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JUTE RESEARCH AND DEVELOPMENT

DP/IND/86/037/11-11

INDIA

Technical report: Industrial Engineering Contributions
(First mission)*

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 G. R. Haines, expert in
industrial engineering

Backstopping officer: J. P. Moll
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Vienna

* This document has not been edited.

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ABSTRACT

Jute Research and Development (Development and promotion of diversified uses of jute), IJIRA, Calcutta. DP/IND/86/037/A/01/37 INDIA
Report on : Industrial Engineering contributions to above project.

The UNIDO Project designed to support the research and development work carried out by the Indian Jute Industries Research Association (IJIRA) and its industrial applications, contains an industrial engineering mission (Job Description number DP/IND/86/037/11-10/J13102). The first part of this mission was carried out between 9th October and 23rd November 1989 with the aim of assessing the work already carried out in this field by IJIRA and of visiting representative mills assessed by IJIRA as good, medium and poor in order to obtain an overall picture of production and managerial methods and to gain an insight into the socio-political industrial environment of the jute manufacturing mills. The overall aim of the industrial engineering section of the UNDP Project is to assist in achieving processing cost reductions at little or no investment cost, to be applied industry wide and as soon as possible, by improving existing processing methods and managerial systems. Additionally, a prime function of the project is to help with institution building of IJIRA by expanding their productivity information and consultancy services.

Observation confirmed that there is scope within the industry for low cost solutions and economies based on industrial engineering analysis of both methods of working and methods of management. Optimum working methods must be derived and used as a basis for subsequent training of operatives and all levels of management, together with auditing and follow-up systems, highlighting areas requiring attention and providing data for the assistance of line management. Full scale industrial engineering investigations are recommended for three sample mills. An experienced Indian industrial engineer plus National Consultant(s), together with IJIRA nominees (who will be trained to continue the work at the end of the UNDP project), will carry out this work. Detailed job descriptions and a timetable have been laid down and appointments made.

KEY WORDS. Jute Manufacturing (India), Industrial Engineering and its applications, Personnel Development, Institution Building, Consultancy Services, Management Techniques, Operative and Management Training.

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Introduction

The UNIDO Project designed to support the research and development work carried out by the Indian Jute Industries Research Association (IJIRA) and its industrial applications, contains an industrial engineering mission (Job Description number DP/IND/86/037/11-10/J13102). The first part of this mission was carried out between 9th October and 23rd November 1989 with the aim of assessing the work already carried out in this field by IJIRA and of visiting representative mills assessed by IJIRA as good, medium and poor in order to obtain an overall picture of production and managerial methods and to gain an insight into the socio-political industrial environment of the jute manufacturing mills. This was carried out in the vicinity of Calcutta. Subsequently, discussions were held with senior mill managements and a seminar conducted for senior company directors to explain and illustrate the potential for the application of industrial engineering techniques and to suggest future lines of work for IJIRA's productivity cell and mill technical service.

The overall aim of the industrial engineering section of the UNDP Project is to assist in achieving processing cost reductions at little or no investment cost, to be applied industry wide and as soon as possible, by improving existing processing methods and managerial systems. Additionally, a prime function of the project is to help with institution building of IJIRA by expanding their productivity information and consultancy services.

This initial part of the mission was carried out by the designated UN industrial engineering expert, G.R. Haines, with assistance from UNDP Project/IJIRA staff in Calcutta.

The purpose of this documentary output is to summarise the activities of this first short mission and to outline the proposed subsequent actions within the remainder of the mission.

A. Briefings at VIC and New Delhi

The actual fieldwork was preceded by a briefing at VIC by Mr. Eräneva, the project's backstopping officer, and a briefing at UNDP offices in New Delhi by Mr. Ramachundran and Mr. Islam.

These briefings gave a general background to the country and the industry and outlined thoughts and progress so far on this particular project. However, the intention was not to lay down any specific course of action for the industrial engineering aspects of the project at that point, but to give information additional to that which would be available from direct contact and observation in the field.

B. Initial work at IJIRA

After studying the Project Document in order to put this mission into the context of the full project, the first few days at IJIRA were spent in going through as much information as could be obtained on productivity - related work already carried out by IJIRA. This included the development of the Inter-Firm Comparison system for the Preparation and Spinning sections of the industry, together with details of seminars held to promulgate the findings and show how effective use could be made of the published information.

The general impression at this early stage was that limited but good initial work had been carried out by IJIRA in the productivity field but that somehow the impetus had been lost and industry had not made the fullest possible use of the information available. The graph of Annexe 1 illustrates this, using the MPI index or Machine Productivity Index, defined as Actual Production x 100%. The industry average shows a reason-

Standard Production

able response for the first two or three years, but then the situation stagnates. However, individual mills did better than this, eg. numbers 19 and 23, which suggests that the potential for further improvement is there in all mills.

The next step taken was to carry out a series of mill visits in an attempt to determine by this had happened and how to overcome it.

C. Mill visits, summary of findings

The mills visited and main management personnel seen are listed in Annexe 2; they covered the private and government-run sectors and one co-operative.

While the actual procedures and methods (both operational and managerial) differed from mill to mill, the general opinions on the state of the industry and its main difficulties were surprisingly uniform and can be briefly summarised as:-

Machinery

This is generally in poor condition and, through the fitting of incorrectly specified or inaccurately-manufactured parts over the years has reached a state where machinery can be out of commission for substantial periods because of the difficulty of obtaining suitable replacement parts. Breakdown losses are therefore frequent and of long duration. There is little evidence of preventive maintenance and even routine maintenance such as oiling is generally carried out by untrained or part-trained personnel. In addition to this, poor layouts often contribute to difficulties of access for both operational and maintenance purposes.

Management

The lack of any formal training in this area, which covers the spectrum from lower supervisory levels up to middle management, has led to a severe shortage of people capable of rooting out incorrect methods of operation or developing and teaching correct ones. Techniques have been "learned", together with ingrained bad habits, by the old system of watching someone else do a job with no opportunity or background which would enable the trainee to develop analytical skills and so question what is being done. At the higher levels of management there is a great deal of movement from one mill to another which leads to a situation in which such managers are

rarely in a position to have been long enough at any one mill to have analysed its problems and implemented solutions. The situation is rapidly approaching when a great deal of practical expertise will have left the industry via retirement of the older management employees, and the younger professional management which should have replaced them will be non-existent or ill-trained. While the older management employees have some appreciation of what help industrial engineering can give, younger members of management have little idea of the real scope of application apart from incentive schemes.

Labour

There is considerable over-manning in some areas, brought about partly by the local political situation, and a multiplicity of unions has to be dealt with. In a few areas there was evidence of output restriction by the employees. Such incentive schemes as were in operation produced a bonus of only 3 - 6% which, together with their indirect nature, meant that they were no incentive at all. However, the main problems in this area are associated with the lack of correct methods of operation being laid down and the lack of proper instruction and training given to all operatives; this is exacerbated by the general method of labour utilisation of the industry whereby only a proportion of the labour force is permanent, the remainder being from a casual pool of labour, which makes it even more imperative to establish optimum methods of operation and to have formalised training schemes for all jobs. One mill had additional labour problems arising from the fact that much of their labour force came in from country areas but at harvest times went back to the villages, leaving the mill even more dependent on casual labour for three or four months in the year.

Training

As already outlined, there is an acute need, particularly as older skilled labour retires, for the establishment of optimum methods of operation and the institution of suitable training schemes for the operatives, together with formalised training schemes for supervisory and lower management levels.

Inter Firm Comparison

While the general opinion was that IJIRA's first essay into this field had been of value there was some criticism that publication was occasionally delayed and so results were out of date when received, and that the format and presentation could be improved so that busy managements could extract and apply the salient information more easily. There was also a hint of suspicion that the records may not be as accurate as they should be, although IJIRA personnel do carry out spot checks in an attempt to prevent this.

General

During these mill visits and at the subsequent discussions held with the upper echelons of management, examples were given as often as possible of areas which, at individual mills, would respond to the application of industrial engineering techniques. There was general agreement on the need for application of such techniques, at limited investment cost, in order to achieve rapid short-term economies which would give industry a little breathing-space while other longer-term developments, eg. marketing and product diversification, were being implemented.

D. Discussions with top echelons of management

These discussions were held mainly at the various organisations' headquarters buildings in Calcutta and were supplemented by private meetings with individuals, attendance at a seminar (the Post-Asia Conference on Quality at the Taj Bengal, Calcutta, on 4th November 1989) and a presentation made at the Bengal Chamber of Commerce on the 17th November 1989 (see Annexe 3 for agenda).

In the main the opinions obtained covered the same factors already outlined in section 3 with perhaps a little more emphasis on the financial aspects and the general lack of investment funds.

E. Subsequent proposals

As a result of these discussions it was agreed with both IJIRA staff and the industrial contacts that:-

- a) There is scope within the industry for low cost solutions and economies based on industrial engineering analysis of both methods of working and methods of management.
- b) As a corollary to the above, once optimum methods have been derived they must be formalised and used as a basis for subsequent training of operatives and all levels of management, together with auditing and follow-up systems, highlighting areas requiring attention and providing data for the assistance of line management.
- c) There are few trained and experienced industrial engineers available in India to carry out this work so the industry would initially need expert assistance in order to achieve rapid results. It is suggested that this could best take the form of expanding IJIRA's consultancy capacity into this field while at the same time giving basic training in industrial engineering methods to mill and IJIRA personnel: this should create both an awareness of the potential and, more importantly, the actual application of industrial engineering techniques as soon as possible so that economics and competitiveness can be improved quickly. This will buy a little time for the development and application of diversification projects, but even after such diversification it is envisaged that there will still be substantial continued manufacture of the "old" products and that the production of both the old and the new products must be organised more efficiently so as to be as economical as possible.

F. Proposed methodology

It must be appreciated that industrial engineering work can only be one factor in improving the economics and potential of the industry, i.e. it is not the grand solution by itself.

Initial emphasis must be on improving operating methods and training and must cover managerial control systems and performance; any potential labour reductions can only be discussed after these objectives have been achieved, in order to minimise potential labour upsets. The industry appears to be a close-knit community which will co-operate fully and enthusiastically if offered correct and positive suggestions with timetabled and costed action programmes.

- a) It is proposed that in order to overcome the deficiencies outlined in the previous sections, full-scale industrial engineering investigations should be undertaken in three mills. One experienced Indian industrial engineer will be employed for the duration of the UNDP project to act as the main source of expertise and to give necessary training to personnel seconded from IJIRA (see section c) below) and the mill personnel at the firms chosen. A more detailed description of his duties is given in Annexe 4.
- b) A more senior Indian National Consultant will be employed on a part-time basis to act as liaison officer with the higher levels of mill and commercial management to ensure that they are kept up to date with progress and to encourage rapid application of the findings and dissemination of the results through the industry. A more detailed description of his duties is given in Annexe 5.
- c) Two members of IJIRA staff will be seconded at no extra cost to the UNDP Project in order to assist with the initial work while at the same time receiving training which will enable IJIRA to continue with industrial engineering consultancy when the UNDP Project has finished.
- d) Details of courses have been obtained from Fielden House plc in the UK which would be suitable for Industrial Engineering Fellowships. One such Fellowship is envisaged, to be given at a later date to the most promising of the two IJIRA staff mentioned in the previous paragraph.

G. Proposed Timetable

Annexe 6a tabulates the suggested timetable for this work while Annexe 6b gives explanatory notes where required at certain points. To summarise, once agreement to the investigations has been obtained from the mills concerned, the Indian Industrial Engineer already appointed (see next paragraph) will survey each mill and give recommendations for subsequent action. He will next devise and run a brief industrial engineering appreciation course for the mill personnel and the IJIRA nominees and then begin operations in each mill in turn. In the meantime, the national consultant will assist in this preparatory work and towards the end of it will begin to supervise operations and carry out the liaison work with mill managements.

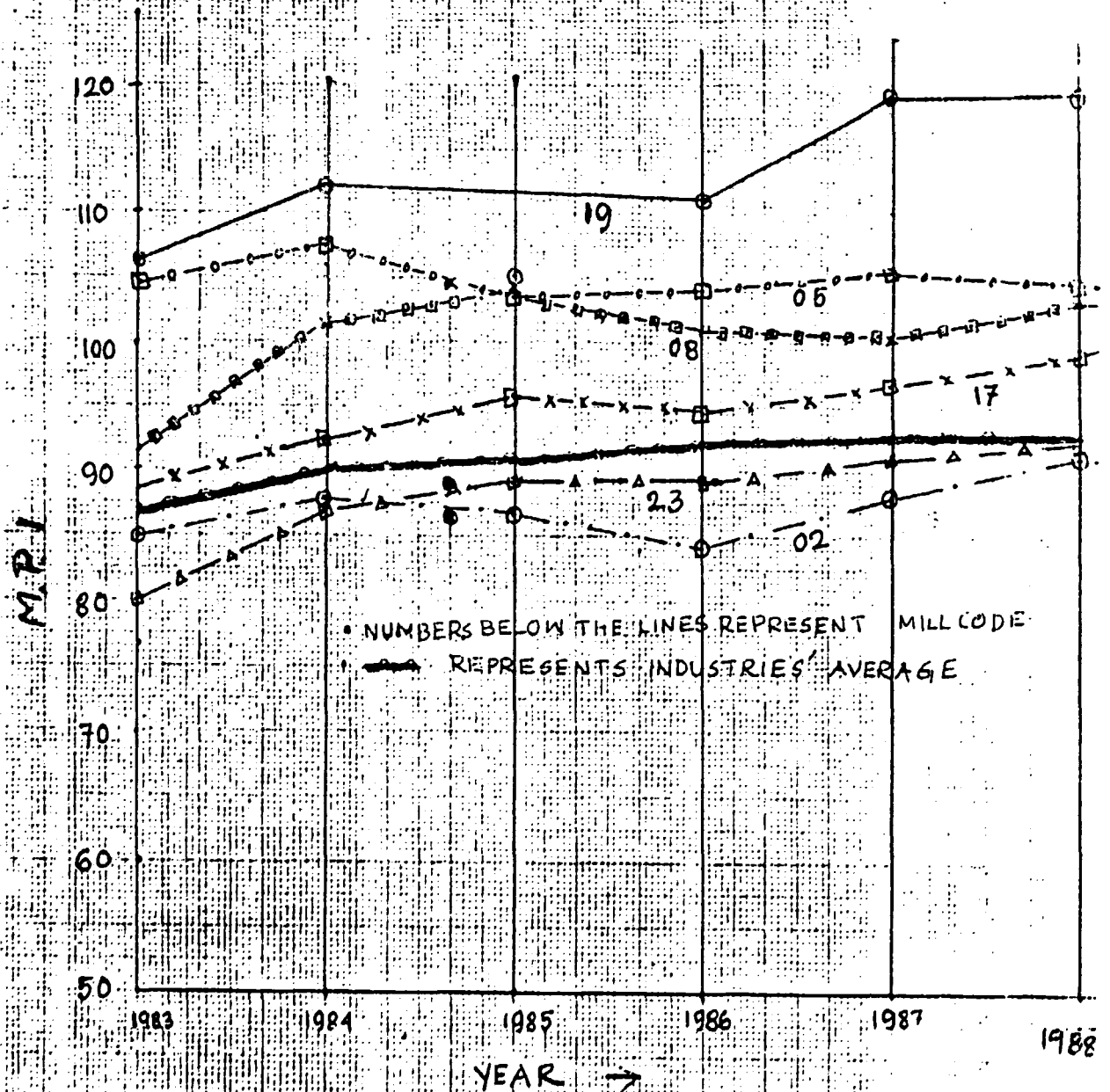
An industrial engineer and a national consultant were appointed on the 18th November 1989; it is expected that they will be available to commence their duties on the 18th December 1989. On the basis of the timetable, which was agreed with IJIRA staff, the operations in the three chosen mills should be established and on course by mid-February 1990. Soon after this (say mid-March) an assessment should be made of how long the selected assignments in each mill will take so that further timetables can be set and monitored frequently. The modifications found to be necessary should be instituted as soon as possible afterwards. The report-back system to cover this period is given in Annexe 7.

Within the timetable of Annexe 6a there is no mention of the weaving IFC and the computerisation of data collection. Mr. S. Palit has already carried out all the preparatory work and development of the necessary techniques and forms so the system is now awaiting application in the mills. On November 17th a suitable Systems man was interviewed in connection with the computerisation aspects and was offered the position; however, he had to give at least three months notice from his present position although Dr. Ranganathan hoped to negotiate an earlier starting date. In view of this, no firm dates could be put on the timetable at the time of this mission. However, it is strongly recommended that as Mr. S. Palit has all the necessary information available, the data collection system for the weaving IFC should be set in motion immediately. The mill

personnel will have to be trained and it is likely that the first units of data collected will be incomplete or possibly inaccurate so that it will probably take three or four months to assemble data worth analysing and ready for the next stage of computerised analysis.

On the general operation of the existing preparation/spinning IFC the norms which were set pragmatically in 1978 and which have never been revised since should, as soon as possible, be replaced or reinforced by industrial-engineering-based targets.

PROGRESSIVE YEARLY PERFORMANCE OF MILLS (BASIS - MPI VALUES)



MAIN MILL PERSONNEL INVOLVED IN DISCUSSIONS

Birla Jute Mills : Mr. D. G. Dadoo, President (Works)
(Private Firm) Mr. V. K. Sharma, Vice-President (Works)
Mr. A. K. Pal, Industrial Engineer
Calcutta Office : Mr. S.K. Ghosh, President

N J M C (Unit: UNION) : Mr. D.K. Dutta, General Manager
(Government Firm) Mr. Mathur, Director (Technical)
Mr. P.K. Ghosh, Manager
Mr. A.K. Mukherjee, Assistant Manager (SQC)

India Jute Mills : Mr. A.K. Ghosh, Chief Executive
(Private Firm) Mr. I.J. Sharma, General Manager (Tech)
Calcutta Office : Mr. B.K. Jalan,
Vice-President (Com.)

New Central Jute Mills : Mr. S.K. Mukherjee, Chief Mill Manager
(Co-operative) Mr. Dasgupta, Manager
Mr. P.K. Mukherjee, Assistant Manager (SQC)
Mr. P.M. Gupta
Calcutta Office : Mr. D. Gupta,
Managing Director

J.K. Jute Mills
(Kanpur Unit) : Mr. R.C. Agarwal, President.
(Private Firm)

AGENDA FOR PRODUCTIVITY DISCUSSION MEETING, FRIDAY 17/11/89

Venue - Bengal Chamber of Commerce
Time - 3 P.M.

1. Introduction by : Dr. S.R. Ranganathan, Director, IJIRA
and National Project Director, UNDP Project

2. Summary of
 - 2.1 Initial IJIRA Productivity work
Inter-Firm Comparison trends since inception
 - 2.2 IJIRA/UNDP Project - Industrial Engineering aspects
 - 2.3 Background of UNDP Industrial Engineering Expert
- by Mr. G.R. Haines

3. Outline of key Industrial Engineering concepts and their application
- by Mr. G.R. Haines

4. Examples of no cost, or low cost and rapid payback, applications of
Industrial Engineering
 - 4.1 From U.K. - by Mr. G.R. Haines
 - 4.2 From IJIRA - by Mr. S. Palit

5. Outline of IJIRA/UNDP Project with reference to Industrial Engineering
aspects.
 - 5.1 Application potential in industry
 - 5.2 Proposed action - methodology and time

Scale of I.E. mill projects and extension of Inter-Firm Comparison
into Weaving

- by Mr. G.R. Haines

6. Discussion Session

Duties of Industrial Engineer

Under the close supervision of IJIRA/UNDP staff but particularly Mr. S. Palit, he will

1. Carry out initial surveys in the chosen mills to assist in determining the proposed courses of action in each and the assistance requirements from mill personnel.
2. Assist in the selection and the training of mill personnel in I.E. techniques as required and supervise their work in the field. An induction session for these personnel will initially be held at IJIRA but the bulk of the training will take place at each mill as the need for each particular technique arises.
3. Be responsible, in the chosen mills, for directing the activities of the assigned mill and IJIRA personnel and giving them precise instructions at all stages on work required.
4. Carry out mill studies as required.
5. Be responsible, in the chosen mills, for monitoring progress and ensuring that the agreed studies and courses of action are vigorously pursued and that schedules are maintained.
6. Collaborate closely with National Consultants in ensuring that each mill management is kept fully informed and up to date on progress in order to secure their maximum co-operation and implementation of recommendations.
7. Keep a daily worksheet of his activities and submit them at the end of each week to Mr. S. Palit.
8. Submit a weekly report on progress at each of the chosen mills, explaining any behind-schedule sections and action being taken to rectify the situation.

Duties of the national consultants

Under the supervision of IJIRA/UNDP staff but particularly of Mr. S. Palit, he will

1. Ensure that the top echelon of management of each of the chosen mills knows week by week of the work being done and progress achieved in order to attain maximum credibility for the project.
2. Collaborate with the Industrial Engineer to ensure that each local mill management of the chosen mills is kept fully informed and up to date on progress in order to secure their maximum co-operation.
3. Urge the adoption and implementation of recommendations made as a result of the I.E. work carried out as soon as possible after completion of each stage and to assist the Industrial Engineer in obtaining this implementation by management.
4. Together with the Industrial Engineer do a Cost/Benefit analysis for each application to support his case for implementation of the suggestions.
5. In the event of particular difficulties arising at any of the chosen mills, assess the situation and make action recommendations to Mr. S. Palit, again in collaboration with the Industrial Engineer.
6. Submit a detailed weekly report to Mr. S. Palit on the visits made during that week.

INITIAL TIMETABLE FOR INDUSTRIAL ENGINEERING PROJECT

WEEK COMM'G		IND ENG	National Consult- ant 3 days/wk	IJIRA Nomi- nees.	Mill PERSL. Mill 1 Mill 2 Mill 3
20/11/89	Letter signed by Dr. Raganathan to 3 chosen mills to obtain their agreement to proposed work and ask for allocation of their staff.				
27/11				(1)	
4/12					
11/12					
18/12	Ind. Eng. starts. Induction into UNDP Project for I.E. and N.C..	X	X		
25/12	Survey of Mill 1 with report and recommendations on line of approach at that mill (2)	X	X		
1/1/90	similarly for Mill 2	X	X		
8/1/90	similarly for Mill 3	X	X		
15/1	Devise the "I.E. Appreciation Course" to be given to the mill and IJIRA Nominees. (3)	X	X		
22/1	Run the "I.E. Appreciation Course". Tidy up any loose ends before mill operations start (4)	X	X	X	X all
29/1	Start operations in Mill 1 (5)	X	X	X	M 1
5/2	Continued Mill 1	X	X	X	M 1
12/1	Start operations in Mill 2 (6)	X	X	X	M 2
19/2	Start operations in Mill 3	X	X	X	M 3
	From this point the I.E., the N.C. and the IJIRA personnel will work between the mills as required in order to continue the training process and to press forward with the work at each mill (7)				

NOTES ON TIMETABLE

1. During this period, the National Consultant Mr. A Choudhury could be assessing the needs of the three mills from the maintenance aspect and giving initial thought to
 - (a) a procedure for re-standardising the machinery and spares.
 - (b) a routine, controlled lubrication system for all machines.
 - (c) specifications for preventive maintenance.

He could also usefully give some thought, as a mill man, to how the IFC figures could be put into a format more easily digestible to mill managers.
2. I suggest Birla as being the best lead-in, as they have a resident I.E. which should help make the first survey easier. I also suggest that the N.C. should spend his 3 days at the mill with the Indian Project I.E. to assist with this work and ensure the correct approach.
3. On his bio-data Mr. Sahoo mentions that he completed a course of "Training for Trainers in Industrial Engineering" so he should have no problems here. For the purpose of this exercise I suggest that a 2 day course at IJIRA would be perfectly adequate as this is an appreciation course (ie. an outline of what I.E. is about) not a full training course.
4. One course only ie. IJIRA and nominees from the three mills all together.
5. Again I would suggest Birla because of the availability of a resident I.E. For this first one only I have suggested a two-week start-up so that any initial snags can be worked out. The aim is to get the project started up at the mill and to start the training/practical experience of the mill and IJIRA personnel.
6. IJIRA people stay with Mill 1. The N.C. divides his time between Mill 1 and Mill 2. The Mill 1 project will obviously carry on with Mill 1 and IJIRA personnel while Mill 2 is being set up, Mill 3 start-up will then be similarly treated.
7. An assessment will then be made, when this stage has been reached, of how long the selected assignments in each mill will take so that progress can be monitored. The overall thrust of the project should also be assessed and any modifications found to be necessary should be instituted as soon as possible.

SUMMARY OF REPORT-BACK SYSTEM

(Also see the notes on the duties of the Industrial Engineer and the National Consultant)

1. The I.E. and N.C. will collaborate closely to ensure that each mill management is kept fully informed and up to date on progress.
2. The I.E. will keep a daily worksheet of his activities and submit them at the end of each week to Mr. S. Palit.
3. The I.E. will submit a weekly report on progress at each of the chosen mills, explaining any behind-schedule sections and the action being taken to rectify the situation.
4. The N.C., as an extension to item 1 above, will ensure that the top echelon of mill management of the chosen mills knows week by week of the work being done and progress achieved in order to attain maximum credibility for the project.
5. The N.C. will submit a weekly report to Mr. S. Palit on the visits made during that week.
6. Mr. S. Palit will submit a weekly summary report to the National Project Director on the week's progress at each mill.
7. A copy of each of the above reports will be maintained in the UNDP Project Offices, filed appropriately and in date order.
8. Mr. S. Palit will submit a monthly summary report to Mr. R. Atkinson who will arrange for transmission of a copy to Mr. G.R. Haines.