will report later. The National Project Director should confirm to UNDP/UNIDO whether Haines is acceptable to them and the GOI.

11-12 Textile technologist, Dr Goswami, Clemson U. USA

Dr Goswami is covering two posts, 11-05 and 11-12.

11-13 Textile chemist Dr L Miles

Dr Miles' second visit is wanted for 1½ months Nov/Dec by which time the dyeing and bleaching plant should be operational at Birla.

11-14 Packaging design

No candidate. UNIDO will approach their packaging specialist for suggestions and the CTA will explore possible sources too. Wanted for 1½ m/m in last part of the year.

11-50 Ad hoc short term Experts

Earlier, Dr Roy Morgan and Miss Rickson of Sillsoe College, UK, indicated that they might be able to put on a short seminar on geo-textiles at IJIRA in July as they were to be in India and Nepal on other business anyway. The CTA contacted them and it now looks doubtful if they can hold the seminar since their timetable has been altered and they have now little time to spare. The CTA will confirm whether they are available or not shortly.

At the PAC meeting on 29 May it was suggested that James Thomson of Jason Consultants (geo-textiles specialists) should be contacted for a mission to cover the use of jute in geo-textiles. The CTA pointed out that Thomson had been approached before but that his fees were well above the UN norms and so he was not recruited. However, the UNDP representative at the meeting said that on other projects, Experts who were considered of value to the project had been recruited even though their fees were in excess of the recognised rates of UNIDO. This being so, Thomson should be approached by Personnel Recruitment for 1 month at the end of the year. The CTA faxed a Job Description to Vienna on 2 June.

An alternative candidate for this post is P R Rankilor, Manstock Geo-Textile Consultancy Services, 1 N. Parade, Parsonage, Manchester M3 2FB, tel 061 832 6447 who should also be approached.

The total man-months for the Experts during 1989 is expected to be 15.5 (Manrev 'F')

SUBCONTRACTS

The only subcontract is a research contract with Harwell Laboratories, UK, on the subject of the use of jute as a reinforcement for plastic resins. The contract is approaching its end and an evaluation meeting is to be held at Harwell on 10 July at which not only the results will be reviewed but a decision will be taken on whether or not a follow-on contract should be awarded. At the meeting too, it is hoped that an Expert can be selected who will go to IJIRA to help to implement the work done so far.

BUILDINGS

1) Birla Jute and Industries Ltd

The pilot plant for the development work on bleaching and dyeing of jute yarns is to be located at Birla. As has been mentioned earlier, the plant is almost ready for dispatch but at the time of the CTA's mission no work has started at the site. This, despite assurances last November that work would start at once. At a site meeting various times for completion of the buildings were given but it seems we cannot expect to see them finished before October. This means that the plant can be installed in November, ready for commissioning in December when the Expert is at IJIRA and can make a most valuable contribution.

2) Kinnison Jute Mill Ltd

This is the site for the enzyme pilot plant. Planning permission has been granted and now work can go ahead. IJIRA and Kinnison have agreed that IJIRA will be responsible for progressing the work of construction. The plant is being ordered now and with a 6-month lead time for it, the building, which is of a fairly simple construction, should be ready in good time. IJIRA will have to ensure that this is so.

3) Project laboratories at IJIRA

Planning permission has at last been granted for these labs but construction will take 6 months to complete. Meanwhile some of the lab equipment bought for the project cannot be used to its full extent.

DETAILS OF ACTIVITIES

Softening fibre by chemical means

Project staff have been working at Reliance Jute Mill adding small quantities of a mixture of sulphonated castor oil, urea and sodium carbonate to soften low grade jute fibre. The results on sacking weft (the lowest quality of yarn produced) have been successful and a report is being prepared. The work is being extended to sacking warp (the second lowest grade of

yarn). Once this is finished the team will go to J.K.Jute Mill in Kanpur to repeat the experiments.

A Fellow is in America for three months (with a possible three month extension) to study fibre softening at Personal Products, a unit of the Johnson and Johnson Group.

Enzyme treatment

Work continues on small scale plants in the mills until the pilot plant is ready at Kinnison Jute Mill. At that mill, building approval has been granted and work is to begin shortly under the control of IJIRA. The pilot plant has been ordered but is not expected for six months or so. The purchase will be made under a Local Purchase by IJIRA who are familiar with the arrangements for payment of the plant and also the later guarantee payments running over the three years after the commissioning of the plant.

Although preliminary work on the safety aspects of the enzyme plant has been done, a further investigation is to be made in co-operation with the Industrial Toxicology Research Centre at Lucknow to make doubly sure that there are no health risks for the worker or environmental hazards associated with the preparation of these enzymes.

In addition to the use of enzymes for up-grading fibre properties, work is being done on the enzyme treatment of the tamarind kernel powder used for sizing warps in the mill. There is a considerable body of evidence that the use of enzymes on TKP not only improves the quality of sizing but reduces the steam consumption at warp drying too.

One Fellowship in USA is now underway and the second will follow in January 1990.

The Head of Division made a very successful Study Tour to America and the UK and returned with a wider appreciation of current work in the field of bio-technology.

Tufting and wrap-spinning

This Activity was taken into the project in March 1989 but so far progress has been minimal and during the next six months it is essential that the selection of staff, the Fellowship programme and the choice of machinery be settled. This can best be done by means of the Study Tour for the Head of Division during which he can meet machinery makers, tufters and other technologists in this field.

Bleaching and dyeing

a) Fabric

Useful work is being done with the existing plant at Anglo-India and a comprehensive range of colours has been assembled into a shade card. Blended jute/polypropylene luggage cloth has been dyed and sold and the luggage fabricator is selling about 1000 pieces per month. Other fabrics are under test for stiffness, light-fastness and water repellency at the Wool Industries Research Institute in India. When the jigger arrives (June) more extensive work can be done on fabrics for upholstery, curtains and other domestic textile applications.

Orders are being placed for a padding mangle and a cylinder drying range but these will not appear for at least six months.

b) Yarns

This work is to be done at Birla and, as has been explained above, the new dye-house is still to be constructed although the plant is almost ready for delivery. In the meantime, a yarn shade card has been prepared for dyes with a light-fastness of 3 or more although the formulations etc will all need to be checked when these dyes are used in the pressure plant.

The co-ordination of the construction of the premises, the installation and commissioning of the plant will be the main work in the next six months.

Blending and decorative uses

Work is concentrating on the use of either all-jute or blended jute as weft for handloom weaving through the Weavers Service Centre, in Delhi. Discussions have been held with the staff of the Centre and also with figures prominent in the marketing of handloom fabrics in India and abroad. Already an export order for a blended wefted fabric has been obtained through this channel.

It is essential that close liaison be maintained between the work on blending and that on dyeing. If jute or jute blends are to find a niche in the handloom market, IJIRA must be in a position to offer technical assistance with the choice of dyes and softening agents etc which allow jute to be used for

fabrics of higher value. Therefore close co-operation between the concerned project staff is vital. The CTA got the impression that at the moment, inter-divisional collaboration on this subject is not as good as it might be.

The only item of pilot plant equipment for blending, an intersecting gill-box, is due to be erected at Birla during the third week of June. By July much more intensive work can be undertaken in this Activity.

Two Fellows are now at Clemson University for six months. All necessary materials for them to work on have been received at Clemson.

The follow-up visit of the Expert, Dr Goswami, is expected in Dec/Jan .

Instrumentation

The Physics Division's workshop for the fabrication of on-line control devices for spinning is now functioning in temporary premises at IJIRA. The output is about 5 units per month and 22 units are on order for the mills.

A Fellowship at N Carolina University is in progress and it is hoped that the Head of Division's Study Tour can be executed in the next few months.

One Expert, Mr A Campbell of Napier College Edinburgh, has been put forward for consideration but the Divisional Head wishes to consider two others before deciding which candidate will be best.

Geo-jute

Two types of double warp twill fabric, the first rot-proofed and the second needle-punched with a jute/polypropylene fleece are on trial at two locations with the Calcutta Port Trust and another is under test by the Ministry of Textiles at Dhera Dhun. So far, the results are encouraging. If this application can be encouraged in India, the potential off-take will be considerable with the added advantage that the fabrics are, or will be, fairly standard and within the capabilities of most of the mills.

In India the knowledge of geo-textiles is not extensive and it would seem that jute, being an indigenous product, could play a part in the many construction projects in the country in the general fields of erosion control, temporary slope-stabilisation and similar applications. It is hoped that an Expert can be appointed this year who will help to encourage Indian civil engineers to use geo-jute and to guide IJIRA in its developments for this product.

Jute reinforced plastic

A mid-term report has been received from Harwell Laboratories where the research sub-contract is being carried out. One Fellow is also there working on new ways of using jute as a reinforcement material. There will be an evaluation meeting at Harwell on 10 July at which progress will be reviewed and a decision taken as to whether or not another contract should be awarded to continue the work.

It is intended that an Expert from Harwell should visit IJIRA in the last quarter of the year.

Meanwhile at IJIRA trials with jute reinforced tea chests and fruit boxes are continuing. Various ingenious designs have been worked out and now field trials of these are under way.

Mill visits

The following mills in India were visited -
Ludlow Jute Mill
Kinnison Jute Mill

Anglo-India Jute Mills
Birla Jute and Industries
Dalhousie Jute Mill
New Central Jute Mill

and in Austria -

Starlinger Ltd