WORK TERM – I
REPORT

CARRIED OUT AT :

BALLARPUR INDUSTRIES LIMITED
YAMUNA NAGAR

PREPARED BY

RAJ KUMAR BANSAL

DEPARTMENT OF MECH. & INDUSTRIAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be a University)
PATIALA
1987

A C K N OWL E D G E M E N T S

I wish to express my sincere gratitude to M/s. BALLARPUR INDUSTRIES LIMITED, YAMUNA NAGAR, for having given me the opportunity to work with them in the Work Term-I.

My special thanks Mr. R.R.Vederah (General Manager), Mr. R.L.Mehra (Personnel Manager) and Mr. S.L.Goyal (Sr. Asstt.Personnel Manager - HRD) for providing necessary help in completing the Work-Term.

My sincere thanks to Mr. Pronob Banerjee (Deputy Manager - IE) and Mr. S.K.Goel (JE-IE) for providing technical help in all matters concerned with my projects.

I am greatly indebted to the staff in Pulp Mill-II, Machine House-II, Finishing House-III, Mechanical Workshop and other departments for their Co-operation and interest in my work Term-I.

Raj Kumar 17/8/87.

(RAJ KUMAR BANSAL)

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Mr. S.K.Satsangi,
Head,
Placement and Coordination,
Thapar Institute of Engg. and Tech.,
P A T I A L A - 147 001.

Subject: LETTER OF SUBMITTAL FOR WORK TERM-I REPORT.

Dear Sir,

This is the Work Term-I report prepared by me for the Industrial Engineering Department of Unit Shree Gopal of Ballarpur Industries Limited (BILT).

At Unit Shree Gopal of BILT Paper, Vanaspati Ghee and Lime Stone are the major products.

The Industrial Engineering Department is headed by Mr. Pronob Banerjee and is primarily involved in Manpower Planning and Productivity Monitoring.

This report has been prepared and written by me and has not received any previous academic credit at this or any other any other Institution. I would like to thank Mr. S.K.Goel and Mr.Pronob - Banerjee for their assistance in preparing this document.

Sincerely,

Raj Kumar

(RAJ KUMAR BANSAL),
ROLL NO. 179/84.

Dated: 17-8-87.

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A B S T R A C T

I did my Work Term-I at Ballarpur Industries Limited, Yamuna Nagar from January Ist to June 30th '87. During this Work-Term Five Projects were undertaken.

— BILT was already working on a Project of "Computerisation of Materials Management System". As a part of this I had the assignment of preparing Operational Flow-chart of documents and finding out Man power saving that would be there due to installation of Computer. The complete Project finally resulted in a Man power saving of 11. While working on this Project, to improve the system efficiency formation of an "INVENTORY CELL" and merging of "Engineering Purchase Cell" (EPC) into "Purchase" was also proposed.

— Determination of utilisation of Lathe Machines (16 in all) and their Operators by Work Sampling. On the basis of average number of Lathes running/shift (12), one or two Lathes of similar capacity may be declared surplus. The study shows that man utilisation on heavy Lathes can be improved by using Man-Machine System and Careful Planning.

— Man power Rationalisation and prepration of "Job Write-up" for the workers in Pulp Mill-II and Machine House-II. The study indicated a possibility of saving 5 men/shift.

— Study of Mechanisation of counting operation and packing of copier reams. Setting productivity norms for cutting and packing of Copier paper. Whereas Mechanisation of counting operation proved to be a financially non-viable proposition, the remaining were conducted satisfactorily.

— I was also associated with routine activities like Productivity Monitoring, Labour Engagement Reporting and short period studies referred to the I.E. Department.

INTRODUCTION TO BILT

INTRODUCTION TO BILT

Ballarpur Industries Limited, popularly known as BILT, is the flagship of coveted Thapar Group with a turn-over of around Rs.300 Crores and with a manpower resource of around 10,000 people, BILT enjoys a reputation of being "efficiently managed", "financially sound" and a self sufficient company. From the dreams way back to 1922 when Late Lala Karam Chand Thapar, Founder father of the Thapar Group, started his career as a Coal Agent, Today's realities of a big empire "Thapar Group" comprises of four Groups which rank prominently in the Country; first BALLARPUR the core group with wide ranging interests both in India and Overseas; then the GREAVES COTTON Engineering Group with its 11 sub-sidiaries and Associate Companies; CROMPTON GREAVES a major landmark on the Electrical and Electronics Landscape of the sub-continent the finally JAGATJIT COTTON TEXTILES with products venturing out from traditional cotton to superior synthetics and now even fibre. Diversification is embodied in a staring of Industries. The Group today handles with equal competence activities as diverse as Paper Making Heavy Chemicals, Textiles, Glassware, Fibres, Sophisticated Engineering and Mining, Sugar, Shipping, Banking, Vanaspati and Refined Oils on Indian Soil and Across International Boundaries. The latest of their ventures is promotion of NODE (Northern Digital Exchanges Ltd.) in conjunction with PSIDC. The plant is situated at Mohali near Chandigarh; the production is expected to start in July '87. NODE has been opened in collaboration with OKI Ltd., Japan.

BILT is necessarily known by paper, their major product. Amongst the numerous qualities of paper SUNLIT BOND and SUNLIT SUPERSHINE are the most popular. Now, Copier Paper a BILT product of UNIT SHREE GOPAL at Yamuna-Nagar is gaining soaring popularity in National Market.

Contd...

Unit Shree Gopal of BILT located at Yamunanagar. has the history of continued growth and all round development. When taken over by THAPARS in November, 1936, it was a small and sick enterprise. A chapter of rebuilding and expanding the Mill started soon thereafter which has continued till today. With this process of rebuilding, expanding, diversifying and following the tradition of maintaining excellent industrial relations, the Unit is poised for achieving much more in terms of increased output, greater efficiencies in inputs consumption and rendering a better and prompt service to the Customers. As the Industrial activity is stepped up, so also the community welfare and development programme. The present activities at the Unit will offer opportunities for greater achievements for its employees and their prosperity in general.

Unit Shree Gopal has a working force of about 4500 people, out of which about 600 are management and clerical staff. The Unit runs in A, B, C and General Shift with a maximum shift interferance of 2000 people.

Initially SHREE GOPAL had only two paper machines with other auxiliary plants and equipments producing 24 tonnes of paper per day. In 1953, one more second-hand paper machine was installed as no. 3 machine with a stock preparation plant and other auxiliaries, followed by a major renovation of paper Machine No.1 and 3 in 1957. In this year itself, major expansion of the whole Mill-was planned to increase the capacity by 70-80 TPD to 120 TPD and in the process the fourth machine with a capacity of 60-75 TPD, two steam Boilers, one Turbo-Generating Set, two pulp Streets, Causticising Plant, Recovery Furnace etc were installed, keeping in line with its diversification activities, the Unit got a captive caustic Soda/Chlorine Plant in 1973, with a capacity of 35 TPD. In the year 1974, a coating Plant was another important event of significance. However, latest and important additions to the Unit have been second Coating plant, three Speciality paper Machines

for the manufacture of Sunlit Super Printing, Sunlit Superfine Copier Paper, Sunshine Super Cartridge, Chart printing Tetrapack Base Paper, for packing milk and juice, Airmail, Base paper for one-time Carbon and carbonising Tissue, M.F. Tissue, Cigarette Tissue, Superfine Grease-proof, Superfine Glassine, Cable insulation etc.

Shree Gopal suffered great setbacks in not being able to commission these machines on account of acute power shortage in the state of Haryana. To overcome the problem, a 5.4 MW Diesel Generating set at a cost of Rs.2.5 Crore has been imported from Japan which is presently working on HPS and LDO. With this the expanded plant is now working smoothly.

The vanaspati Plant which was set up in 1948, with a capacity of just 10 TPD has been expanded to 100 TPD in 1973-74. Besides lately the Vanaspati Division has added to its cap 100% PURE MAIZE CORN OIL "CORNOLA" which is a healthy cooking medium with distinguishing qualities such as high percentage of poly unsaturated fatty acid which is good for heart rich in Vitamin 'E'.

Unit Shree Gopal has always been concerned about the three 'E' sviz. Energy, Environment and ECology which are major areas of concern for any Pulp & Paper Industry. Effective steps have been taken to improve the quality of Air and Water. The company has installed an effluent Treatment Plant at a total capital outlay of Rs.2 Crore which is being formally commissioned in mid March, 1986. Besides, the Company has planted over 1,80,000 Eucalyptus trees in its own land of about 134 acres at Hundewala (Jagadhri) apart from contributing in the Social Forestry scheme of the Government of Haryana. Further more, the Company has already placed an order for a modern Recovery Boiler with Electrical precipitators to help improve the Air quality; and has been consuming non-conventional fibrous raw materials like grasses, wheatstraw, bagasse etc. In substantial quantities to reduce dependence on wood and taken up as a long term goal to find alternative sources of energy and reduce consumption of energy during manufacture of paper.

PROFILE OF UNIT SHREE GOPAL

1936	The then Punjab Pulp and Paper Mills initially promoted by an English Company known as Foundation Co. of England taken over by Late Lala Karam Chand Thapar on its lequidation.
1948	Vanaspati Plant with initial capacity of 10 TPD set up.
1953	IIIrd Paper Machine installed.
1957	4th Paper Machine installed production capacity increased to 120 TPD
1973	Caustic soda Chlorine Plant installed.
1974	Coating Plant commissioned.
1974	Production capctity of Vanaspati Plant expanded to 100 TPD.
1983	Three speciality Paper Machines installed.
1984	100% pure Maize Corn Oil Product with brand name "Cornola" added in Vanaspati Products.
1984	New Caustic Soda Chlorine Plant commissioned- Production capacity of Chemicals increased.
1985	New Coating Plant Commissioned and production capacity increased.
1985	5.4 MV Diesel Generating set commissioned.

BALLARPUR INDUSTRIES LIMITED

	FACTORIES :
PAPER DIVISION	
Paper Mills	Unit - Shree Gopal, PO Yamuna Nagar Distt. Ambala.
	Unit - Ballarpur, PO Ballarpur Distt. Chandrapur.
Coating Plant	Unit - Shree Gopal PO Yamunanagar Distt. Ambala.
Stationery Works	Unit - Shree Gopal, PO Yamuna Nagar Distt. Ambala.
	Unit - Ballarpur, PO Ballarpur Distt. Chandrapur.
CHEMICAL DIVISION	
Caustic Soda/chlorine	Unit - Karwar, PO Binaga, Karwar Distt. North Kanara.
	Unit - Shree Gopal, PO Yamunanagar, Distt. Ambala.
	Unit - Ballarpur, PO Ballarpur Distt. Chandrapur.
Phosphoric Acid	Unit - Karwar, PO Binaga Karwar Distt. North Kanara.
STPP	Unit - Karwar PO Binaga, Karwar Distt. North Kanara.
Bromine/Bromide Plant	Unit - Singach Salt Works, PO Singach Distt. Jamnagar.
Salt Works	Unit- Singach Salt Works, PO Singach Distt. Jamnagar.
	Unit - Gokarna Salt Works, PO Madangiri, Distt.North Kanara.
VANASPATI DIVISION	Unit - SG Vegetable Products, PO Yamuna Nagar, Distt.Ambala.
	Unit - SG Can Factory, PO Yamunanagar Distt. Ambala.
SHIPPING DIVISION	C/o. - Hede Consultancy Co Pvt Ltd., Nirmal Building, 16th Floor, Nariman Point, Bombay-400 021.

SUBSIDIARIES :

English Indian Clays Ltd., KP 11/461 Veli, Trivandrum - 695 021.

Jg Glass Ltd., Pimpri, Pune - 411 018.

Jg Moulds Ltd., Pimpri, Pune -411 018

Janpath Investments and Holding Ltd., 25, Brabourne Road, Calcutta -700 001.

Nilkash Investments & Holding Ltd., 25, Brabourne Road, Calcutta-700 001.

OVERSEAS PROJECTS :

1. Phoenix Pulp & Paper Company Ltd., Thailand.
2. Ballarpur (Glass) Nigeria Ltd., Nigeria.
3. P.T. Saraswati Bhakti Coated Papers, Indonesia.
4. Ballarpur Palm Oil Sdn Bhd, Malaysia.
5. BILT Middle East Pvt Ltd., Dubai.
6. Hotel Project, Seychelles.

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COMPUTERISATION OF MATERIALS MANAGEMENT SYSTEM

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OBJECTIVES

1) To study the existing flow of work, make changes/ modifications to avoid duplication and arrive at the desired work system. This in the form of a flow chart is also expected to help system software development.

2) To determine volume of documents would be held by the computer so that appropriate hardware is arranged for installation.

3) To do a work study of individuals in various departments(involved in Materials Management System) thus arrive at the man-power saving figure of individual departments.

4) To workout cost effectiveness of the computerised system and present a view about overall increase in efficiency of the Materials Management System.

5) To identify the areas that can be brought into the ambit of Materials Management System (computerised) and estimate the saving that can arise thereof.

DEPARTMENTS IN WHICH STUDY WAS CARRIED AND WHOSE WORKLOAD (PARTLY) IS PROPOSED TO BE TRANSFERRED TO COMPUTER/

1) Purchase and Engg Purchase Cell
2) Accounts
3) Costing
4) Stores
5) Traffic
6) SGVP (Comm.)

23/6/87

INTRODUCTION

In any organisation men, materials and energy, money and machinery are the major inputs. Efficient management of these inputs alongwith lucid understanding of organisational goals, leads an organisation to excellence. Materials constitute - to __% of the total operating cost of paper industry and in many cases tend to account for increasing proportion of product cost. Also, problems encountered in connection with materials tend to be come more difficult and more numerous than was previously the case. It is therefore, imperative to efficiently manage the materials for which management needs to focus more attention, more time and talent on the subject, which in turn will help to achieve organisational goals which may be Maximum Profit, Minimum Cost, Social Welfare or all.

The term "materials" is used in a general sense and refers to whole range of goods and services which are purchased or otherwise procured from outside source, and are used or processed or distributed in order to provide finished products for sale. Such materials are often finished products of other producers. In this general sense the specialised services as well as raw materials, component parts processed and semi manufactured materials and merchandise for resale are also included. Everything in fact which a trading resources, its financial resources and its plant and equipment in order to produce its market offering, can be seen materials in this sense.

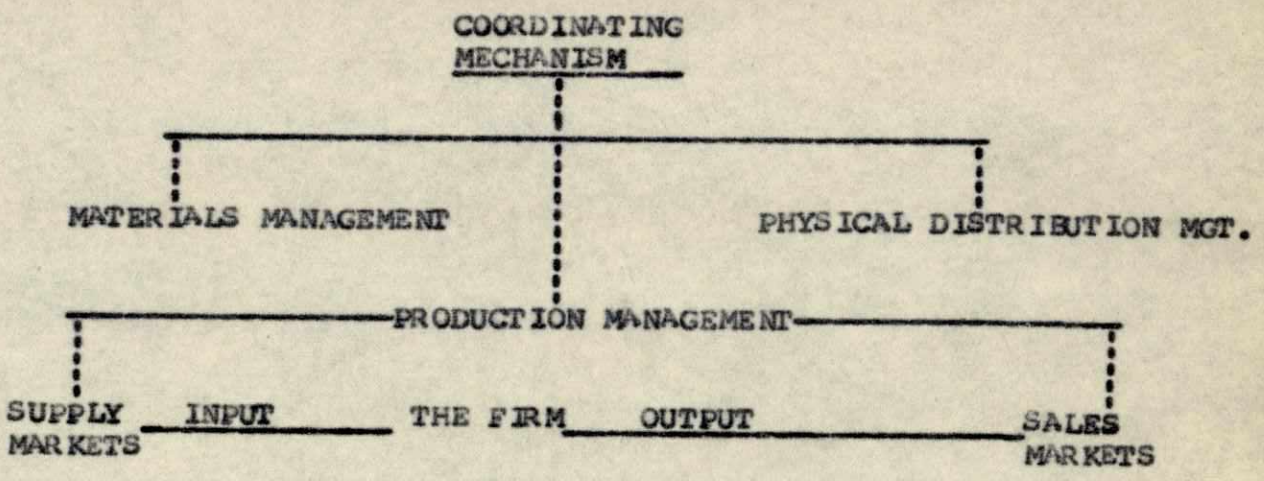
In brief the aim of this system is timely procurement of materials to avoid stock outs and thus loss in production.

The need is to ensure supply of materials not necessarily at lower cost but more profitably. When this involves coordination of purchasing with non-materials related activities such as finance or marketing, and when potential contribution of purchasing

.....2/-

is substantial, then perhaps purchasing should not be included in the materials management structure but should stand alone. When the main problem is to coordinate the materials related activities, the purchasing should be part of the Materials Management System. Coordination between functional specialities is really what material management is about.

Conceptually the relationship between Materials Management and remainder of the system may be illustrated as in figure below:



Logistics/Materials Admn.

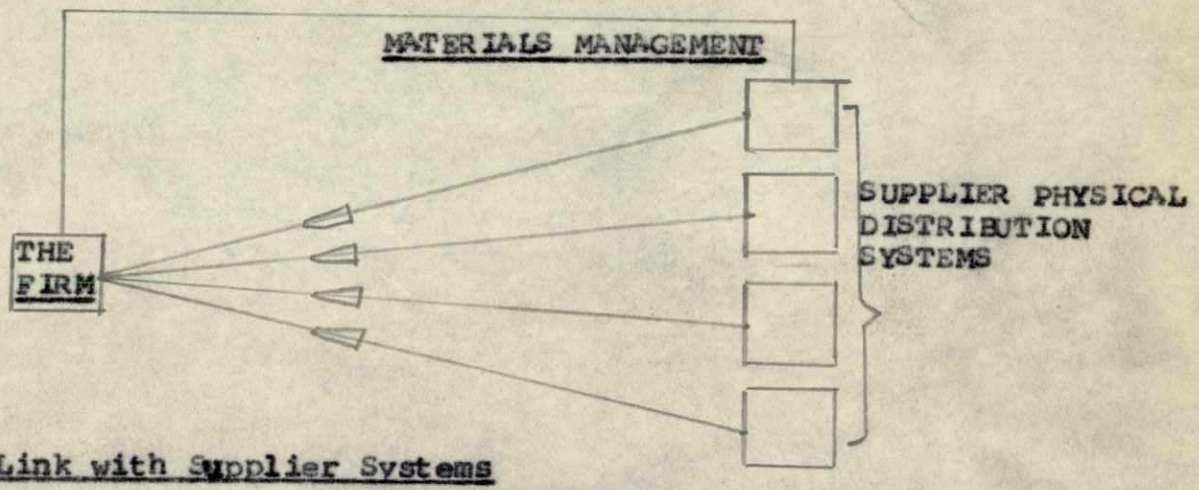
The scope of materials management in this view embraces the management of flow of materials from supply into the firm. It may be defined as:

It is a concept concerned with the management of the flow of materials into an organisation to the point where these materials are converted into firm's end product(s). Responsibilities include collaboration with designer (those who raise requisition) on material component specifications, purchasing - which includes the search for and location of, suitable source of supply, incoming traffic, goods receiving and inspection, supplier quality control, inventory control (raw material and components and possibly work in progress) and material control. In some cases internal material handling might be included.

Clearly, if a system approach has not been adopted, the various functions which are embraced by the definition would generally be seen as separate departments e.g. Receipt Section of Stores Deptt.

As with all system approaches, the main thrust of materials management system is to avoid sub-optimisation; to look for system efficiency and effectiveness; and to help achieve common objectives rather than those which apply to elements within the system, which may be competing one with another. In addition it should be concerned with 'Supply Marketing' which implies an orientation towards the environment within which the firm operates as a buyer.

This latter part of the task may be seen as linking mechanism with the many physical distribution systems with which it is in contact. This is suggested by figure below as regards efficiency and effectiveness:



The Link with Supplier Systems

Materials Management provides concise delegation of responsibility and authority eliminating the possibility that depts may have overlapping responsibilities. In so doing it recognises the importance of management principle of accountability by providing a Materials Manager who is responsible for all aspects of Material decision - a condition lacking is conventional organisation. The materials Manager, placed in a position to exercise direct control

....4/-

overall material functions, can maintain the necessary overview and can assure that needed balance of functions is achieved.

He goes on to argue that this balancing of functions results from two subsidary objectives of materials management. The first of these is "To coordinate the materials function into a total system, in which the whole is greater than sum of parts". The 2nd objective is "To provide a communication network among the several material functions that provides a quick, accurate and a comprehensive transfer of data, regarding demands occuring anywhere along the system".

The list of benefits which firms believed they had realised from adopting materials management approach, includes elimination of buck passing; better inter departmental cooperation; lower prices for materials and equipment; minimise stockouts; faster inventory turnover; continuity of supply; reduced material lead times; reduced transportation cost; less duplication of effort; better morale; development of personnel; reduced materials obsolescence, improved supplier relationship and better records and information.

At Unit Shree Gopal there are about 22,000 number of items which are classified as follows :-

1. BERT classification

   B - Block items which are lying/procured against capital jobs.

   E - Items of essential but not of regular nature.

   R - Items whose consumption if quite Regular e.g. Chemicals etc.

   T - Temporary items. These represent one time requirement and have tobe used within a specified period.

2. ABC classification of Regular items.

   A - Items having annual consumption above Rs.6000/-

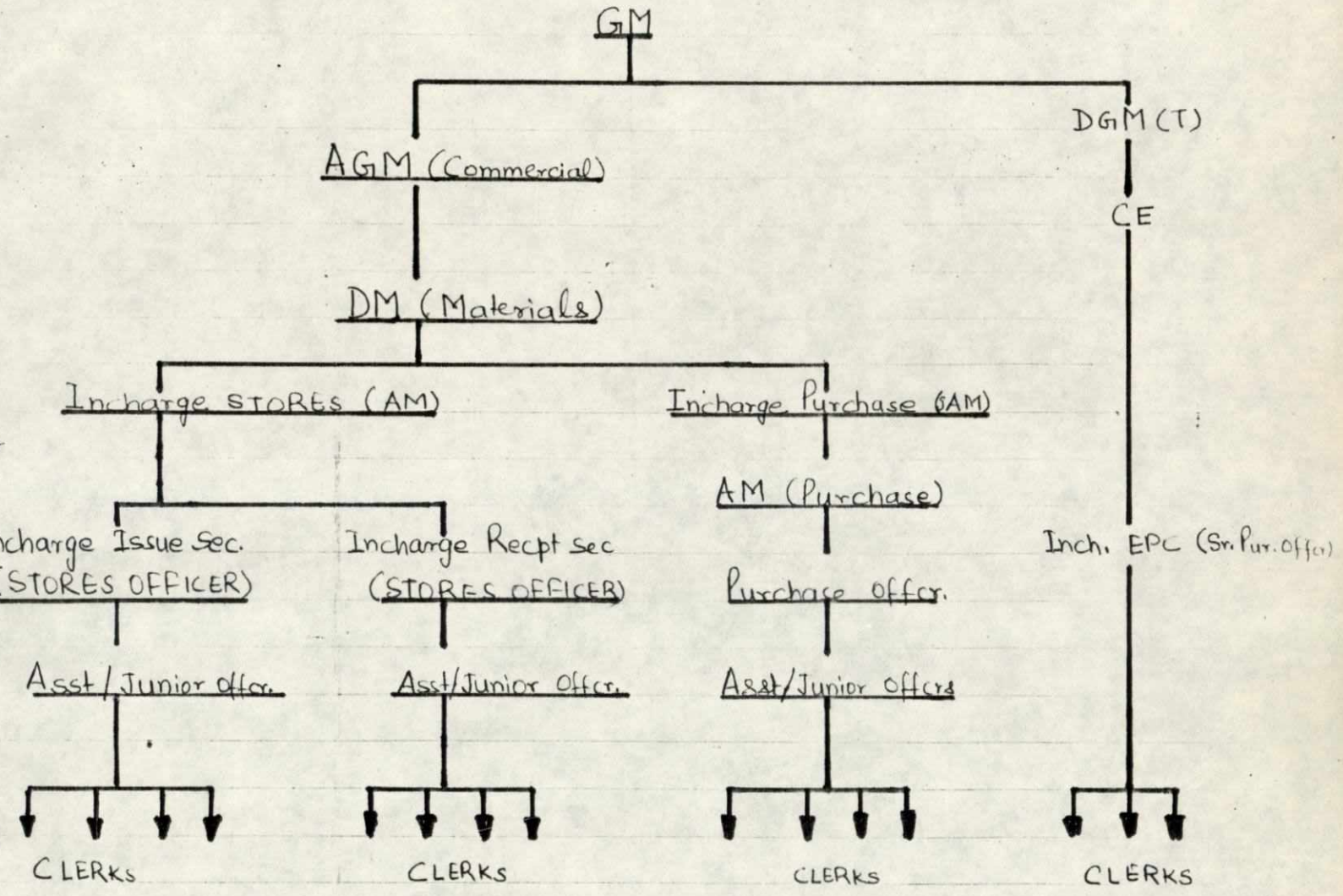
   B - Items having annual consumption between 2500/- & 6000/-.

   C - Items having annual consumption below Rs.2500/-.

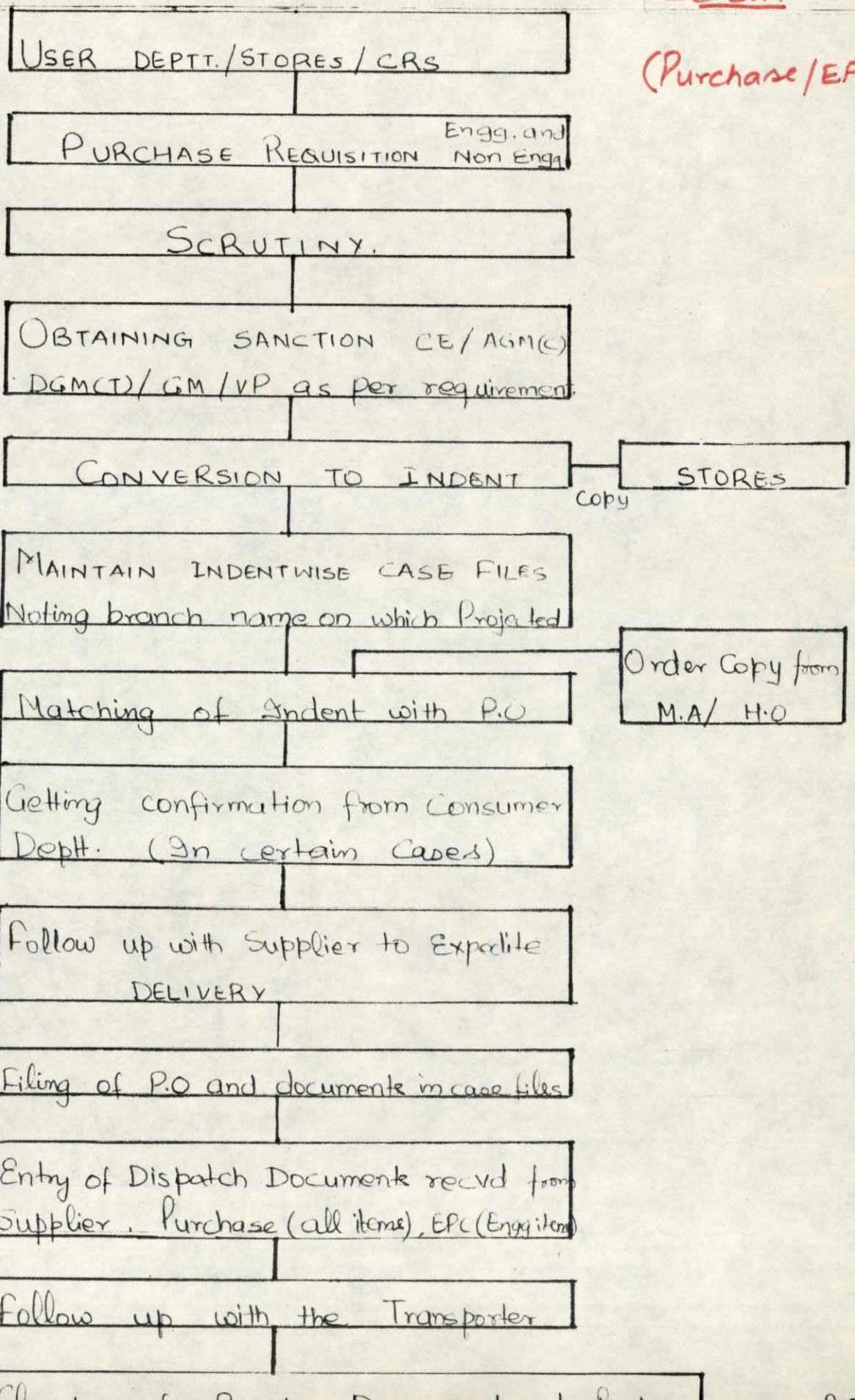
About 10 % of R-items are procured through Computer Requisition System (CRS). These items do not have much frequent changes in specifications and are not of critical nature.

3. All the items (Engg., Chemicals, Paper tec.) are divided into various Groups which were basically done under Computer codification. However, this serialwise codification of items makes it easy to locate items of one particular type. The division at Unit ShreeGopal into various groups and their description is attached in (Annexure _____).

ganisation Chart of Materials Management System at Unit Shree Gopal.



Present Work System - In the form of a flow - Chart



(STORES)*

DESPATCH DOCUMENTS TO STORES via Traffic and Accounts.

INDENT → STORES ← Order from M.A/H.O

STORES → ENTER INDENTS IN LEDGER FOLIOS

ENTER INDENTS IN LEDGER FOLIOS → FILING of P.O and INDENT

Material from outside Party → STORES ← BILLS FROM OUTSIDE PARTY

STORES → FILING of BILLS IN ADVANCE

STORES → INFORM "TRAFFIC" FOR • LODGING CLAIM IF ANY

STORES → Verify contents and issue acknowledgement

STORES → Prepare D3 for Central Excise.

Verify contents and issue acknowledgement → ENTRY IN MASTER CONTROL REG.

Prepare D3 for Central Excise. → ENTRY IN RG 23

ENTRY IN MASTER CONTROL REG. → STAMPING challans and put Sr. No

STAMPING challans and put Sr. No → Entry in Recpt Register

Entry in Recpt Register → Put RR Sr. No. on all copies of challan and other Documents.

Put RR Sr. No. on all copies of challan and other Documents. → Compare Receipts with P.O/INDENT

(STORES)*

OFFER MATERIAL FOR INSPECTION

Write Supplier's Code, BERT and the User Deptt name on challan

HAND OVER MATERIAL AND DOCUMENTS TO ISSUE SECTION

ENTER DOCUMENTS IN Recpt Book

CHECK MATLS WITH DOCUMENTS

PLACE MATL IN BIN AND MAKE BIN CARD ENTRY

Prepration of KRs (6 copies)

CHECKING BY Supervisor

Post KR in ledger. Balancing and adjust pending order

ENTER "T" items in Register

Prepare IKR for Total/Partial Rejection of Material

ENTRY IN REJECTION REGISTER AND SEND IKR TO "Purchase"

Arrange packing of Matls

Make outward Gate pass

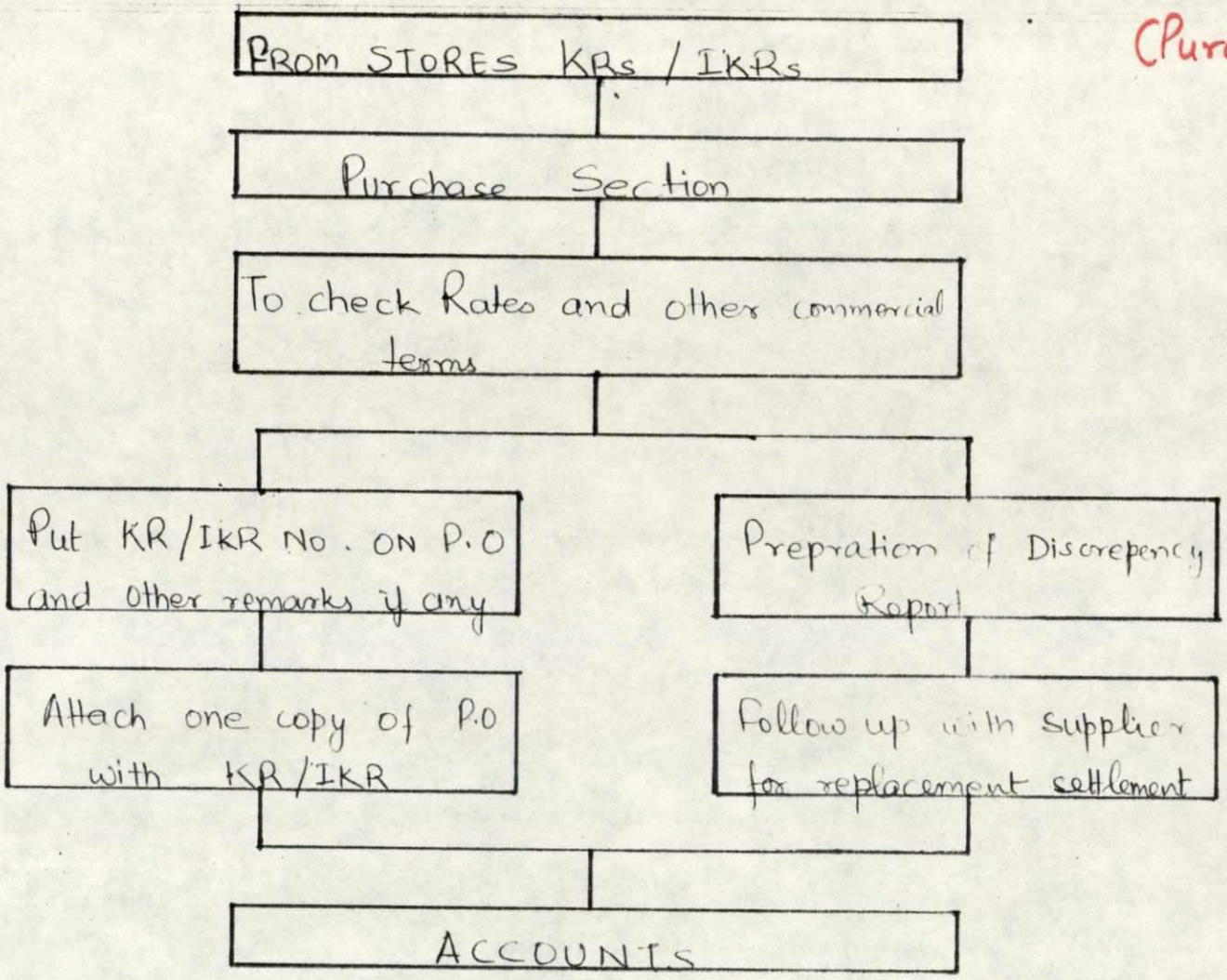
Prepare Periodic Rejection statement for Purchase

FILE — 1 copy — DISTRIBUTION OF KRs and IKRs — 3 copies — PURCHASE SECTION

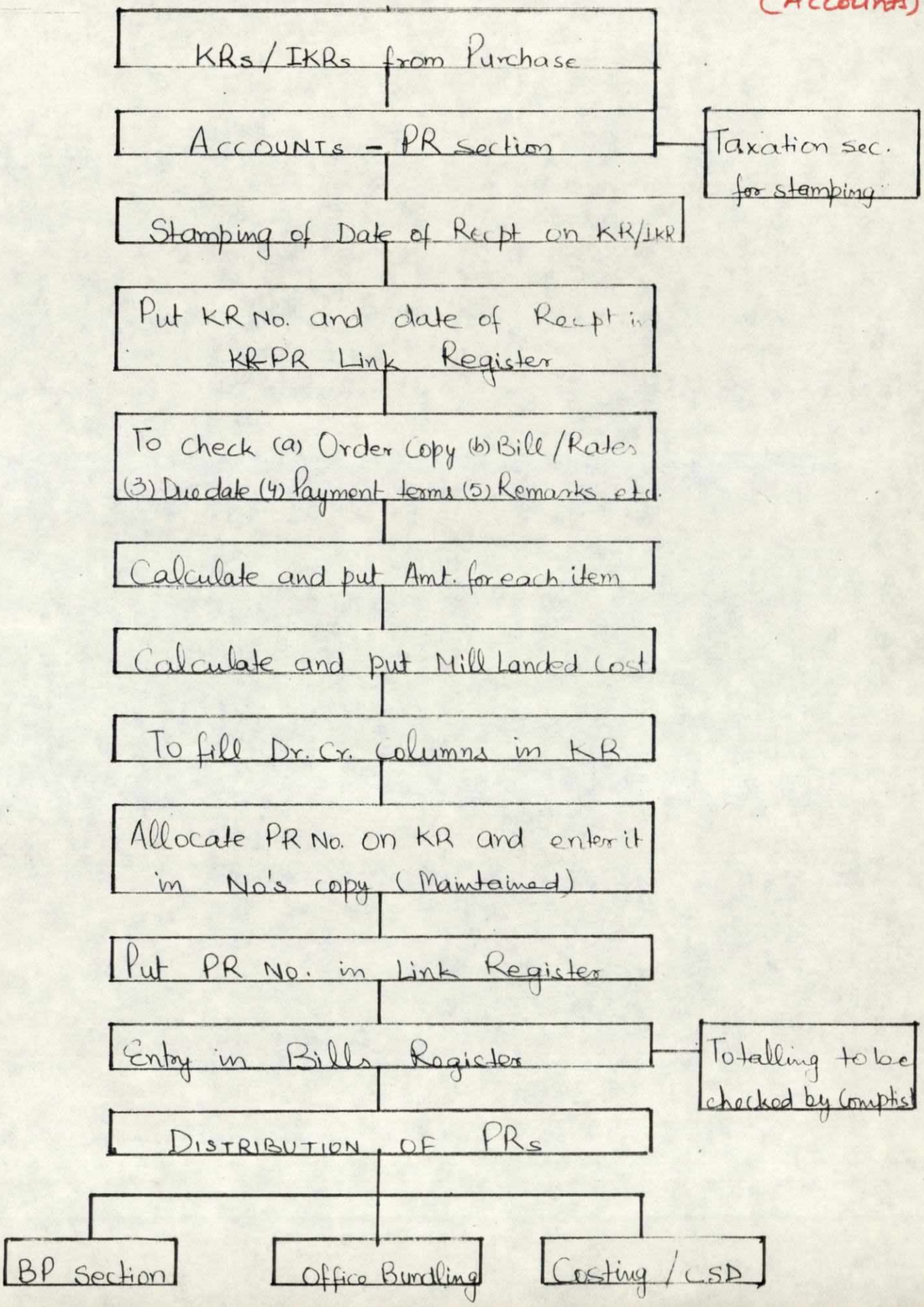
To Engg Cell

To Costing/CSD

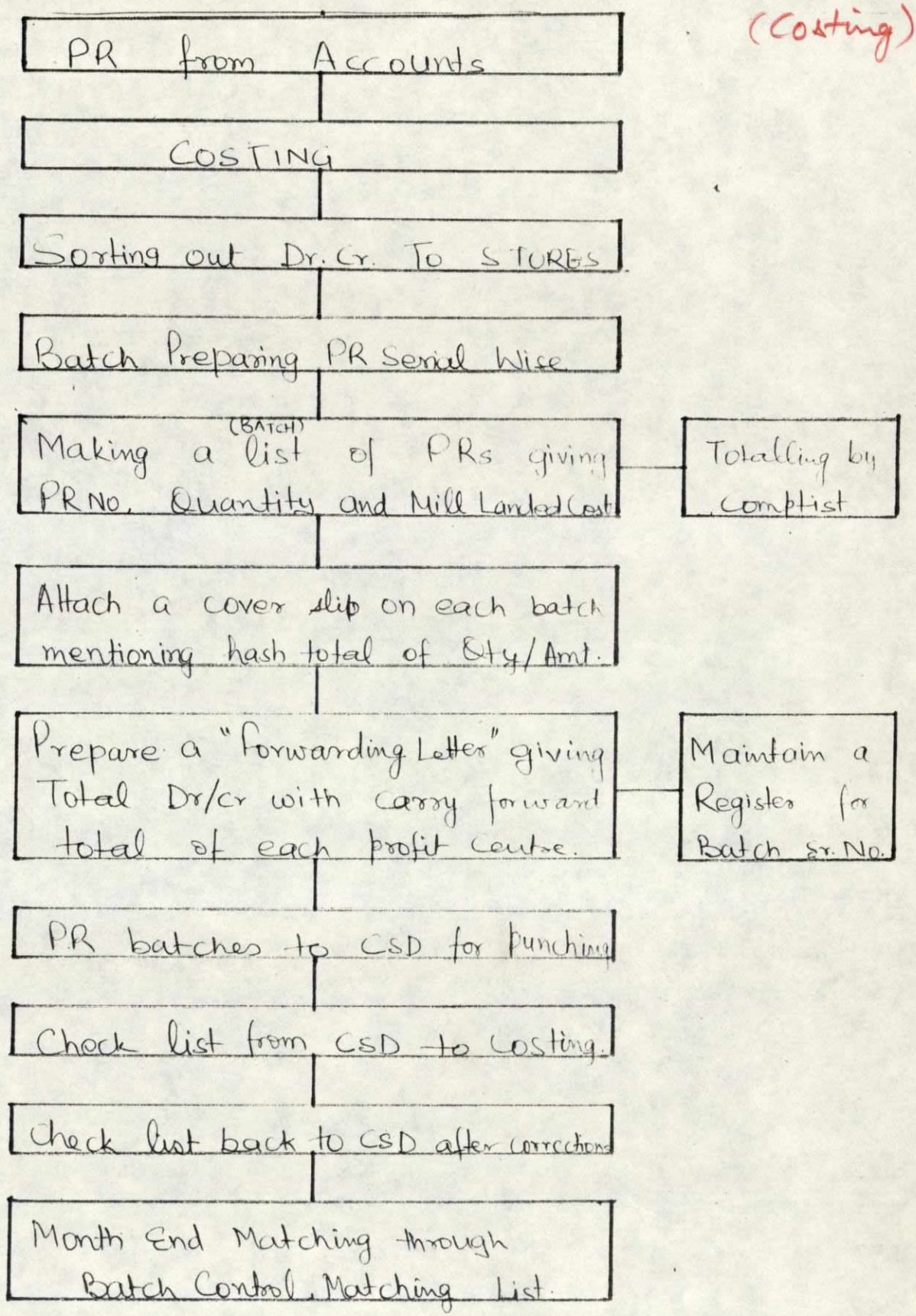
(Purchase)*


FROM STORES KRs / IKRs
Purchase Section
To check Rates and other commercial terms
Put KR/IKR No. ON P.O and Other remarks if any
Attach one copy of P.O with KR/IKR
Prepration of Discrepency Report
Follow up with Supplier for replacement settlement
ACCOUNTS

(Accounts)*


KRs / IKRs from Purchase
ACCOUNTS - PR section
Taxation sec. for stamping
Stamping of Date of Recpt on KR/IKR
Put KR No. and date of Recpt in KR-PR Link Register
To check (a) Order Copy (b) Bill / Rates (3) Due date (4) Payment terms (5) Remarks etc.
Calculate and put Amt. for each item
Calculate and put Mill Landed Cost
To fill Dr. Cr. Columns in KR
Allocate PR No. on KR and enter it in No's copy (Maintained)
Put PR No. in Link Register
Entry in Bills Register
Totalling to be checked by Comptst
DISTRIBUTION OF PRs
BP Section
Office Bundling
Costing / CSD

(Costing)*

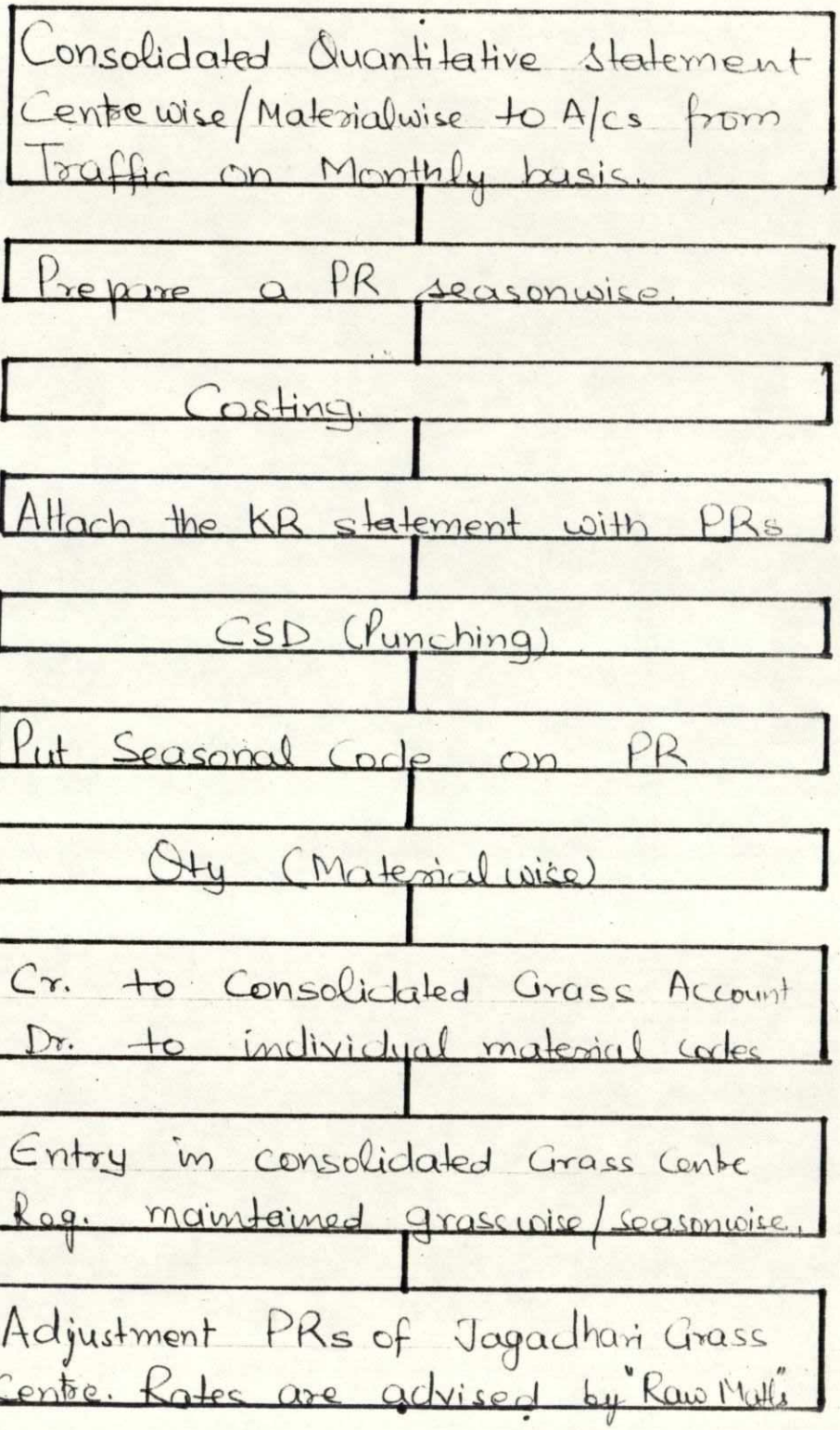


* The bracketted name shows the department in which work is being done on the documents.

Details of Documents in Accounts Dept → In the form of a flow-chart

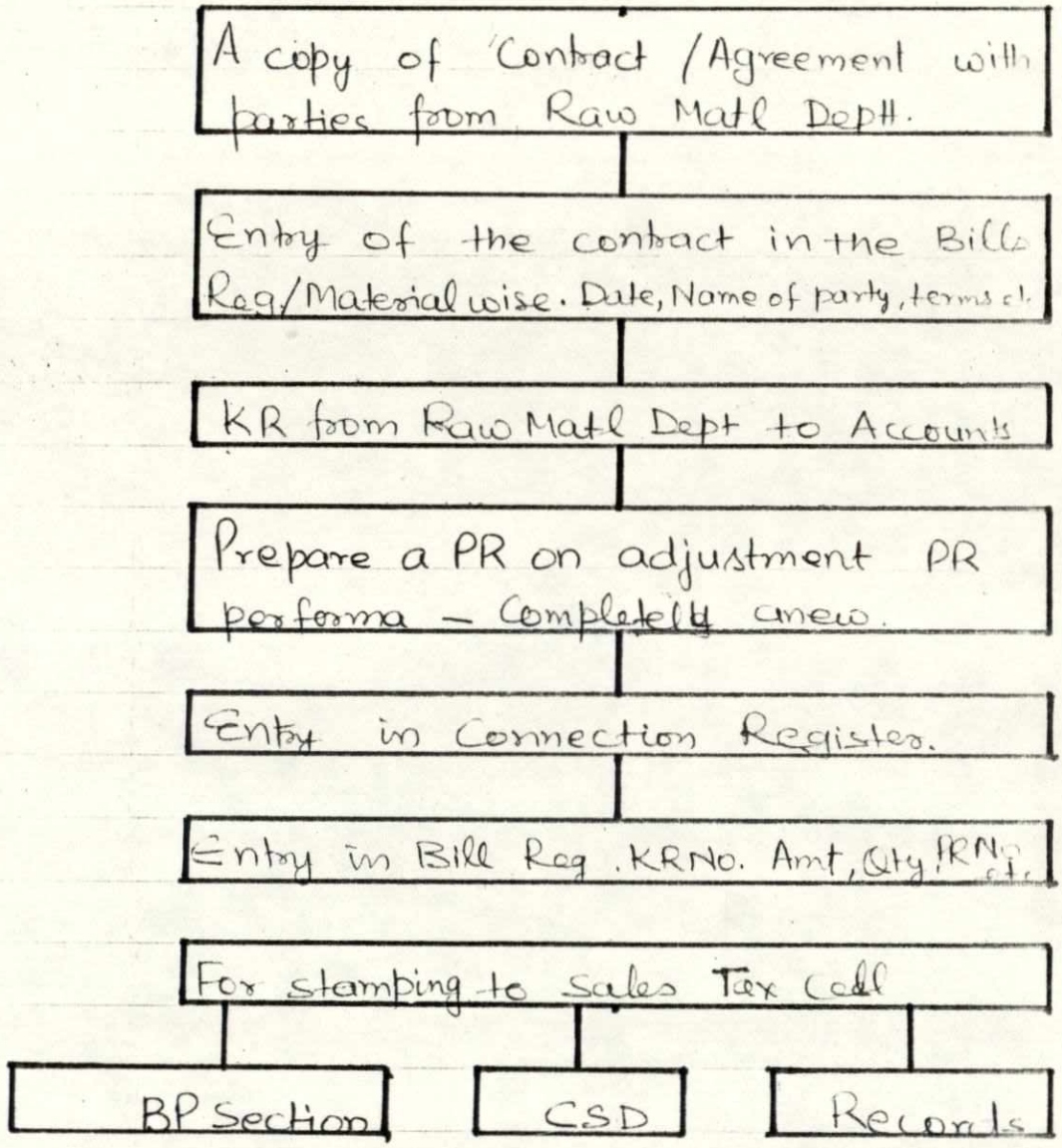
Raw Material PRs

For Grass Centres – These are credited to consolidated Grass Account.



A Quaterly statement showing total raw matl recvd (commu.) /seasonwise to costing by A/cs. Costing advises for discrepencies.

Raw Material PRs (Other Parties)



Incentives – At the end of the contract or as agreed upon, an adjustment PR for incentive Amount as advised by Raw Material Department.

Reconcillation of Party A/c

A list from Raw Matl Department to A/cs and they tally it with their records. Corrections if any are intimated to BP Section. List contains Qty Recvd, Amt paid, Amt payable etc.

Imported Raw Materials

KR from STORES Thru Purchase

Entry in Impt. Raw Matl Reg.

Rates are provisional as advised by Purchase.

By Rail

By Truck

Put freight amount in PR (from Frieght Register) / RR Serialwise available on KR

Frieght is paid in the Mills. Entry in Frieght Register. A PR at monthend.

Provide provisonally for the clearing charges of the shipment.

Reversle and adjustment (if difference) for frieght and clearing charges on Recpt of the Bill of the shipment charges

On recpt of Debit Note from H.O towards Cost, reversal of entry and necessary adjustments are made.

Adjustment of Octroi for Matl by Rail –

Note the Octroi in Frieght Reg. and Prepare a month end PR.

Mills Own Truck Frieght PRs

A monthly statement from Transport Dept / Truckwise for Kms to A/c &

Prepare a statement showing kms covered during the month for different A/c heads / Truckwise.

To prepare a Journal Voucher for debiting to each A/c head and cr. Recovery agnst use of Mill trucks

To prepare correspondant Journal Voucher for each A/c head. Cr. Paper Mills Dr. A/c head.

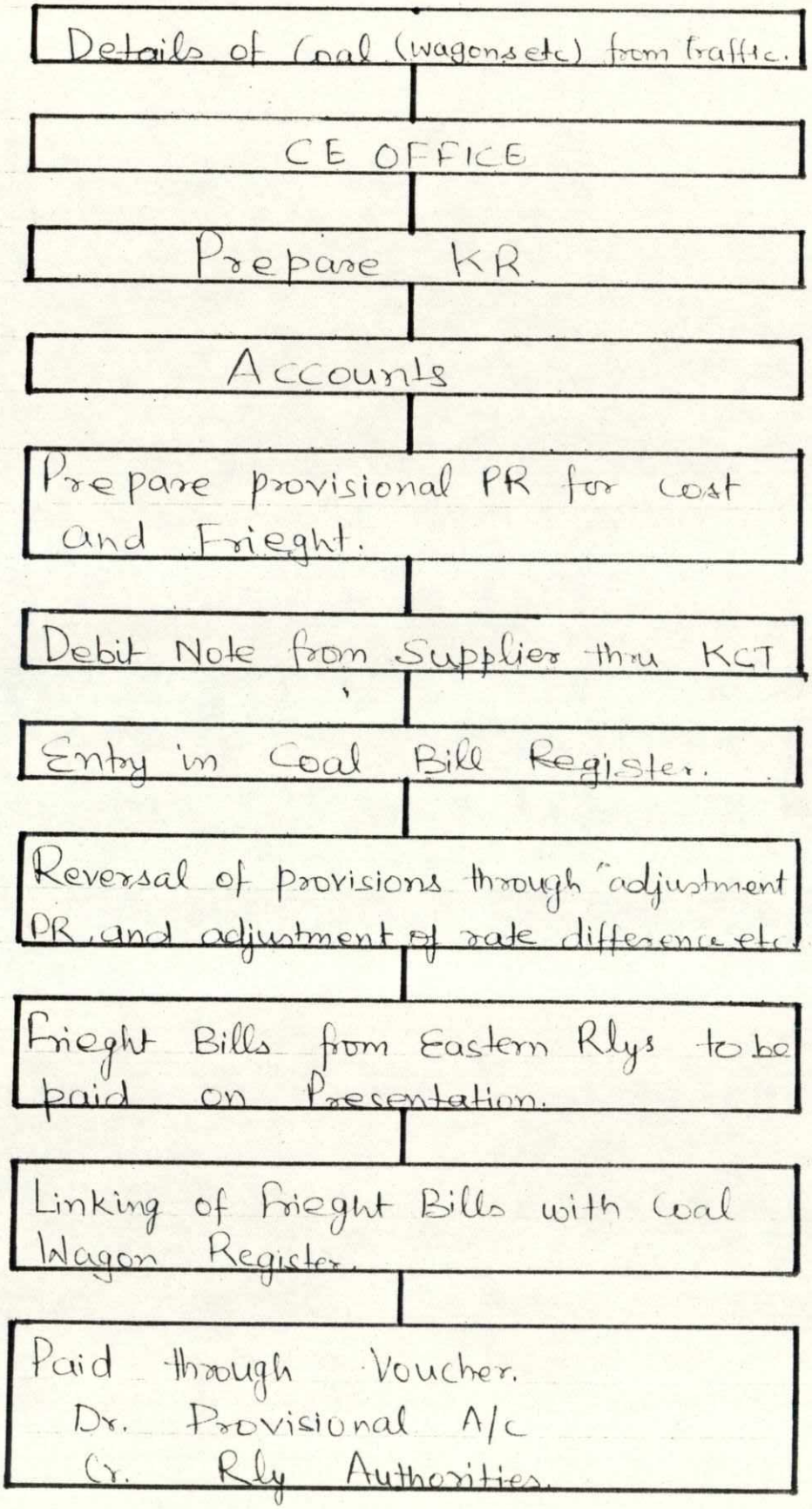
Debit Notes to Grass Centres / monthly for adjustment of Mills own Truck freight.

Differences if any in the above, are adjustments are done by a Voucher and Dr. Cr Note

Statement for Paper Delat Waste Paper Del is made every month / truckwise.

A voucher is prepared Dr. Party Cr. Recovery Agnst Use of Mills own truck

Coal PRs


Details of Coal (wagons etc) from traffic.
CE OFFICE
Prepare KR
Accounts
Prepare provisional PR for cost and Frieght.
Debit Note from Supplier thru KCT
Entry in Coal Bill Register.
Reversal of provisions through "adjustment PR, and adjustment of rate difference etc
Frieght Bills from Eastern Rlys to be paid on Presentation.
Linking of Frieght Bills with Coal Wagon Register.
Paid through Voucher.
Dr. Provisional A/c
Cr. Rly Authorities.

Adjustment PRs relating to Debit / Credit notes from Head Office / Sister Concerns.

An adjustment PR is made whenever a debit / Credit note from H.O / Sister Concerns is received after approval of the concerned department. The situation may arise when

a) Half / Part of one concern's consignment is recvd by other concern.
b) Purchase is made through H.O or H.O pays on behalf of the concern. etc.

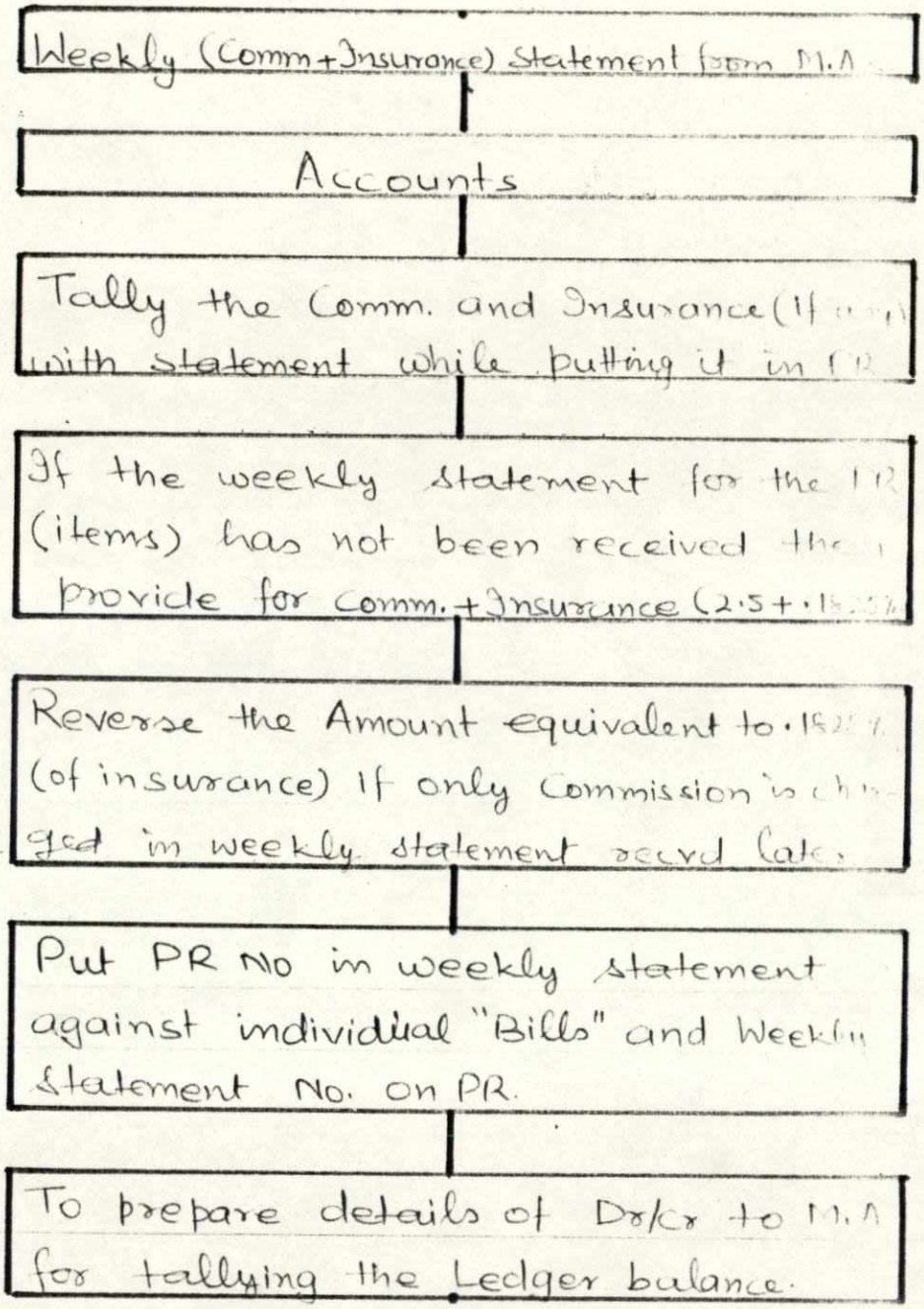
Closing Schedules (Year End)

1. Stores on loan returnable account.
2. Stores material under Inspection
3. Stores material under Transit.
4. Raw Material in Transit
5. Unexpected Orders against Capital Jobs
6. Imported Material.

Other Closing Schedules.

1. Rly Claim Suspense A/c (Quaterly)
2. Insurance claim Suspense A/c (Quaterly)
3. Provision for unpaid goods (bills)
4. Unconnected Wagons
5. Sundry Creditors Claim Account
6. Railway Coal Freight Account.
7. Material in Transit — Coal.

Reconciliation M.A Comm. All branches

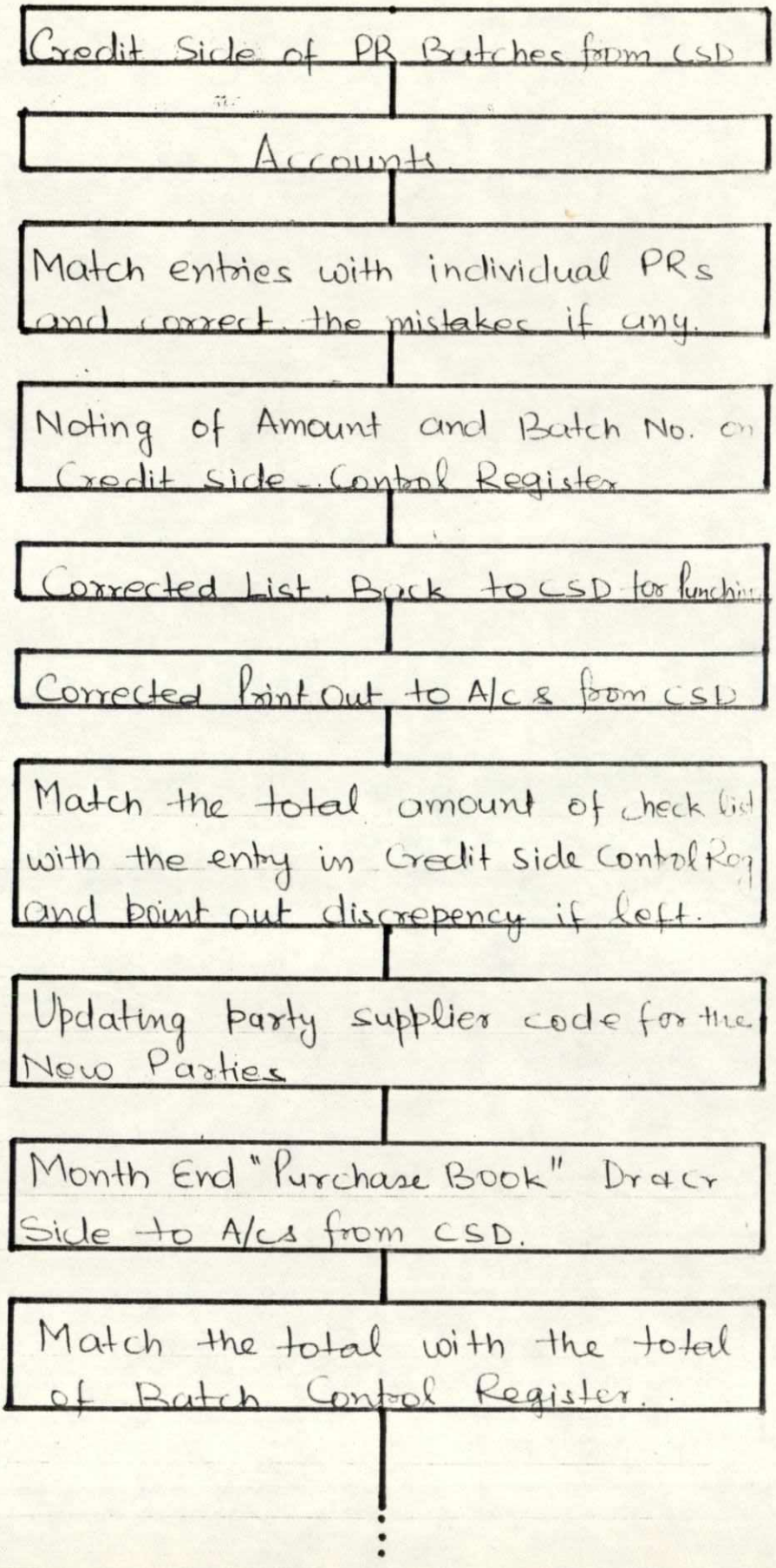


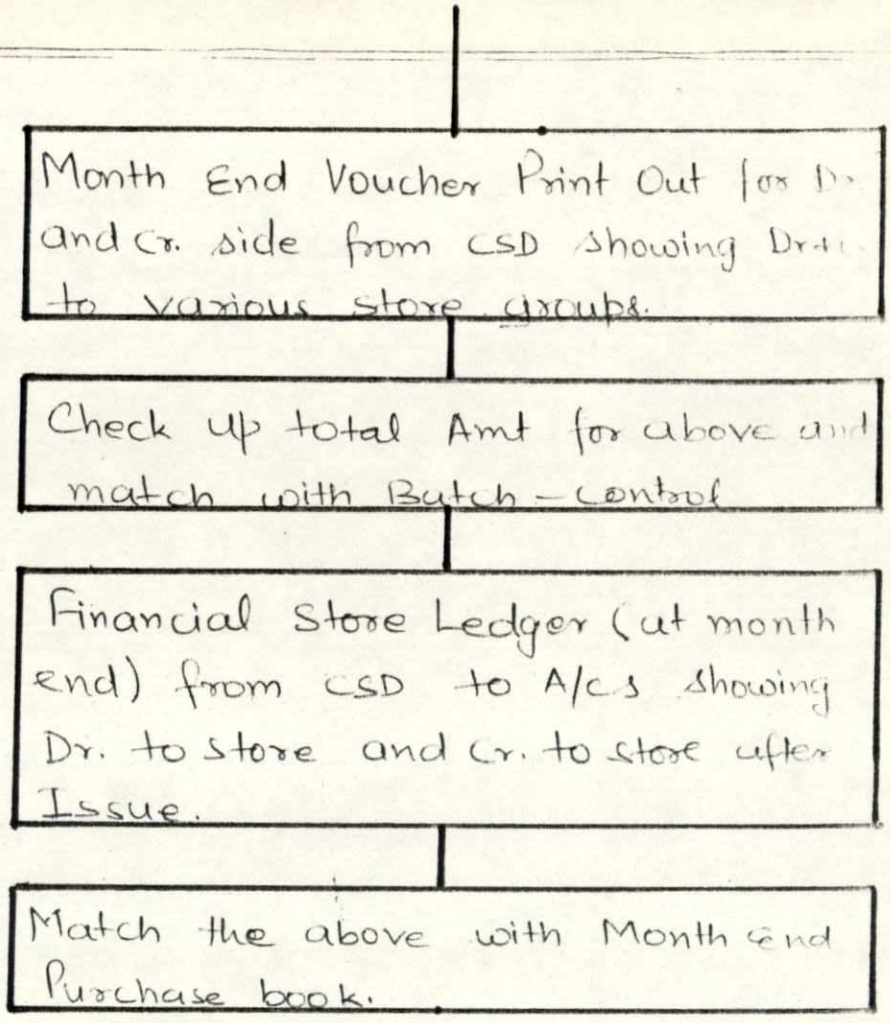
Other Related Statements

– A Quaterly statement of pur-ases made through Modern Agenci- showing.

Cost, Commission & Insuranc- etc in sent to Sec. Dept H.O Calcutta.

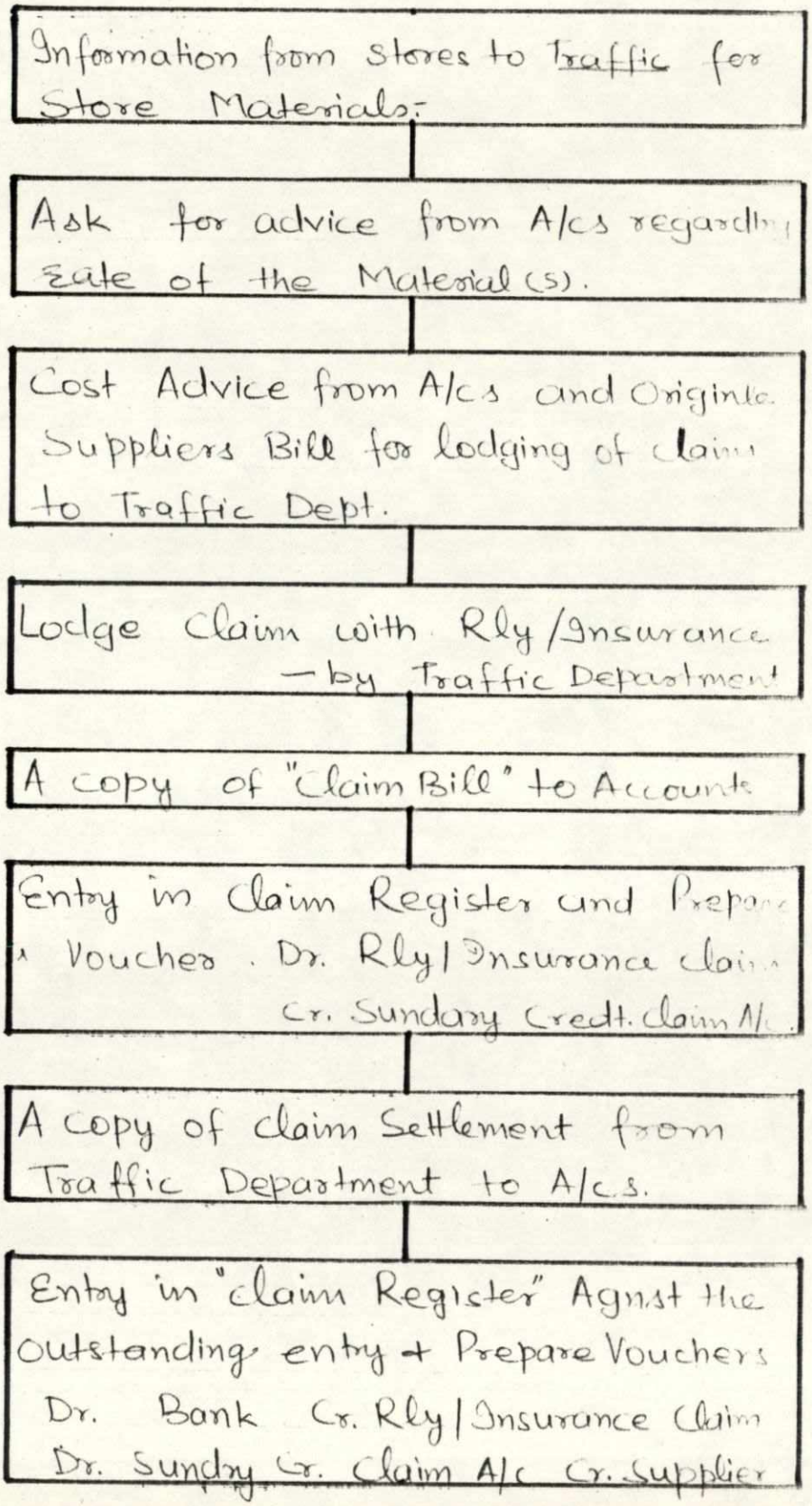
Purchase Book Vouchers




Month End Voucher Print Out for Dr. and Cr. side from CSD showing Dr. to various store groups.
Check up total Amt for above and match with Batch - control
Financial Store Ledger (at month end) from CSD to A/c's showing Dr. to store and Cr. to store after Issue.
Match the above with Month end Purchase book.

Rly / Insurance claims

Material Shortage / breakage / Damaged or Undelivered



DUPLICATION OF WORK BETWEEN PURCHASE AND ENGG PURCHASE CELL (EPC)

a) Requisition of all Engg items come to Engg Purchase (EPC).

*b) Conversion into indent. A copy of this is sent to Purchase and they file it for commercial matters.

c) Placement of order through MA/MAHO

*d) One order copy each comes to Purchase and EPC and they tally it with indent

e) Follow up by EPC

*f) Despatch documents from outside party via Purchase to EPC. Both purchase and EPC note down despatch particulars on their ledgers.

*g) Copy of KR/IKR to EPC for information. 3 copies of KR/IKR also come to Purchase for payments etc as explained in flow-chart.

*Represents duplication of work in EPC and Purchase. This is quite clear that parallel records are being maintained for all Engg items at EPC and Purchase for procurement and commercial matters respectively.

However, if Engg Purchase is merged with Purchase the above duplication in work and added shuttling of documents would go off. Also it would be easier and better controlled when a single man is dealing with commercial as well as procurement aspects of the material purchase.

For instance, in case of Rejections(Paid/Unpaid) the follow up to party/buying agency is being done both by EPC and Purchase by the way control statements sent to Buying agency or communication for individual items.

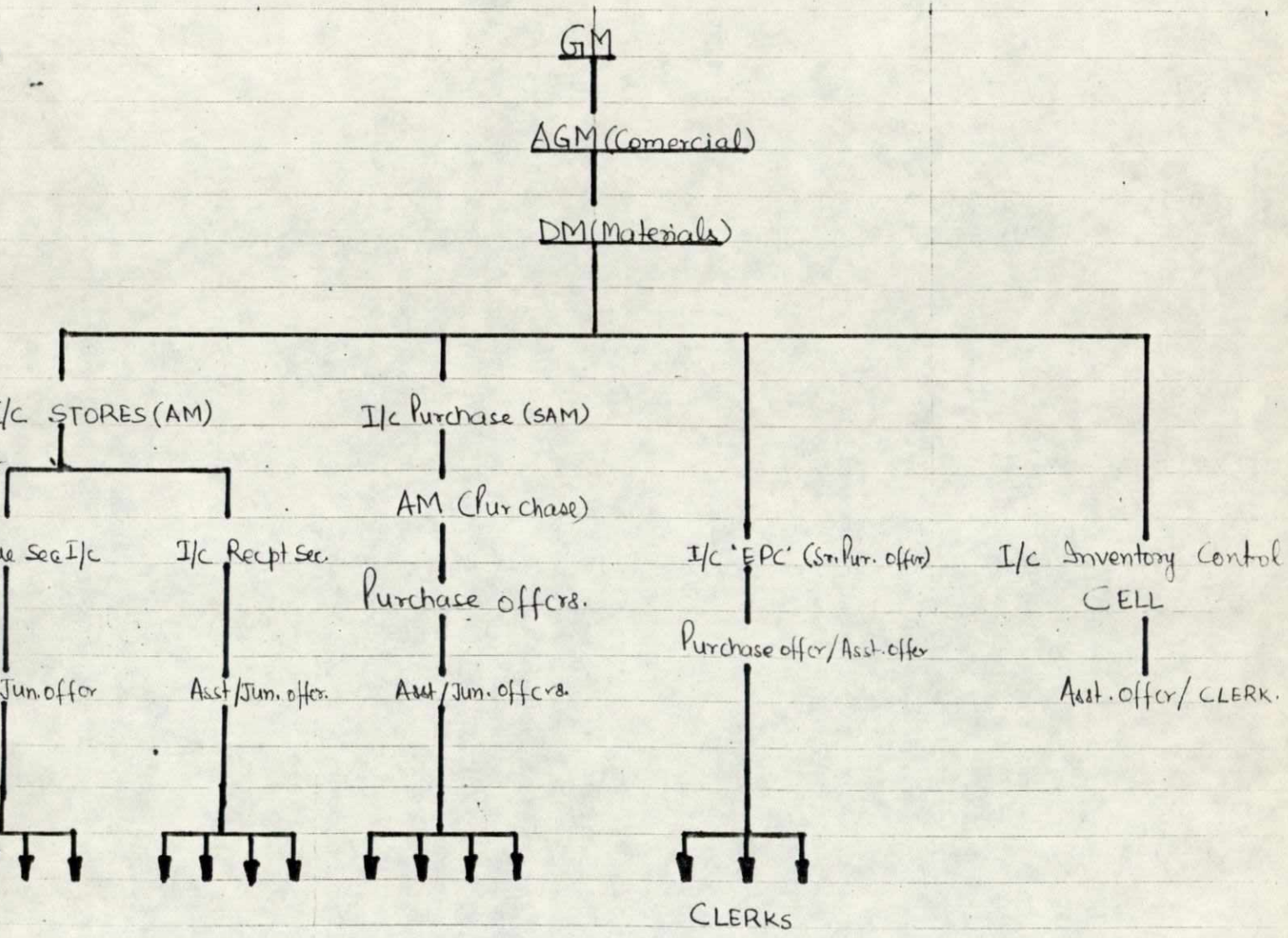
PROPOSAL FOR FORMATION OF AN INVENTORY CELL

At present CE and AGM(C) are responsible for inventory control of Engg and Process items respectively. This is being done in EPC and Purchase and nobody is specifically engaged in Inventory control and as such adhoc exercises are being carried out.

On an average, the total inventory of Unit Shree Gopal is 12 Crores. Out of this Engg items constitute about 3.5 Crores. For such a massive amount of Inventory, Regular Exercises i.e. Revision of parameters seeing consumption pattern, Actual Lead Time, Value of item and its source of availability; Identification of slow moving and Unmoved items etc should be done on an on going basis.

This type of a job for effective control demands whole time engagement of certain Personnel. Thus it is imperative that an Inventory Cell is formed who should be responsible for all the inventory functions.

posed Organisation chart of Materials Management System.



WORKING AND SCOPE OF THE SYSTEM

1. The various informations like material receipt, issue, purchase order, indents etc. will be logged in computer as soon as they are generated i.e. keying in of the data at source. In the existing Stores accounting system they are accumulated till the month end for processing.

2. To maintain stock balances which will get updated as and when material is received or issued, thus doing away with the Bin Card System (not initially) and Quantative Stock Ledgers and various registers maintained manually in the stores department. Also preparation of Stock Critical Reports and stockouts.

3. To raise indent /P.O. based on Standard guidelines laid down by management and their monitoring for supply of material.

4. Generation of Exception Reports for Control purposes such as stock statements for critical inputs and their sufficiency for vis-a-vis current consumption rate.

5. Generation of Periodic control statements like dormant A/c, Overdue statements, abnormal lead time, 'T' item average statement etc.

6. Transfer of materials management data to Main computer (ORG-80) for financial statements.

7. Outstanding rejection and their follow-up.

8. Vender evaluation/rating

9. Development of screens to provide latest tally on querry basis like consumption pattern, stock efficiency and scrolling of unmoved items for a particular period.

Nodes Requiring Services

- The following sections in the Unit are identified where data will be logged in computer or information will be querried and relative information will be displayed on monitor or printer.

a. Stores Receipt Section

- Logs challan GR/RR noting
- logs inspection note
- identify material codes, P.O. indent
- Updated stock
- Monitoring inspection.

...2..

b. Stores Issue Section

- logging of issue slips
- print acknowledgement of material issue.
- Update stocks
- Reporting Exception stock position.
- Raise indent based on stock position and parameters/levels.

c. Purchase Section

- logs indent, P.O.
- logs dispatch advice
- follow up on indent/Pur.reqn.
- raise indent keying in Pur. reqn.
- Vendor evaluation/rating
- Exception reports
- Generation of Periodic Control statements.
- Consumption pattern, unmoved items, rejections
- Rate filling of KRs.

d. Accounts Department

- logs bills, bank advice, freight payment
- supplies payment schedule
- preparation of PR
- Update BP position by logging actual payment position.

Volume of Documents

a) Stores Receipt Section- The no. of consignments per year for various categories of items are:

1.	Locally procured items	- 4400 /year
2.	Heavy chemicals	- 1000 / year
3.	Building materials	- 3000/ year
4.	Lime stone	- 2500/ year
5.	Oil for DG set	- 900/ year
6.	Project items	- 600/ year
7.	Other items	- 3700 /year

Assuming that there are 3 items per consignment in average for category (1) and (7) and other categories have one item per consignment. The no. of items receipt per day is 105. Taking 3 minutes as rough estimate for processing each item, time required for logging receipt data is 105 x 3 mnts = 5 hrs.

b) Store Issue Section

Presently issue requisitions are processed at four separate windows. Following was collected from Feb.'86 to March '86.

Window No.	No.of issue req. in a day		
	Min.	Max.	Avg.
1	20	125	45
2	26	85	46
3	27	115	72
4.	14	83	39
Total	87	408	202

Assuming that max. load on all the four windows does not occur on the same day, we may keep a provision to service 300 requisitions in a day which will result in 900 mts = 15 hrs of data logging time.

C) Purchase Section

The volume of logging of daily data at this point is not very high. But utilisation of system for various queries and monitoring indents, purchase order. Stock critical Reports, Exception Reports for control purpose and statements like Dormant A/cs etc. can be generated at this end.

A data from July 86 to Dec.86 was collected.

No. of KRs made in above period	=	3867
No. of indents " " "	=	2000

This gives us about 33 keying in documents per day i.e. 2 hrs of time.

d) Accounts Department

The information that will be logged at this node will be supplies bill, freight payment, bank advices etc. which are low in volume.

However, processing at this point will be high for preparation of PR vouchers, suppliers payment schedule, querry on BP position etc.

Man Power saving in various departments

Department	Clerks	Comptists	Total
Accounts	2½	½	3
Costing	2	½	2½
CSD	½	-	½
General Stores	2	-	2
Traffic	2	-	2
Purchase	1	-	1
Total	10	1	11

A detailed workload study was carried out in Accounts and Purchase. In Accounts Costing, Stores, CSD and Traffic the saving figure as given by the respective Depattmental heads was found quite appropriate. However, in Purchase one clerk was spared after the study for which the Departmental Head did not commit initially. The details of the studied carried out in Purchase Deptt. are attached.

Manpower saving

Major area where manual working is envisaged to be reduced are-

a. Discontinuation of preparation of formal KRs and to do direct feeding of the data on to the system.

b. Discontinuance of manual stores ledger at Stores end.

c. Discontinuance of Bin cards, and

d. Out of 6 windows at the stores at 4 manual working is going to be reduced.

Stores

Out of 4 ~~men~~ main Stores windows where 4 clerks are asso-ciated, it is envisaged, with the stoppage of KRs and posting ledger, two clerks would be saved. The remaining would to be working at the other aspects of issuance of material and Receiving of material at General Stores after they have been passed at Receipt Section.

With the abolishing of Bin cards, it is envisaged that one Helper would also be spared but it is initially proposed that we should not go in for discontinuance of bin cards as there are chances of loosing control but this aspect can be reviewed at a later stage.

With the dispersing of Stores ledger and manual KRs this would also make available one Supervosiry level person at Issue section of Stores.

Traffic

Study has been made at Traffic Deptt. where raw material KRs, ledger keeping and documentation are done. It is envisaged that data feeding of these raw materials receipt and issuance would also be fed to the system though PC at the Stores End. Presently there are four clerks at Traffic Deptt. end for preparation of KRs, maintenance of ledgers etc. A PC ~~us~~ is proposed to be put at Traffic Dept. where keying in of the data will be done. It is accessed that a clerical reduction would still be there at Traffic Deptt. and out of 4 clerks, two clerks would become available.

The above takes into account the material codes and other related data would be given through PC at Stores for general items and for Raw material thru PC at Traffic and other aspects of accounts codes, job codes and cost/accounts related codes would be fed into the system thru PC at Accounts end.

As a part of Materials Management Computerisation this would also cover Order and Order Status.

...

Accounts

At present a total no. of 5 clerks are engaged in PR preparation of A/cs Dept. Besides PR preparation a lot of other works like recondillation of M.A. commission and other A/cs etc. as attached in annexure-are done by them. Thus only a part of the work of these clerks i.e. conversion of KRs into PRs will be shifted on to the Computer.

The PRs as now are scattered Profit centrewise are proposed to be centralised at one place. A saving of 2½ clerks and ½ comptist is envisaged.

It is presumed that as per the present system supplier's bill (which is needed by Stores Deptt. for physical verifications of material) and a copy of P.O. will be passed on to A/cs Deptt. It is also presumed that the Commercial Deptt. will always update rates and change in any other terms of the Purchase Order on the Central Node in Purchase Deptt.

Costing

At present 3 clerks and ½ Comptist are engaged on checkinghash totalling, batch preparation etc.(Given in flow chart). As per accessment carred by I/c Costing which was found be appropriate in a glacing study a saving of 2 clerks and ½ Comptist is envisaged. A small register would be maintained at the Stores end, for hash totals of material codes and issue receipt quantity and would tally the same at the end of the day with the daily hash totals generated by the PCs at Stores End.

Computer Services deptt.

As per the assessment carried out by I/c CSD a saving of ½ Operator is envisaged.

Hardware Requirement

For the volume of data previously given it was discussed with the Supplier. As per the discussions held the following hardware is envisaged tobe required :

1.	Central Node (Place Purchase Deptt.)	1 PC/ AT	640 KB 60 MB Disc 1 Printer 320 KB floppy drives
2.	Stores (Issue & Recpt. Secs)	3 PC/ XT	640 KB 3 Printers 6 floppy drives of 320 KB
3.	Accounts	1 PC/ XT	640 KB 1 Printer 20 MB disc 320 KB floppy drive
4.	Traffic	1 PC/XT	640 KB 320 KB floppy drive 1 Printer,20 MB disk.
5.	Engg.Purchase/Inven--tory Cell	1 PC/XT	640 KB 320 KB floppy drive 20 MB 1 Printer.

Net working the Nodes (Pcs)

The resources at the nodes are required to be shared among themselves through suitable "Local network software" for the reasons listed below.

Files created and maintained at One node may be queried at other node, eg. Purchase Order logged at Purchase section will be referred at receipt section for validation of consignment data. Similarly Stock Balance, Vendors name file, material master etc. will be acessed at more than one node.

b. There are situations when programme involved at one node may initiate printing at another node eg. updating stock balances by issue at Stores section may initiate printing of understock items at Purchase section.

c. Data logged at one node is required to update master-files at the end of day eg. Receipt data of the day updates the Purchase Order file mentio maintained in node of Purchase section. Physical transferability of data through floppy, which is cumbersome tooperate, may be avoided if the nodes are inter-connected.

Regulated power at supply at Nodes

Some of the master files are updated on-line as soon as the transaction is logged, the corresponding master stock will be updated e.g. Stock balace is modifed in stock file while receipt of issue is recorded on computer. Any failure in power supply generally corrupts data stored in computer and reviving the status is a difficult process. Support of Power conditioning equipment in power supply will help to avoid such situations.

However for security of data, back up of master files are maintained at the end of every days drill. The current status may be brought from such back ups by updating the days transactions. But this is quite a time consuming process.

6. Requirement of secondary memory (Disc space)

a. Information logged at each node will be backed up daily. So each computer at the node should be equipped with a floppy drive. However the drive will be used as a sractch pad also during processing of other jobs.

b. For storing master information and cummulative transaction pending receipt, indents, PO etc. one hard disc at each node will serve the purpose.

Tangible improvements in the Computerised System :-

1. The present manual operations are quite slow, in fact most manual operations are slow. Data processing in the Computer will be at enormous speed which will reduce the waiting time for compilation of an information and also increase the productivity.

2. This will help in cutting short of the paper work which will save a lot of stationary.

3. Accuracy and Reliability of the computerised system will be cent percent. Of course it will depend upon the accuracy with which data is keyed in at source.

4. Usefulness of the data will be increased at the User's end as the information will be available in a pattern and it could be instaneously retrieved for special purposes.

5. a) The dependebility on manual working will be reduced. Manual working is prone to serious mistakes and is quite cumber-some.

5. Since fewer humans will be involved in the system, it will cut down in office space which is very costly in these modern times.

Cost details of the Hardware :

	Type	Nos.	Disk	Floppy	Rs.(lacs)
1.	PC/XT	3 (640 KB)	3 (20 MB)	3	.45x3 = 1.35
2.	PC/AT	1 (640 KB)	1 (60 MB)	1	= .75
3.	PC/XT	3	-	6	.22x3 = .66
4.	Printer	7	-	-	.22x7 = 1.54
					4.30
	System software development cost				= 1.50
					5.80

Other Costs :

a)	Cable cost (for Networking etc)	= Rs.3,80,000.00
b)	Air Conditioners (6)	= Rs.1,00,000.00
c)	Serve Stablisers (6)	= Rs. 25,000.00
		= Rs.1,45,000.00

Therefore Total cost = 5.80 + 1.45 = Rs.7.25 lacs appr.

Cost Details of Savings :

The saving in terms of stationary will be quite huge in the view of discontinuation of KR, IKR, PR, since for each generally 6-7 copies were made. In addition to this discontinuation of various Ledgers, Registers etc will add to the saving. However at this stage it is difficult to tangibly establish the amount of stationary needed at Computer. Therefore keeping a margin we assume that the present stationary cost strikes off with the stationary cost of the proposed system.

Total Man Power Saving = 11 men.
Average cost per man per year = Rs.22,000.00

Therefore Saving = 2,42,000.00/year.

Applying straight pay-back period method for ease in explanation.

Pay back period = 3 years.

Other areas which can be brought in to the ambit of materials management system (Computerised).

As written earlier the study for flow of documents, various periodic statements and maintenance of Ledgers etc was also made at SGVP (Commercial). It is proposed that commercial functions of Shree Gopal Vanaspati Plant (SGVP) are brought into the ambit of materials management systems. It will be easier to incorporate SGVP (Commercial) into the computerised system because the basic pattern of working is same i.e. preparation of KR, PR etc except a few minor changes here and there.

The details of flow of documents regarding materials management, and other related statements to it are attached in the next pages.

Processing of Documents- Shree Gopal Vanaspati Plant (SGVP)

SGVP (Commercial) OILS

STC

Allocation letter from "Director Vanaspati" on the basis of previous months production to SGVP (Purchase)

↓

A copy of D.O from STC and Payment Advice" to SGVP Commercial at Unit.

↓

Entry of D.O and Payment Advice in Party's Ledger.

OTHER PARTIES

Contracts at H.O

↓

Purchase Advice from H.O to SGVP (Comm.) at Unit.

↓

Posting of particular of the Purchase Advice in Oil Bargain Register.

↓

Entry of Purchase Advice in Party's Ledger.

↓

Prepare Oil Purchase Contract

- Copy → H.O
- Copy → A/cs
- Copy → Party
- Copy → Filing

↓

Clearance of Bank Documents if any

↓

Oil from STC / Outside Party

↓

Entry of GR / Challan / RR and other particulars in Recpt Register

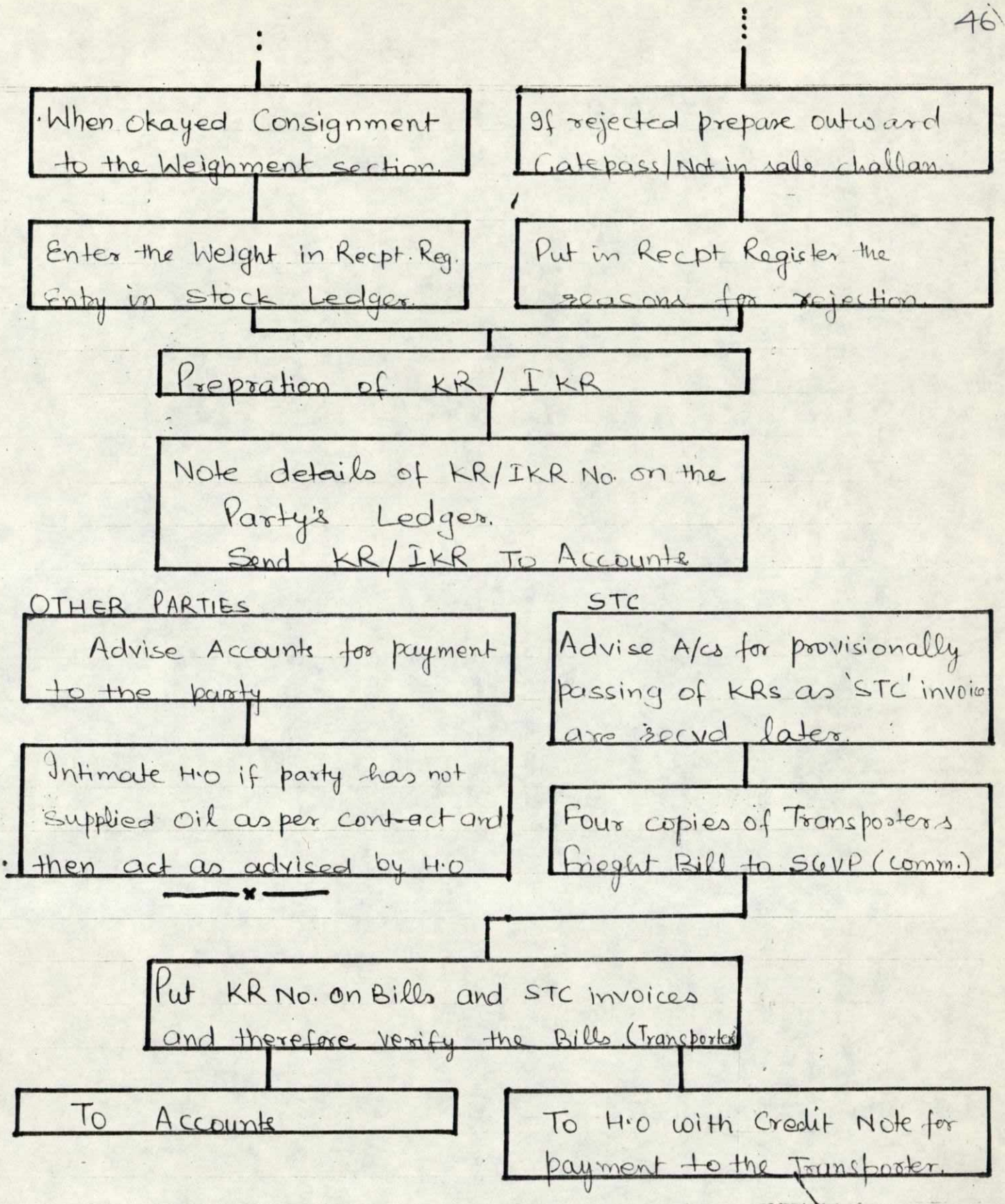
↓

Fill Oil sample intimation form

↓

Send the above form to the lab along with sample of oil from consignment

- If Okayed.
- If Rejected.



Road Frieght Reimbursement Claim : Prepare a claim Statement every month for every depu. Attach transporters Bill, GR, Photocopy of stc invoice, Debit (Note A/cs), Transporters recpt, CA certificate. Six Copies of above are made. One to A/cs, 4 to H.O, 1 for records.

Other Related Statements — SGVP - Commercial

1. Prepration of Daily Stock Report Every Morning.
   copy - H.O thru SAM
   copy - Commercial Officer
2. Daily Oil Stock Position
   showing - O.B, Recpt, To date Recpt, Issue and To date Issue & Closing Balance.
   copy - Weighment Section
   copy - Process (SGVP)
   copy - Cost Accounts
   copy - Office Records
3. Monthly Recpt - Issue - Production and closing position of the Stock to the Directorate VPO
4. Fortnightly Stock position for Distt Food + Supply Controller Ambala showing O.B, Recpt, Issue and Closing Balance.
5. Fortnightly Insurance Statement for Ex - Supplier Works Contracts
6. Insurance Statement. Maintain a Daily Stock Register on monthly basis.
   Calculate Av. Stock and Av. Rate of the month ∴ Calculate total Amount of money to be insured in the gone by month.
7. Quaterly Statement on Monthly basis to the Directorate of Vanaspati Oils and Fats. (Std Format - as demanded by VPO)
8. Monthly Statement to the Transporter showing Shortage over and above as agreed ∴ Debiting to their Accounts and amount equivalent to the above at month End.
9. Send Weekly "Return" to VPO
   Showing - Contract No, quantity, Name of the party, Commercial Terms and average rate of the week.

SGVP - Commercial (Empty Tins)

"Bargain" at Head Office

3 copies

Process (SGVP) copy | SGVP (Purchase) copy | Bargain File

Empty Tin Bargain Register — Entry in Contract No. Date, Qty, Terms of Bargain etc.

Empty tins from Outside party with Challan, Bill and Inward Gate pass

Enter in Recpt Register (full details)

Put the Recvd Qty in Form — IV Reg.

Prepare an inspection Report

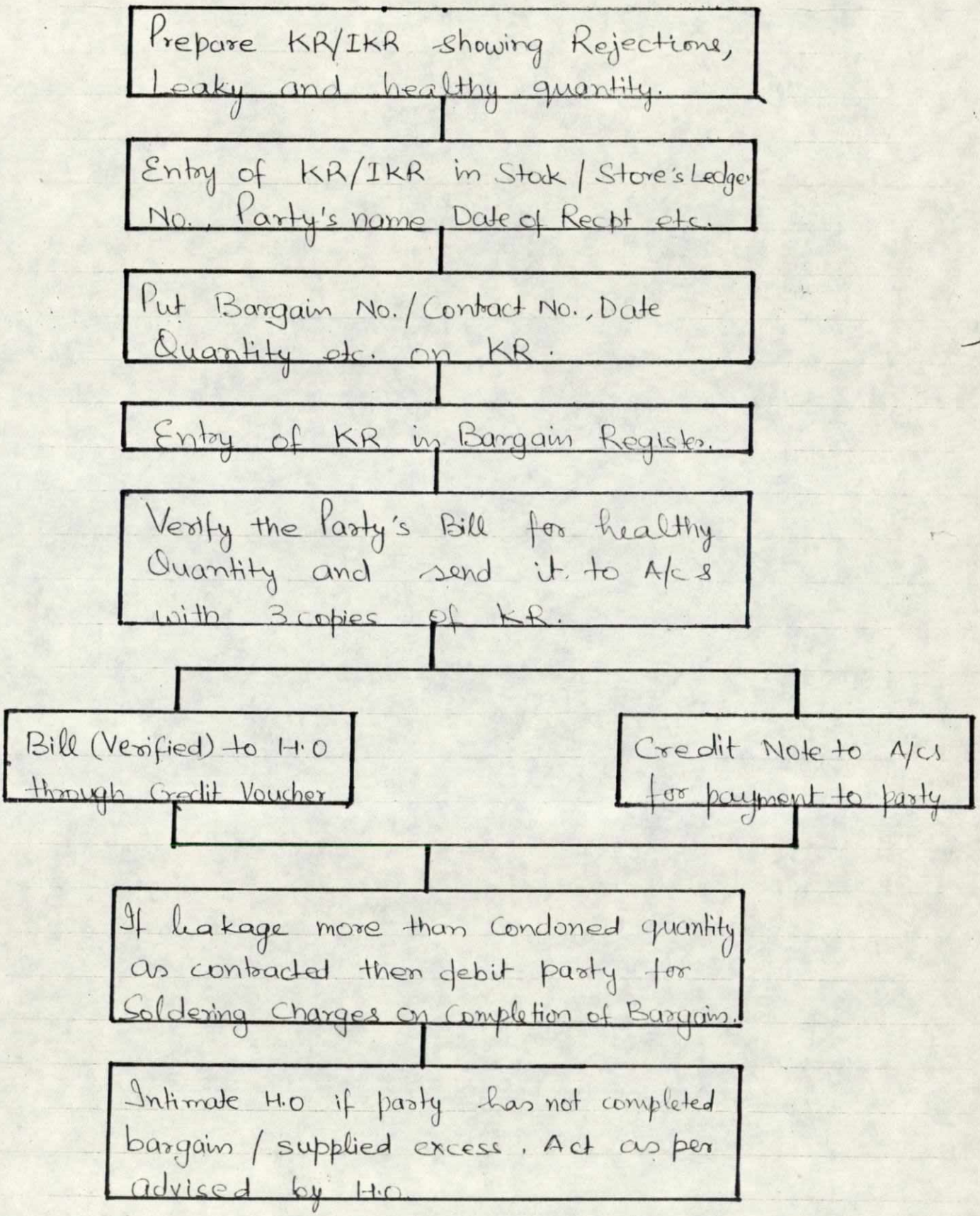
Unloading of consignment in Godowns

Prepare a (Freight + Octroi) Voucher if payable as per the terms.

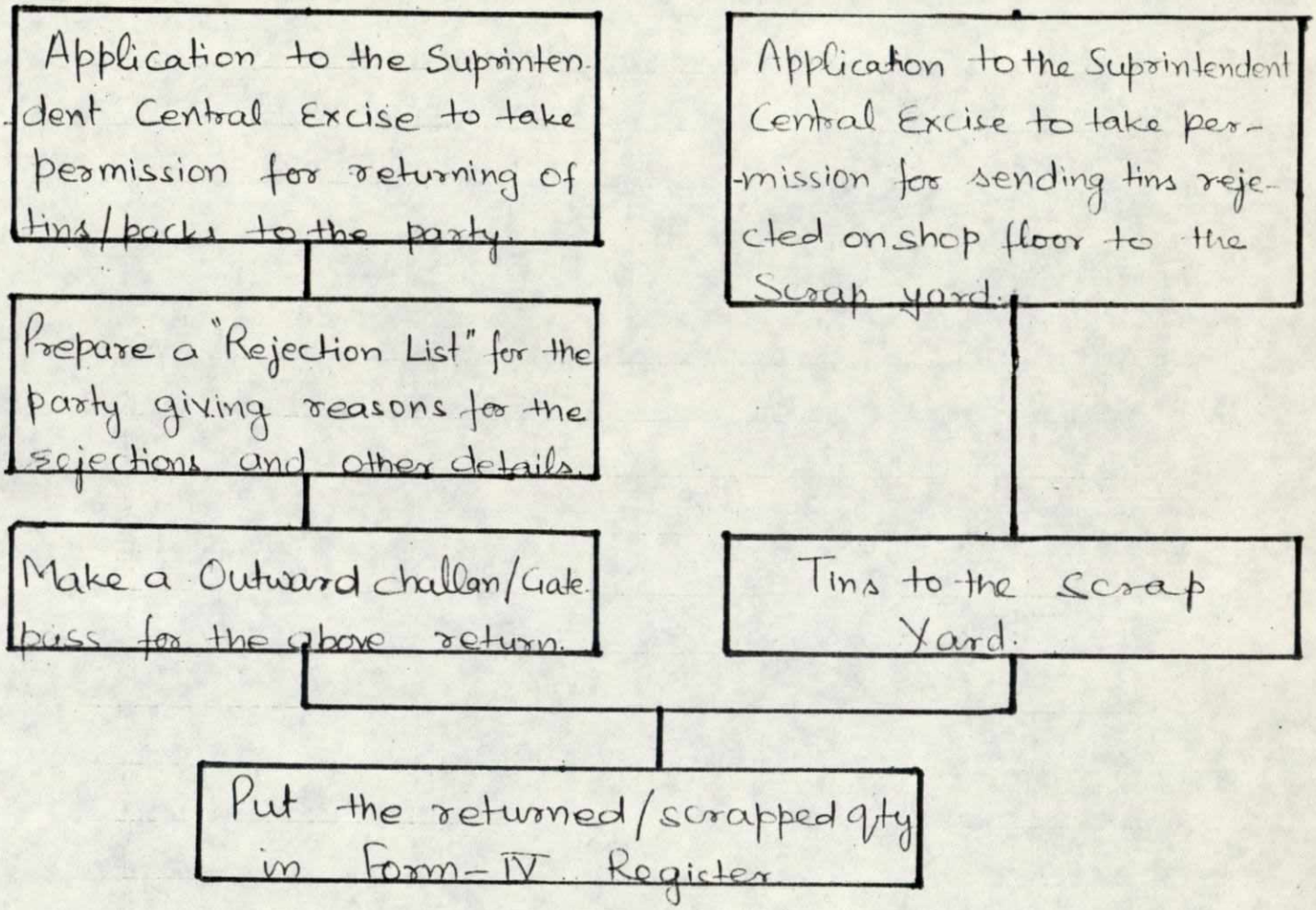
Test the Consignment for Rej and Leaks

Enter the healthy qty in stock ledger

Put the rejected qty in party wise rejection register.


Prepare KR/IKR showing Rejections, Leaky and healthy quantity.
Entry of KR/IKR in Stock / Store's Ledger No., Party's name Date of Recpt etc.
Put Bargain No./Contract No., Date Quantity etc. on KR.
Entry of KR in Bargain Register.
Verify the Party's Bill for healthy Quantity and send it to A/c's with 3 copies of KR.
Bill (Verified) to H.O through Credit Voucher
Credit Note to A/cs for payment to party
If leakage more than Condoned quantity as contracted then debit party for Soldering Charges on Completion of Bargain.
Intimate H.O if party has not completed bargain / supplied excess. Act as per advised by H.O.

SGVP - Commercial (Rejected Tins)



. Other Related Statements:

- Monthly Reconcillation Statement for Rejected and passed tins separately showing O.B, Recpt, issue and closing balance.
- Daily Stock Statement (for every type of pack) to Head Office
- Rejection Statement showing % damaged during filling, pack wise.
- Bargain Wise fortnightly position to H.O

Division of all items into various material groups.

Various Groups and their Description

Group No.	Description
10	Raw Material Paper (Grasses, Wood, Pulp, Wastes etc)
11	Raw Material CSCP (Salt etc)
12	Manufacturing Stores - OCP (Base Paper)
13	Raw Materials - SGVP (Edible Oils).
14	Manufacturing Stores - Stationary (Base Paper)
15	Raw Material Speciality - (Wood Pulp)
19	Raw Material Lime Kiln - (Lime Stone)
56	Manufacturing Stores - NCP (Base Paper)
17	Coal and Industrial Gases
18	Packing Materials
20	Chemicals for Paper plant and Stationary
21	Chemicals for CSCP
22	Chemicals for Coating Plants
23	Chemicals for SGVP
24	Chemicals for Power Plant
25	General Chemicals
28	Chemicals - Speciality paper Machines.
27	Oils and Lubricants
29	Machinary Spares - Speciality
30	Machinary Spares - Paper
31	Machinary Spares - CSCP
32	Machinary Spares - OCP
33	Machinary Spares - SGVP
34	Machinary Spares - CSWP
35	Machinary Spares - Power plant
36	Machinary Spares - General
38	Machine Furnishings (Wires, filter cloth, felts.
40	Iron and Steel
41	Pipes and Tubes.

Group No.	Description of Items
42	Pipe Fittings
43	Hard Ware - Fastners
44	Hard Ware - General
45	Tools and Implements
46	Adhesives and Abrasives
47	Building Material
48	General Sundaries
50	Electrical Stores
51	Electrical Spares
52	Instruments and Air Conditioning
53	Packing Material - CSCP
54	Welding safety Appliances.
55	Machinary Spares - NGP
58	Stationary Stores
59	Scrap Stores
60	Bearings
65	Belts, joints and other rubber items.
71	Automobile Stores
75	Complete Plant & Equipment - Matching Gp paper
76	" " " - CSCP
77	" " " - O & N coating Plant
78	" " " - SGVP
80	Block Stores - Power Plant
85	Block Stores - Speciality Machines.

UTILISATION STUDY OF LATHE MACHINES

AND

OPERATORS BY WORK SAMPLING

UTILISATION STUDY OF LATHE MACHINES AND LATHE OPERATORS BY WORK SAMPLING.

I N T R O D U C T I O N :-

OBJECTIVE :-

To determine utilisation of Lathes and their Operators (Turners) in Mechanical Workshop and arrive at no. of Lathes required for the operation.

About the Workshon :-

The Mechanical Workshop of Unit Shree Gopal is necessarily a repair and Maintenance Workshop. The workshop runs in all the three shifts i.e. A, B and C shifts. Normally Breakdowns of various machines are attended to minimise the loss in production. Cost of working on a machine part may go on the higher side than that of its market machining cost. This is done to reduce loss in production the cost of which is much higher than the difference of above mentioned costs.

The mechanical workshop has got a foundry section and a welding section to facilitate casting and fabrication of parts or complete equipments before their machining is undertaken.

There are sixteen lathe machines, two shaping machines, slaughters, grinding machines, drilling machines and various other special purpose machines. The nature of jobs is highly irregular. Jobs range from machining of small bolts, studs and shafts to quite huge steam drums and paper rolls. Under ordinary circumstances (when there is no breakdown) pending jobs which are of secondry priority are taken up. This includes repair of machine parts which had been replaced due to certain minor faults.

Method followed for the study :-

The method followed for the study was work/ Activity Sampling.

Introduction to Work Sampling :

Work sampling (also known as 'activity sampling 'ratio delay study', 'random observation method', snap reading method' and 'observation ratio study') is, as the name implies, a sampling technique.

In order to obtain a complete and accurate picture of the productive time and time of the machines in a specific production area, it would be necessary to observe continously all the machines in that area and to record when and why any of the machines were stopped. Since it would be impossible to do so without large number of workers spending their whole time on this task alone, some other method has to be adopted. The other method involves making tour of the factory at random intervals, noting which machines are working and which are stopped and noting the cause for each stoppage. This forms the basis of the WORK SAMPLING. When the sample size is large enough and observations made are indeed at random there is quite a high probability that these observations will reflect real situation plus or minus a certain margin of error. Thus it is clear that to a large extent this technique is based on probability.

Steps in Making a work/Activity Sampling :

1. Define the problem.
   (a) State the main objectives or purposes of project problem.
   (b) Describe in detail each to be measured.

2. Obtain the approval of the section/department head in which the work sampling is to be made. Make certain that the operators to be studied and other people in department understand the purpose of study.

3. Determine the desired accuracy of the final results. This may be stated as the standard error of a percentage or desired accuracy or as absolute error or desired absolute accuracy. The confidence level should also be stated.

4. Make a preliminary estimate of the percentage occurance of activity or delay to be measured.

5. Design the study :
   (a) Determine the number of observations to be made.
   (b) Determine the number of observers needed. Select and Instruct the people.
   (c) Determine the number of days or shifts needed for the study.
   (d) Make detailed plans for taking observations such as the time for taking the observations and route to be followed by the observer. (This should not be made known to the object being studied).

6. Make the observations according to the plan. Analyse and summarise the data.
   (a) Make the observations and record the data.
   (b) Summarise the data at end of each day.
   (c) Determine the control limits.
   (d) Plot the data on control chart on the end of each day.

7. Check the accuracy or precision of the data at the end of the study.

8. Prepare report and state conclusions. Make recommendations if such are called for.

Formula Used :-

$$L = \pm K(P(100-P)/N)^{\frac{1}{2}}$$

Where

N - Total number of observations required.

K - is the value which predetermines the statistical degree of confidence that can be placed in formula.

P - is the percentage occurance of a particular activity (as indicated by the proportion of reading N registring this activity).

L - is the limit of error such that ($P \pm L$) expresses the limits within which an actual value of P can be expected to vary.

(When K = 1 the limit of error can be applied to 68 cases in 100.

K = 2 The limit of error can expected to apply to 95 cases in 100.

K = 3 the limit of error can be expected to apply to 99.7 cases in 100.

Therefore according to appropriate value of'K'as 1, 2 and 3 the confidence limits are 68%, 95% and 99.7% respectively.

For 95% confidence Limits.

$$L = \pm 2\ (P(100-P)/N)^{\frac{1}{2}}$$

Or $$L^2 = 4P\ (100-P)/N$$

Or $$N = \frac{4P\ (100-P)}{L^2}$$

From here it is possible to determine the number of observations. At first from a pilot study, P is estimated or

Contd..

questionated viz. you actually starts off with an expected value of P say P* specifying the tolerance, L (depends how much of accuracy is desirable, the initial number of observations N* can be got.

$$\text{Suppose } L = \pm 3\%$$

$$P^* = 30\%$$

$$N^* = \frac{4 \times 30(100-30)}{3 \times 3}$$

$$N^* = 933$$

Now based on these N* number of readings, find out the percentage number of times the particular activity has really occured. Set this value as P**. Now again ~~fax~~ calculate the number of observations to get N** for the same value of L. Carry out additional readings. Now determine P again say P***. Now if for these values P*** and N** a value of L is got which is within $\pm$ 3%, then we can say that the results have reached the desired accuracy and P*** is the percentage of occurance of that particular activity.

Method Adopted for the Sampling Study.

A three-week sampling study was conducted in Mechanical Workshop of Unit Shree Gopal. First three days were spent for familiarisation of nature of work in Mechanical Workshop. The study was conducted in A, B and C shifts in order to produce a true picture of the utilisation of Lathes and their Operators.

As the sampling study demands the observations/ readings were taken at random instants throughout the shift with a gap of about 5 - 20 mts between each observation. The observations were recorded on a chart (Sample attached).

Codes used for the study :

Code No.	Specification
1	MAN WORKING & MACHINE RUNNING (Man is working on the job i.e. filing, checking the size etc or operating slides etc.).
2	MAN IDLE & MACHINE RUNNING (Man is sitting/standing idle i.e. not doing something related to the job).
3*	MAN WORKING & MACHINE STOPPED (Man is working on the job/machine or away for tool grinding, mate arrangement etc).
4	MAN IDLE & MACHINE STOPPED (Man is near the machine but doing no work).
5	MAN MISSING & MACHINE RUNNING. (Man is away from the work spot).
6.	MAN MISSING & MACHINE SHUT

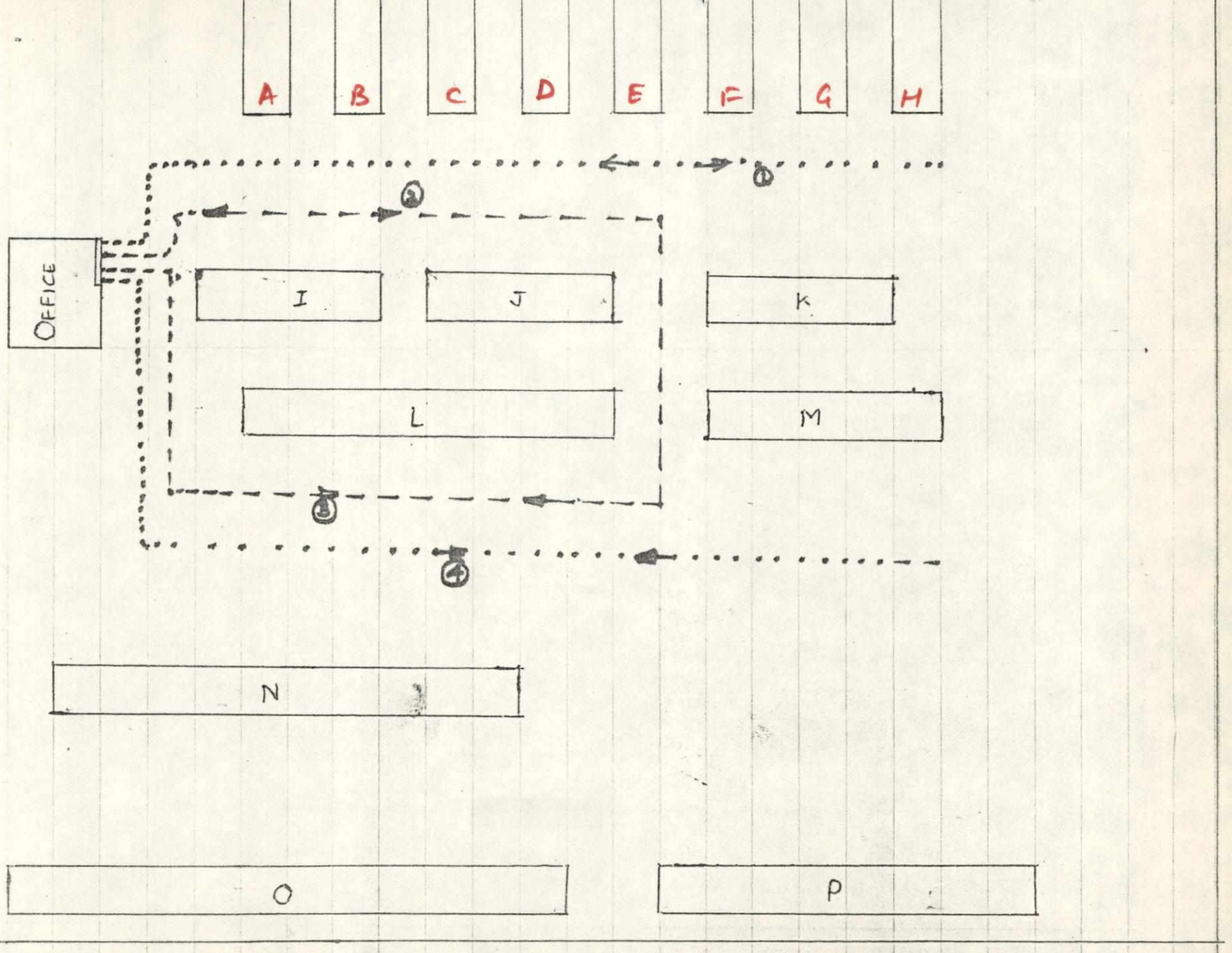
* The observations under 3* i.e. Man Working and Machine stopped were split into two parts of 50% each. Each representing man working on the work spot and man working away from the work spot respectively.

CHART FOR OBSERVATIONS

Shift : _____ Date : _____

Shift Supervisor: _____

S. No.	LATHE TIME	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	RE-MARKS.
1.	8.05	1	2	3	1	2	2	6	3	3	3	3	1	3	3	1	1	
2.	8.12	1	1	2	3	4	3	3	3	1	3	3	2	3	3	2	3	
3.	8.27	4	3	3	2	1	2	3	3	1	3	3	3	1	1	1	1	
4.	8.45	3	2	1	2	3	5	2	1	3	1	1	2	3	1	2	1	
5.	8.55	4	3	2	1	3	3	1	2	1	2	1	2	2	5	1	2	



①, ②, ③, ④ represent roots followed for taking observations and these roots we randomly followed. Root ③ or ② or ① and ④ needed to be followed for one set o observations for all the 16 Lathes. 'A' to 'P' are sixteen lathe machines.

Details regarding how observations under various codes have been included for getting the desired results :-

1. Percentage utilisation of Machines.

For finding observations favouring the above the observations shown below have been included.

$$\text{Code (1)} + \text{Code (2)} + \frac{\text{Code (3)}}{2} + \text{Code (5)}$$

2. Percentage utilisation of Man.

(a) Working on the Machine.

Observations favouring are : $\text{Code (1)} + \frac{\text{Code (3)}}{2}$

(b) Other related Works

(Tool Grinding, Tool bringing, Matl.arrangement etc).

Observations favouring are :- $\frac{\text{Code (3)}}{2}$

(c) Machine Running and Man Idle.

Observations favouring are :- Code (2)

(d) Man Idle and away from work spot

Observations favouring are :

$$\text{Code (4)} + \text{Code (5)} + \text{Code (6)}$$

Preliminary calculations for Work Sampling :

Observations for the First two days were as follows and we will be calculating P, N, L etc from these observations.

Date	No.of lathes working	Observations for different Codes. 1	2	3	4	5	6	Total No. of observations.
3.6.87	15	117	131	50	7	3	97	405
4.6.87	15	81	88	111	8	4	93	385
		198	219	161	15	7	190	790

N = 790

Now let us calculate 4 'P' for different desired results.

1. Utilisation of Machines

   No. of observations = $198+219+\frac{160^*}{2}+7$ = 504 = 63.79%

2. Utilisation of Man

   a) Working on the machine

      No. of observation = $198+\frac{160^*}{2}$ = 278 = 35.18%

   b) Other Related Work

      No. of observations : = $\frac{160^*}{2}$ = 80 = 10.12%

   c) M/c Running Man Idle - 219 = 27.72%

   d) Man Idle & Away from Work Spot = 15+7+190 = 112 = 14.17%

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Now $N = 4P(100 - P)/L^2$

When K = 2 i.e. for 95% confidence level.

Intially keeping L constant we find that 'N' is proportional to 'P' when 'P' is less than 50 'N' is proportional to '$\frac{1}{P}$' when 'P' is greater than 50.

Therefore for Calculation of N, and 2(a) need to be considered.

Let us keep Limit of Error as ±2%.

Limit of Error also represents desired accuracy of the result.

Calculations of N w.r.t. 1 : $N = \frac{9 \times 63.79\ (100-63.79)}{3 \times 3} = 2310$

Calculations of N w.r.t. 2(a):

$N = \frac{9 \times 35.18(100-35.18)}{9}$

= 2280

Analysis and Calculations for the Result :

1. Utilisation of Machines (Overall) :

No. of observations = $737+1543+26+\frac{944^*}{2} = 2778$

Utilisation of Machines as percentage of number of observations :

$$= \frac{2778}{3922} \times 100 = 70.90\%$$

Check

$P = 70.90\%$

$K = 2$

$N = 3922$

$$L = \pm 2 \left(\frac{P(100-P)^{\frac{1}{2}}}{N}\right)$$

$$L = 2 \left(\frac{70.90 \times 29.1}{3922}\right)^{\frac{1}{2}}$$

$L = 1450$

Therefore 'L' is less than 2

2. Utilisation of Man (Overall):

a) Working on Machine

No. of observations = 737+472 = 1209

= 30.86% of Total No. of observations.

Check

$P = 30.86$ $N = 3922$ $K = 2$

Therefore $L = 1.47$

Therefore 'L' is less than 2

D A T A
* * * *

Date	Shift	No.of lathes working	Observations for different Codes						Total No. of obser-vations.
			1	2	3	4	5	6	
3.6.87	B	15	117	131	50	7	3	97	405
4.6.87	B	15	81	88	111	8	4	93	385
5.6.87	B	15	62	135	132	1	2	57	389
6.6.87	B	14	66	133	104	4	7	62	376
Total		59	326	487	397	20	16	309	1555
8.6.87	C	13	78	168	81	-	1	49	377
9.6.87	C	13	664	139	82	1	1	55	342
10.6.87	C	14	90	130	85	1	-	77	383
11.6.87	C	11	32	136	66	-	-	54	288
Total		51	264	573	514	2	2	235	1390
13.6.87	A	10	41	146	55	-	1	37	280
14.6.87	A	8	24	103	68	2	2	31	230
15.6.87	A	9	34	136	61	-	4	25	260
16.6.87	A	9	48	98	49	2	1	9	207
Total		36	147	483	233	4	8	102	977
Grand Total		146	737	1543	944	26	26	646	3922

(b) Other Related Work like Tool Grinding, Tool bringing and Material arrangement etc.

No. of observations = $\frac{944^*}{2}$ = 472

= 12.04% of Total No. of observations.

Check

P = 12.04%

N = 3922 K = 2

$L = 2\ (\frac{P(100-P)}{N})^{\frac{1}{2}}$

L = 1.03

therefore 'L' is less than 2

(c) M/c running and man Idle.

No. of observations = 1543

= 39.38% of Total No. of observations.

Check

P = 39.38% N = 3922 K = 2

L = 1.56

Therefore 'L' is less than 2

(d) Man Idle and Away from Work Spot.
(Including tea, Lunch & Personal needs etc.).

No. of observations = 26+26+646 = 698

= 17.8% of Total No. of observations.

Check

N = 3922 P = 17.8% K = 2

Therefore L = 1.22

Therefore 'L' is less than 2.

Calculations for Results in Different Shifts.

1. Utilisation of Machines.

'A' Shift :

N = 977

No. of observations = $147+483+\frac{233}{2}^{*}+8 = 754$

Therefore P = $\frac{754}{977} \times 100 = 77.17\%$

When K = 2 using the formula we find L = 2.68

'B' Shift :

N = 1555

No. of observations = $326+487+\frac{397}{2}^{*}+16 = 1028$

Therefore P = $\frac{1028}{1555} \times 100 = 66\%$

When K = 2 We find L = 2.40

'C' Shift :

N = 1390

No. of observations = $264+573+\frac{314}{2}^{*}+2 = 996$

Therefore P = $\frac{996}{1390} \times 100 = 71.65\%$

When K = 2 We find L = 2.41

2. Utilisation of Man.

(a) On Machine :

No. of observations = $147+\frac{233}{2}^{*} = 264$

N = 977

Therefore P = $\frac{264}{977} \times 100 = 27\%$

When K = 2 We find L = 2.84

'B' Shift :

N = 1355

No. of observations = 326+199 = 525

Therefore $P = \frac{525}{1355} \times 100 = 33.76\%$

When K = 2 We find L = 2.56

'C' Shift :

N = 1390

No. of observations = $264 + \frac{314}{2} = 421$

Therefore $P = \frac{421}{1390} \times 100 = 30.28\%$

When K = 2 We find L = 2.464

(B) A Shift

N = 977

No. of observations = 116

Therefore $P = \frac{116}{977} \times 100 = 11.87\%$

When K = 2 We find L = 2.06

'B' Shift.

N = 1555

No. of observations = $\frac{397^*}{2} = 199$

Therefore $P = \frac{199}{1555} \times 100 = 12.79\%$

When K = 2 We find L = 1.69

'C' Shift:

N = 1390

No. of observations = $\frac{314^*}{2} = 157$

Therefore $P = \frac{157}{1390} \times 100 = 11.29\%$

When K = 2 We find L = 2.24

Similarly we can calculate the value of % utilisation for 2(c) and 2(d).

5.1 : RESULT :-

1. Utilisation of Machines :

Overall	= 70.90%
A - Shift	= 77.17%
B - Shift	= 66.00%
C - Shift	= 71.65%

2. Utilisation of Man :-

(a) Working on the Machine :

Overall	= 30.86%
A - Shift	= 27.00%
B - Shift	= 33.76%
C - Shift	= 30.28%

(b) For other Related Work like Tool Grinding, Material arrangement etc.

Overall	= 12.04%
A Shift	= 11.87%
B - Shift	= 12.79%
C - Shift	= 11.29%

(c) While Machine is Running & Man is Idle.

Overall	= 39.38%
A - Shift	= 49.43%
B - Shift	= 31.31%
C - Shift	= 41.22%

(d) When Man is Idle and Away from Work Spot (including Tea, Lunch, Personal needs etc.)

Overall	= 17.8%
A - Shift	= 11.66%
B - Shift	= 22.18%
C - Shift	= 17.19%

5.2 : SUGGESTIONS FOR BETTER UTILISATION AND INCREASE IN OVERALL EFFICIENCY OF LATHE MACHINES.

1. EXCESS LATHE MACHINES :

Average number of Lathes working in a Shift = $\frac{146}{12} = 12$

(Refer Data)

We find that on an average 4 lathes remain idle in a shift. Therefore it is suggested that one or two lathes of similar nature/capacity may be declared surplus.

2. MAN-MACHINE SYSTEM :

On lathes L, N, O, P certain jobs are taken up where the cut is too long and continuous check of dimensions on the machine is not required. Also it takes long time to machine such jobs (One to several shifts). The machining work of such jobs may be planned, if possible, in such a way that one man could attend two machines simultaneously.

3. ENERGY WASTAGE :

The bulbs and fans on each machine remain on while the Operator is away for Lunch/Dinner, Tea or Some other work and the machine is shut. It has also been observed that bulb/fan sometimes remain on while machine is shut for whole of the shift.

4. IDLE RUNNING :

Certain machines were observed to be running idle while the operator grinds the tool, talks to the Supervisor etc.

MAN POWER PLANNING INCLUDING JOB WRITE UP OF ALL OPERATIONS IN PULP MILL-II

MAN POWER PLANNING INCLUDING JOB WRITE UP OF ALL OPERATIONS IN PULP MILL-II.

INTRODUCTION :-

Objectives :-

1. To prepare job-write up of the workers category in Pulp Mill-II.

2. Job Analysis and work load study in probable areas and establish possible savings in terms of manpower.

Paper Making - In Brief.

In the beginning the raw material whatsoever used is being cut into small pieces, so called chipping in case of wood etc. The small chips are then digested in a Pressure vessel called Digester and then the same (Pulp) is blown off to the pulp mill for brown stock washing and bleaching of the pulp. From different pulping streets, the stocks are pumped to stock prepration where different qualities of pulp are blended, fibres are cut to desired size, dyes and chemicals are added (according to the colour wanted) and finally the prepared stock is pumped to the machine section. The final product paper is ready after the low consistency pulp passes over wire-part and dries up in a series of Dryer Cylinders. The paper is finally wound on rolls.

ABOUT PUBP MILL -II.

It has two pulping streets namely 'A' and 'B' streets running in parallel. In 'A' street only woods are used comprising Pine Wood and a mixture of hard woods. In 'B' Street mostly agricultural raw materials such as bagasse, Wheat-straw, Rice-straw, Kahi are processed. Some quantity of Eucalyptus is also used depending upon requirements.

Pulp Mill-II can be divided into four sections :-

1. Raw materials preparation.
2. Digester House.
3. Wash Plant.
4. Screening & Bleaching.

1. RAW MATERIAL PREPARATION HOUSE :

a) CHIPPERS :- It is necessary to reduce the Wood to chips for pulping in order that the cooking liquor may penetrate the wood quickly, completely and Uniformly. The operation is know as chipping and the machine used for cutting the wood into chips is known as Chipper. Bandsaws are also used in this section to split the wood logs into smaller dia, pieces which can be fed into the chippers. We have four bandsaws, five KMW chippers, and one bigger chipper.

b) DEPITHING PLANT :- Bagasse as received from Sugar Mills contains moisture content of about 50% Bagasse is normally baled and stacked for storage & natural drying. The average composition of bagasse on moisture free basis is approximately as follows :-

Good fiber	60%
Water Solubles	10%
Pith, dirt etc.	30%

The pith, though similar to fiber in chemical composition is non-fiberous in character and, therefore, has very little value in paper making. Moreover, it creates difficulties in processing of bagasse.

It is therefore, very essential that max. amount of pith is removed from the bagasse. This is achieved in our Mills by dry depithing method. Bagasse is passed through hammed Mills and thereafter screened to remove pith.

c) Wheat-Straw is screened in a willow to remove dust and finer particles to avoid processing troubles and render a cleaner pulp.

DIGESTER HOUSE :

In this Section various raw materials are cooked with chemicals to convert them to pulp. Cooking is the delignification process of Woods and other cellulosic raw materials and is carried out in big mild steel pressure vessels with the aid of chemicals under certain conditions of temperature and pressure. We have tumbling type of Digesters, four in each street which are versatile for all types of raw materials.

Out of the two principal alkaline cooking processes i.e. Soda & Sulfate we follow later as it yeilds stronger pulp and is also amonable to modern chemical recovery system. In sulfate process the cooking liquor is a mixture of sodium hydroxide and Sodium sulfide. Direct stream is used for raising the temperature. Through manipulation of three variables i.e. concentration of chemicals, temperature and time of cooking, the pulp characteristics can be varied as per requirements. When the cooking of a particular batch is complete, the contents of the digester are blown to a blow tank, which acts as a storage of pulp alongwith spent chemicals. The contents are kept in suspension by means of an agitator provided at the cone of blow tank. Blow tank is also provided with pressure relief valve and a vacuum break. The flash steam generated during the blowing operation is led to a heat recovery system for getting hot water.

WASH PLANT :

The primary function of wash plant is to wash the pulp free of spent chemicals and other soluble impurities. Both the streets are equipped with rotary vacuum washers working in series. Three stage washing system with counter current

washing is employed. This helps in minimum dilution of liquor sent to Recovery plant.

SCREENING & BLEACHING PLANT :

Screening of pulp is necessary to remove uncooked materials such as knots, nodes etc. which are hard to bleach and if not removed effectively will lead to a sheet of paper containing specks and shives. This is performed by passing the pulp in suspension through vibratory screens such as Jonson Knotters. For finer screening pressure screens of Bird centriscreen type are used. The pulp at this stage is brown in colour & can be removed through bleaching. The aim of bleaching is to remove the residual lignin left after cooking and solubilizing of the colouring matter while retaining the strength properties of pulp. The chemicals employed in the bleaching operation are gaseous chlorine, causting soda and calcium hypochlorite.

Caustic soda is used for extraction of chlorolignin products after chlorination stage in 'A' street. Some caustic soda is used for buffering the calcium hypochlorite to maintain alkaline P.H.

Interstage washing is done to remove the reactive products. After attaining the required brightness, the pulp is finally centricleaned to remove fine dirt and shives.

Sections in which study was carried out :-

1. Digestor House
2. Wash Plant
3. Bleach Plant.

Present Man Power Strength in above sections :-

Digester House.

S.No.	Designation	No.of persons.
1.	Sirdar	1
2.	Operator	1
3.	Digester Blower	1
4.	Cooking Attendant	1
5.	Helper Blower	1
6.	Shramik	5
	Total	10

Wash Plant :

1.	Sirdar	1
2.	Operator	2
3.	Screen Room Attendant.	1
4.	Blow Tank Attndt.	1
5.	Wash Plant "	1
6.	Shramiks	3
	Total	9

Bleach Plant :

1.	Sirdar	1
2.	Operator	2
3.	Bleach Plant Washing Attendant.	2
4.	Bleach Plant screening Attendent	1
5.	Chlorine Attendant	1
6.	Bleach Plant "	1
7.	Shramiks	4
	Total	12

Grand Total = 31

The above man-power strength is for a single shift in each shift.

Method followed for the study :

The study was carried out from section section. Going arround with respective supervisors the positioning of various workers and their nature of job was acquained to. Then workers were observed working for some time.

After having discussions with the supervisor job-write of the workers was prepared. The job-write for discrepencies was got checked up with head of the department. Jobs of various workers were then analysed and areas in which saving was possible were deciphered. The basic principles which were kept in mind were as follows :-

a) Job combination.
b) Common crewing
c) Check low utilisation.
d) Job abolition with the help of better/mechanised methods.

Then employing the above methods and looking into the facilities required to provided for implementation the proposal for the rationalisation was prepared.

JOB WRITE UP

Digestor House.

1. Sirdar (2nd Floor)

1. He maintains the quality of the cooked pulp.
2. He maintains the production demand i.e. Blowing of more digesters when high grammage is running onthe machine.
3. Coordination with the Chipper House - inform the Supervisor.
4. To instruct the cooking attendent regarding chemical dosing.
5. He checks the process variables i.e. tempeature and pressure of the digestors.
6. He checks the digestor house steam demand. If steam pressure is not sufficient he reports to the supervisor or contacts the power house.
7. Testing of white liquor for active Na_2O -- seldom.
8. To check the size of the chips etc and he will inform the chipper house people of the size is more than desired.
9. He is responsible for the overall functioning of the digester house section.
10. Calculation of Black and White Liquor for dosing.

2. O P E R A T O R. (Ist Floor).

1. He is responsible for steaming of the digestor. When digestor is filled with chips he starts the digestor motor (Tumbling) and the steam.
2. When 4 kgf/cm^2 pressure is reached (½ hour time). He vents the digestor and again when the digestor depressurises he open the palet valve for the steam.
3. He is responsible to maintain the required temperature and pressure of the digestor. If presume falls below a

certain level then he informs to the Supervisor. After cycle is completed he stops the digestor Motor and its steaming (4½ to 5 hours).

4. In case of a mechanical fault he informs the digestor house Sardar/Supervisor.

3. COOKING ATTENDENT (IInd Floor).

1. He is mainly responsible for chemical dosing. He adds the required volume of white and black liquor on calculated by the Sardar.

2. He checks the lid of the digestor after the digestor is filled.

3. He checks the blow tank position and inform to Blower for Blowing. (Recorder at 3rd floor).

4. He is responsible for pumping of white liquor to over-head tanks.

5. To maintain a stock register for white liquor showing O.B, Received and balance Date-wise.

6. To open the valves of caustic and Liquor tank and operate the pump-at ground floor- for (4).

7. He goes to 2nd floor to open the valve of caustic/ Liquor dosing from the Overhead tanks.

4. B L O W E R. (Ground Floor).

1. He is mainly responsible for blowing of digestors.

2. He draws the sample from each digestor after cooking is complete and sends it to digestor house Sardar/Supervisor for checking. After getting the clearance he he blows the digestor with the help of helper blower.

3. He is responsible for the starting of and shut down of circulation pump for blow heat recovery.

Observations :

TIME FOR INITIAL SETTING BEFORE BLOWING = 3-4 min.

TIME FOR BLOWING = 7-8 min.

TIME FOR FIXING AND CLEANING = 10 min.

TOTAL BLOWING TIME = 20-22 min.

Under Normal Conditions no. of Digestors which are blowed in a shift are as follows :-

Ast - 4 Digestors Cycle Time (6½-7 hrs)
Bst - 4 " " " (5-5½ hrs).

When heavy grammage is run on Machine :

A Ast - 6 Digestors Maxm are blowed.

Bst - 4 -do-

Cycle time if required is reduced accordingly. This is compensated by excess steaming etc.

5. BLOWER HELPER (Ground Floor).

1. He is the helper to the blower who helps him in blowing and taking the sample from the digestor.

6. SHRAMIKS (IInd floor).

They are responsible for loading of chips or Agricultural residues, opening and closing of the lid of the digestor and general cleaning.

1. To bring the lid packing from stores once in a fortnight.
2. To load the Jhonson vibrator Reject into the digestor with the help of a shovel.
3. To clean the floor to clear it of the black liquor etc.

W A S H P L A N T :-

1. SIRDAR (IIIrd Floor).

1. To mark the attendance of all the workers of wash plant. Take casuals against abst.
2. Preparation of "pending jobs for repairs" list for shut day.
3. As per the instructions of shift Incharge he tries to maintain the Black Liquor Strength, Pulp Production, minimum Alkali loss.
4. Checking of gland leakage of pumps and inform the fitter for discrepency.
5. For any problem in running of the plant he informs the shift Incharge from time to time.

2. O P E R A T O R S - 2 (3rd floor).

One each at A-street and B-street.

1. He responsible for maintaing flow rate of pulp which finally effects the production.
2. As per the flow rate of pulp he adjusts the speed of Vaccuum filters.
3. He maintains the level of the three seal tanks. (Recorder at 3rd floor).
4. He maintains the "degree twaddle" of Black Liquor by the way of adjustment of spray rate and pulp flow rate. He also checks the degree twaddle with the help of a Twaddle metre 4-5 times in a shift (4 mts).
5. He maintains the level of the Vats to avoid overflow and avoids its jamming.
6. He checks the Vaccuum Pr gauge in the main line for proper Working of Vaccuum of Washers and informs the Blow Tank Attendant, If Vaccuum falls below specified level.

6. He is responsible for Blow tank ring Dilution and maintain proper dilution to avoid Jamming of Blow Tank Agitator.

7. He checks the G/packing of pumps. In case of leakage calls the fitter/inform Sirdar.

5. SCREEN ROOM ATTENDANT (At S.R)

1. He goes to S.R and checks the Twaddle of Black Liquor to be Recovered.

2. Cleaning of Black Liquor Screens at S.R.

3. To report for amount of Black Liquor received at S.R.

4. To keep the sample of Black Liquor that has been supplied to S.R. in safe custody and hand the sample over to man from C.S.CP.

5. To help in changing over the supply of Black Liquor from one tank to the 2nd.

6. SCREEN ROOM ATTENDANT.(Ist Floor).

1. To see the level of the screen stock chest and adjust the rate of screening (Valve).
2. He is responsible for the process variables. Dilution of Stock/Maintainance consistancy of pulp for inlet stock to the screen.
3. He checks the quality of the screen pulp and try to maintain best screening.
4. He checks the screen for its proper functioning like there should be no jamming of ₱ Reject line and perforated basket.
5. Checking of consistancy of inlet stock to the screen stock chest. (3-4% consistancy).
6. Cleaning of Thickner and Washer Wire with Acid.
7. He is responsible for Vaccum pump sealing water level. If there is any breakdown in this pump he calls the fitter and get it set right.

7. SHRAMIK -(2nd floor)

1. To maintain the level of pulp in Wash stock chest.
2. To maintain the consistancy of pulp for stock which is coming Johnson Vib Screens. If less/more inform Wash Plant Operator to do the proper dilution.
3. To keep the Johnson vib screen perforations clean-removal of reject continously.
4. To vary the depth of channel to maintains the even flow in both the Vibrators.
5. Maintains the pump on 2nd floor i.e. Transfer of stock from washed stock chest to Vibrators.

Bleach Plant - Job Write up

1. Operator-I (Mixer Man) IIIrd Floor

(a) To maintain the level of Towers in "A"-stand and 'B'-stand (total 5 Nos). The towers should normally be empty to the depth of 1 metre. If level of a tower is other than required he tells the BPWA to increase/decrease the speed of Washers.

(b) He instructs the BPWAs about dosing of Bleach and Caustic. He determines the amount by the way of sample checking of pulp (steaming and Bleaching)

(c) He is responsible for the final brightness of pulp.

2. BPWAs (Bleach Plant Washer Attdts)-2 → IIIrd floor
- One each in Ast and Bst.

(a) As per instructions from Mixer Man he informs the Tower Chest Man (by the way of whistling) to run the pump of Tower Chest.

(b) He runs Chlorine Washer (No. I)
- He runs screen chest pump at Ground floor. He has to go to the ground floor for valve opening.
- He opens suction dilution valve at first floor. If fresh water pressure is low he informs Sirdar.
- He runs the Chlorine Mixer, booster pump (3rd floor) and fresh water pump.

(c) He opens Spray Washers of all the filters.

(d) He checks the flow rate of chlorine (Rotameter). If to be adjusted he informs Ch. Gas. Attndt at Ground Floor. Colour of the pulp should be particular one.

(e) As per instructions of Mixerman he increase/decreases speed of the Washers.

(f) He checks the inlet valve of chlorine Towers, Booster pump valves and Scr. Chest pump valves while starting the plant.

(g) To keep an eye on the level of the screen Chest (Unbleached pulp storage chest) and informs the Sirdar if it is low.

3. Chlorine Attendant (Ground floor)

(a) He maintains level of Bleach Liquor chests (2) and Caustic chest (1). Informs Chemical House about start/stop the supply of above chemicals. (He informs on Telephone or has go personally).

(b) He checks the Quality Bleach Liquor & Caustic and informs the Chem. House about it.

(c) He checks the stock of Chlorine Cylinders (Gr. floor). If less than Mim^{m} level he informs Supervisor / Sirdar.

(d) He is responsible for changing of Empty cylinders with filled cylinders at the supply line.

No. of Cylinders used / shift = $1\frac{1}{2}$

(e) He checks / maintains the temperature of the

Vapouriser (for Chlorine gas) and maintains the level of distilled water in Vapouriser.

(f) As per instructions of BPHA he adjusts flow rate of Cl_2 (gas) from Chlorine Cylinders.

(g) When any of the Gas line gets jammed he cleans it. (Air Pressure).

(h) He is responsible for leakage of Chlorine gas in lines.

(i) He checks an empty chlorine Gas Cylinder with the help of a Pressure Gauge. If some amount of the gas is left in cylinder then he drains it in Caustic S Tank.

(j) To change the supply line of Chlorine gas if the one under use gets jammed. Changing has to be done at Ground floor as well as at 3rd floor.

1. BPSA (Bleach Plant Screening Attendant) – IInd floor.

(a) As per the instructions of Final Washer Operator he runs the equipment. (Whistle-Signle)

(b) He maintains the level of Primary Centricleaning box.

(c) He checks the flow rate of reject from Press-Screen, Johnson Screen / Lindgreen Screen). If not proper he informs the Operator – II.

(d) He checks load on Primary Pumps.

(e) General / Acid Cleaning of Screens etc.

5. Bleach Plant Attendant – At No.3 Tower chest – Ground floor.

(a) As per instructions of Ist floor operator he runs the pump of No.3 chest. He maintains level in the chest and consistancy of the pulp so that best screening is done.

(b) He instructs 2-Shramiks about level of the chests.

(c) If dilution is not proper the screens get jammed.

(d) He relieves chlorine Gas Attendant when he goes to Chemical House for starting/stopping supply of chemicals.

6. Operator – II (At final washer) – Ist floor.

(a) As per level of the final stock chest he starts the final filter.

(b) Running of Press screen and Centricleaner and instructs 2nd floor Bleach Plant Attndt for starting necessary equipments.

(c) Instructs No.3 Chest Man in A-street and No.2 Chest Man in B-street for running pumps.

(d) He maintains level of Centricleaning Boxes (both streets). Increases/decreases pulp feed. He checks pressure of Centricleaners

(e) He checks the pulp Quality. "Carbon, Shives/Specks" then see ~~whether~~ whether Press Screen & Centricleaning are running okay.

(f) Final Washer samples to be shown to Supvs. (Every hour).

(g) For taking/giving pulp to PM-I he is instructed by Sirdar/Supervisor – he checks levels of the chests.

(h) If refiners are to be shut/started – he remains in contact with people at Stock Prepration.

7. Shramiks – 2 (at Tower Chest) Ground floor.
- for 'A'-steet Chest No 1, 2 and 'B'steet Chest No 1, 2.

(a) As per instructions of 3rd floor Bleach Plant Attendant he starts the pumps.
(b) He checks the leakage of Glands of pumps.
(c) He maintains proper dilution in the chest.
(d) He controls discharge valve of Towers
(e) To maintain level in the chests – Tube type level indicator is there.

8. Shramik – 1 (Final Washer Operator Asst): Ist Floor.
(a) He assists the Final Washer Operator in his jobs.
(b) He helps Chlorine gas Attendant in change over of cylinders.
(c) He prepares Sulphamic acid (once in 24 hours) at 3rd floor. It takes about 1 hour to prepare the above.

9. Shramik – 1 2nd Floor.
(a) He is responsible for continously jam lifting of Johnsons Screens. (With the help of a trolley)
(b) He is responsible for General Cleanliness of the 2nd floor.

10. Sirdar – 1
(a) He is responsible for overall supervision. He sends the sample of pulp to supervisor for PH checking and instructs BPWA accordingly.
(b) To prepare a sheet of pulp in final stage for judging the quality of the pulp. He also checks brightness of pulp.
(c) He checks Fresh Water Pressure and informs Pump House. He also instructs/advises about adjustment of pulp rate.

Proposals of Man-Power reduction in Pulp Mill-II.

1. Digestor House.

Combination of jobs of Sirdar and Cooking Attendent :-

Cooking Attendent and Sirdar both remain on IInd floor for most of the time in a shift. Job load on cooking Attendent (as in Job Write-up) is quite low and work done by him is also not of specialised nature. His work is proposed to be dispersed between Sirdar and Operator as follows. (Refer Job Write-up of cooking Attendent).

1.	Chemical Dosing	To be done by Sirdar.
2.	Checking of Lid	To be done by Sirdar.
3.	Check the blow Tank position. Or A blow tank level recorder is put at Ground Floor so that Blower himself can see the level.	To be done by Sirdar.
4.	Pumping of Liquor/Caustic to overhead tanks.	To be done by Sirdar.
5.	Operation of pump Ground floor.	To be done by the Blower/ Blower helper.
6.	Opening of valves at Ist floor.	To be done by Operator at Ist floor as told by Sirdar by the way of whistling etc.

2. Wash Plant :

(a) Combination of jobs of two shramiks at Johnson Knotters:-

Work load of Shramik in 'A' Street is very less. A common shramik can do the following for both A street and 'B' Street.

1. Maintenance of flow rate of pu,p as per instructions of Operator.
2. Regulating the flow of water.
3. Pushing the reject of Johnson Knotters at 'B' street (only) to the pipe leading to 2nd floor. (Once in 2 hours).

For further facilitating the work a screw conveyor may also be provided for automatic removal of reject at 'B' street.

b) A common Operator for 'A'-street and 'B'-Street at vaccum Washers/Filters (at 3rd floor).

A common operator can effectively manage the vaccum washers for both 'A' street and 'B' street which run in parallel. Work load on the operators is low (refer Job-write up) and their position is fixed on vaccuum washers. For implementation of the above the following facilities should be provided.

b-1) A direct access to be provided from 'A' street vacuum washers to 'B' street Vacuum washers. This can be done by the way of providing a wooden platform across at the end of vacuum filters in both the streets.

b.2) It will further facilitate the working of the Operator if "Seal Tank Level Recorders" for both the streets be put at one place and at the same level as the vacuum filters.

3. Bleach Plant :

Mixer man job to be divided among the two Bleach Plant Washer attendents.

Work Load of Bleach Plant Washer attendents and Mixer is very low (refer Job Write up).

a) Maintaining of Levels of Towers - The job to be performed by the B.P.Washer Attendents for their respective streets.
b) Sample checking of pulp - To be done by the respective attendents.
c) Final Brightness of Pulp- Respective Attendents responsible for final brightness of the pulp.

Proposed Man Power Allocation :

Digestor House :

Sr.No.	Designation	No. of persons
1.	Sirdar	1
2.	Operator	1
3.	Digester Blower	1
4.	Helper Blower	1
5.	Shramik	5
	Total	9

Wash Plant :

1.	Sirdar	1
2.	Operator	1
3.	Screen Room Attendent	1
4.	Blow Tank Attendent.	1
5.	Wash Plant Attendent	1
6.	Shramiks	2
	Total	7

Bleach Plant :

1.	Sirdar	1
2.	Operator	1
3.	Bleach Plant Washing Attendent.	2
4.	Bleach Plant Screening Attendent.	1
5.	Chlorine Attendent	1
6.	Bleach Plant Attendent	1
7.	Shramiks	4
	Total	11
	Grand Total =	27

The reduction in the Pulp Mill as a result of the study is 4 men/shift which is about 13% of the existing man power allocation.

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MAN POWER PLANNING INCLUDING JOB WRITE
UP OF ALL OPERATIONS IN MACHINE HOUSE-II

*++

Man power Planning including Job Write up of all operations in Machine House - II.

O B J E C T I V E :

To prepare the job write of the workers Category for the sections of Machine House-II in which study was carried out and to establish the saving figures in the possible areas of reduction in man-power.

About Machine House-II.

Machine House No.2 can be divided into three sections :-

1) Stock Preparation
2) Machine No. 4
3) Rewinders and cutting section.

Stock Preparation :-

It is done after the pulp Mill-II i.e. when the pulp is finally washed and is collected in buffer chest of 10-12 tonnes capacity. The pulp which is made in PM II does not contain fibres of uniform length. So the purpose of stock preparation is to make the fibres of uniform length so that the paper made from such pulp is free from cloudiness. The cloudiness of the paper is seen in presence of light. Stock from 'A' street in buffer chest is pumped to Jordan Refiners No.2, 3, 4, 5, & 6 which work in series and it is the first stage refining of 'A' street stock. Buffer chest has one stand by pump which is used in case of failure of one pump. Now the stock goes to stock chest No.2 and it flows further to two refiners. The stock of 'B' street flows into bleached chest No.2 and flows to two refiners and then to stock chest No.1. None equal quantity of pulps from two streets is mixed. The proportion of pulps from streets depends on the quality of paper required. The mixture then goes to mixing Chest No.1 then to bleached chest No.2 and then to second stage of refining which has four refiners 7, 8, 9, 10. This

stock is taken to mixing chest No.2 where alun, clay size are added in it. Alun and size are added to produce precipitation of ink so that ink does not spread on the paper. Clay is added to give weightage to paper and to produce smoothness on the paper. Pulp is agitated in mixing chest No.2, 3 and machine chest No.1, 2 to have proper mixing of pulp with the chemicals and colours (dyes) which are also added in mixing chest No.2 to make paper of different colours. If needed the stock is once again taken to Jordan Refiner. Now the stock is ready for machine No.4.

MACHINE NO.4.

The stock, after being prepared in stock chest, goes to the centricleaners by pumping in centricleaning pump. The accept of the centricleaners goes to fan pump which pumps the stock to vertical stock chest. The reject is sent to stock preparation plant after passing through Johnson.vibratory screens. The accept goes to head box, from head box the consistancy of the stock is maintained as 0.5% where the water is removed firstly by gravity. Now wire part starts and the stock flows over the hydrofoils where vacuum is created by making the angle on the surface of the hydrofoils. Then it flows over the table rolls and section boxes where dewatering is done by vacuum in the section boxes. The water mark is made on the paper by dandy roll.

Now the sheet passes over the couch roll where more water is removed by vacuum. The consistancy of sheet goes upto 18 to 30% upto the couch roll. When sheet enters the first press roll, its consistency in 35-36%. After the press part the sheet goes to dryer section. Heating of the sheet is done by means of big castiron rollers, with steam inside. Steam temp. is generally 125-130^{o}C and

pressure 35 psi. Firstly small heating is done in first stage then more heating in second stage and then cooling in third stage. Total 33 cylinders are further divided into different sections as described under :

Ist set	=	6 dryers.
IInd set	=	6 "
IIIrd set	=	4 "
IVth set	=	4 "
Vth set	=	6 "
Sixth set	=	6 "

The first cylinder is a baby cylinder of smaller diameter size in order to avoid the effect of wriggling. In cylinders 34 and 35 cooling is done by fresh water inside. These two cylinders are made of copper.

Then the sheet goes to calendering where only 4% moisture is remaining in the sheet. Calandering gives a smoothening action to the paper. Ultimately the sheet is rolled on the rollers.

Rewinder :

The function of rewinder is to make the roll of required deckle and to cut the roll into different deckles at the same time. There are two cutters one is Mason slot rewinder and other is Belort Rewinder. In Mason slot rewinder there is front drum rewinding where in case of Belort Rewinders there is Back drum winding. The speed variation between the backdrum and front drum is achieved by differential drive in case of Masons system.

Cutter :

There are two types of cutters one is simplex cutter and other is Duplex cutter. There is one revolving Knife in the simplex cutter and two different sizes of the paper can be cut simultaneously.

The sheet lengths are varied by changing rpm of the revolving knives i.e. if the knife cuts are faster more paper passes between strokes of knife. This cutter has a working deckle of 122" and handles upto 12 rolls of 60 gsm each time.

Sections of Machine House-II in which study was Carried out.

1. Stock Prepration.
2. Machine No.4.

Present Man Power Strength in above sections :

STOCK PREPARATION.

Designation	No.
Sirdar	1
Assistant Sirdar	1
Size Man	1
Assistant	1
Shramiks	2
Total	6

MACHINE NO.4.

Head Mistry	1
Mistry	1
Dryerman	1
Attendents	3
Assistant	1
Pulper Assistant	1
Shramik	2
Total	10

Grand Total = 16

SCOPE OF THE STUDY :-

The manpower strength for Machine No.4 is more or less an emergency man-power strength. With respect to the regular jobs to be performed in this section the man-power allocation is very high. But with respect to the emergency needs i.e. while the paper sheet breaks the strength is quite justified. The loss in production of paper is about 50 kg. per minute which means about Rs.400/- (Market value) for the cheapest quality of paper. The crew being an emergency one the allocation is quite justified. It becomes difficult to assign position to any particular member of the crew during the Paper Break. The main aim is to keep the paper running and every member of crew galvanises into action in the area(of the machine) he might be while the hooter signifying the Break in paper goes off.

Method followed for the study :

The study was carried out sectionwise i.e. first for the stock preparation and then for the Machine No.4. Going around with respective Supervisors the positioning of various men was understood. Then workers were observed silently on their work spots. After discussions with respective supervisors the Job Write up for all the workers were prepared. Analysing the job write up the probable areas of man-power reduction were identified.

Job Write UP

STOCK PREPRATION :

1. SARDAR (Ist floor).

1. Testing of pulp for freeness and consistancy at different stages.

Final Washer	A st.	B st.
Unrefined stock	A st.	B st (A+B) st.
Refined stock	A st.	B st (A+B) st.

and consistancy of back water.

2. Monitoring of Refiners as per instructions.

- Loading/unloading depending upon the requirement of fineness in fibres wrt freeness.
- Regulate the flows.
- Bypass any particular Rejiner when there is a need for repair etc.

3. Checking Levels of chests intermittently for Refined stock chest 1, 2, 3.

and Regulation of flow of pulp in chests.

4. Take samples for testing in lab for (A+B)
- every two hours.

5. To stop the refiners & whole plant as the machine is stopped for a longer period.

6. Overall Supervision of Stock Prep. section.

2. ASSISTANT SARDAR (2nd floor).

1. Filling of Measuring tank.

2. Emptying the measuring tank into the Bleached stock chest No.2 of A-street.

3. Regulating of flow of pulp from refined stock Chest No.3 to Mixing Chest No.2.

4. Regulation of flow of pulp from Refined Stock Chest No.3 to Mixing Chest No.3.

5. Maintain the level of chests when pulp is supplied so that chest do not overflow.

6. To regulate the stock of Mixing Chest No.3 to Machine Chest.

7. He is responsible for running of "Thickner".

8. Measuring tank is emptied into the Couch pit. He is to ensure that couch pit is empty before pulp is supplied to itwith the help of a pump.

9. Report to Supervisor/Sardar for not working of various pumps, breakdown or mechanical fault.

10. When Machine is stopped (for a shut or change of order) he cleans Mixing chest No.2, 3, andMachine Chests by the way of spraying water.

11. Operation of various pumps i.e. Refined Stock No. 5,4.

12. To stop the pump and agitator of couch pit when machine is shut and divert pulp from Thickner to Refined stock chest No.5.

3. ASSISTANT (Ist Floor)

1. He helps the size man in mixing of various dyes and chemicals.

2. He brings the samples of the following and checks up their PH on an Electronic Automatic PH Metre.

- Final Washer Pulp	- 2 times in a shift.
- Back water	- 4 times in a shift.
- Head Box	- Once in a shift.

3. He helps the Sirdar while By-passing one of the Refiners/starting a Refiner.

4. To pump the pulp from hydropulper to the Refined stock Chest No.5 when both the shramiks on Duty are casuals.

5. To relieve Asstt Sardar and Sizeman for their personal needs.

6. To attend to breakdown of Pumps/Refiners and gland leakage etc. He calls the fitter for repairs.

7. He checks the Final Washer Pulp sample for bleaching, shade and brightness.

8. He informs the Sirdar at PM-II to start the pump at Refined stock chest No.5 which pumps the stock to hypochest.

4. SIZE MAN (Ist floor).

1. Preparation of solution of Dyes for addition in the stock.
2. Addition of size, Alum, clay etc in the Mixing Chest No.2- every ½ hour.
3. Checking of the shade of the pulp in Mixing Chest No.3.
4. Transfer of stock from Mixing Chest No.2 to Mixing Chest No.3.
5. To clean the chests (as directed) on a Machine Shut day.

5. SHRAMIK-I. Permanent/Casual.

1. All the Peon jobs of the Deptt.
2. Helps Shramik-II in feeding the broke to the hydropulper.
3. General cleaning of the section.
4. To get the dyes, chemicals and stationary issued from Gen. Stores and stationary stores resp.

6. SHRAMIK-II (Permanent) - Ist. Floor.

1. Feeding of broke into the hydro pulper. This feeding is continously done till the hydropulper is full.
2. Addition of water in the hydropulper as per requirement for dilution of stock (Regulation of Value).
3. After the stock is ready he is responsible for starting the pump (at Ground floor). The stock is pumped to stock chest No.5 and he has to see that the chest does not overflow.

Job Write Up - Machine No. 4

1. Head Mistry
   (a) To examine the tail end of the paper break and find out cause for the braks. If break is too frequent and cause is evident then do the necessary adjustments in consistancy of Pulp etc.
   (b) To clean the Dandy Roll after a break. (This is done 3-4 times in a shift. If breaks are more frequent the cleaning is not done every time).
   (c) To check the alignment of 4 Press Wire rolls.
   (d) To feed the paper strip to the First Press and Signle the Wire man for increasing the Width of sheet.
   (e) He in responsible for GSM of paper.
   (f) He is responsible for Proper sheet formation.
   (h) He is responsible for Overall proper Running of the Machine.

2. Press Boy (Positional Manning) — He sits on a raised platform after the Wire Part.
   (a) Clean the Doctor blades of the Press Rolls.
   (b) Throw the broke into the broke trolley.
   (c) To find out the "tail end" of the paper break and give it to the Head Mistry for examining the cause of break.

3. Wire Man (Positional Manning)
   - To guide the wire when ever it shifts.

   When paper breaks at Wet End
   (a) On being signalled by the "Press Boy" he decreases the width of paper sheet.
   (b) To inform of the "Break" to the crew at dry end by the way of Whistling.
   (c) To increase the width of paper sheet as it is progressively fed from Press Part to Dryer Rolls etc as per signal by concerned man.
   (d) To lift the Couch draw Roll with the help of hydraulic mechanism.
   (e) To feed the paper to Ist Press.

4. Misty →

   He is responsible for the Dry End which covers
   (a) All the dryers (b) Calenders (c) Reel etc.
   (d) He is responsible for checking of GSM.
   (e) He is responsible for maintaining proper Moisture Content.

5. Dryer Man -
   (a) Steam Regulation to dry the paper to the correct Moisture Content.
   (b) To guide the shell (while reel change) smoothly on to the stand.

6. Assistant –

(a) To see the role surface and take corrective action for defects.

(b) To put the hook/s on to the shell stub or fulled reel ends while a change over is done.

7. Attendants – 2

(a) To see that the felts do not go off the Dryer Cylinders.

(b) To operate the crane (1) when a reel is changed or shifted to the ground floor.

8. Pulper Assistant and 2-Shramiks – Total 3 men
– Ground Floor at the hydropulper.

(a) Put the broke into the hydropulper. (Continously)

(b) To send the broke pulp to the Stock Prepration Chest. Operate the pump and see that the chest does not overflow.

(c) To clean the screens and Water Drains. (Twice a shift)

(d) To shift the Press Broke of Machine (2nd floor) to the Stock Prepration section.

(e) General Cleaning of Machine and Pulper.

(f) To bring food etc for Supervisor.

Proposal of Man-power Reduction in Machine House-II.

STOCK PREPARATION :

Abolition of Job of Assistant in Stock Preparation :

The work load of Assistant is very low and nature of his duties is that of a Helper and a Reliever. The Shramiks of the section are also under loaded except for days when 'Broke' (Waste Paper) in high amount which is a consequence of two many breaks on Paper Machines or Coating Plant. The job of Assistant is proposed to be distributed amongst his other crew members as follows :-

a) Mixing of Dyes and Chemicals :- Mixer man to perform the above job completely and if need be take help from Shramiks-I.

b) Bringing of Sample for PH Checking :- Shramik-II and Sirdar to collect all the samples from various spots.

c) Checking of PH on Electronic metre :- To be done by Sirdar.

d) By passing/starting the Refiner :- This is a job of irregular nature. Shramik-II to help the Sirdar in performing the above.

e) Pumping of Pulp from Hydropulper to Refined Stock Chest No. 5 :- To be done by Shramik-II.

FINISHING, TRIMMING & CUTTING ON

GUILLOTINE AND PACKING OF COPIER PAPER

FINISHING, TRIMMING & CUTTING ON GUILLOTINE AND PACKING OF COPIER PAPER.

OBJECTIVES :-

1. To study the existing work-system and work out a cost benefit analysis if instead of the present manual system a mechanised system for counting of sheets of paper is used.

2. Do a Method study of paper trimming and Cutting on Guillotine machine and arrive at productivity norms through Time Study.

3. To set norms for packing copier paper reams manually in corrugated boxes and workout an optimum gang size for the above work.

4. To work out cost Benefit analysis if instead of present systemof packing of copier reams (as in (3)), the reams are Shrink-Wrapped.

PRESENT WORK SYSTEM :-

Copier paper is cut into sheets on a Duplex Cutter. These are further cut into small precise sizes on Guillotine Machine owing to stringent requirement of Photo-copying machines.

After having been cut on Duplex Cutter pallet full of copier paper is supplied to "finishers". Finishiers are highly skilled workers. Their operation initially includes sorting out the creased sheets (which can not be used on Photo-copier M/c) and counting the bigger sheets into reams of 500 each. They then put top and bottom 'flats' (braon paper of - GSM) on the reams and restack them on pallets. These pallets are then taken to the Guillotine M/c where sheets are cut into smaller precise sizes after having been trimmed for about 0.5 cms on all the sides.

These cut reams are delivered to 'Finishiers' who pack individual reams in wrappers. 12 such reams are then packed in a Corrugated box. About 300 of these corrugated boxes are loaded and despatched in a full-truck load.

GSM OF COPIER PAPER IS 75/80 GSM (Grams per sq.meter)

Major sizes Cut at Duplex Cutter :-

		Nominal Weight.
44 x 61 cms	(a)	9.2 kg.
44 x 71 cms	(b)	11.2 kg.
44 x 90 cms	(c)	13.8 kg.

Major sizes cut at Guillotine Machines :

21.5 x 29.7 cms	(d)	2.3 kg.
21.5 x 34.5 cms	(e)	2.8 kg.

Height of 1 ream (500 sheets) of copier paper = 5.5 cms.

NB : 1 ream of (a), (b) is cut into 4 reams of (d) and (e) resp.
1 ream of (c) is cut into 6 ream of (d)

Mobile Automatic counting Machine vis-a-vis present system of counting :

As explained in the "Present Work System" a Finisher is responsible for sorting, counting and Packing of individual reams. Performing the above, output/finisher/shift for copier paper is 1.25 MT. As per the present production of copier i.e. 200 MT/month the no. of man-days reqd. per month (of Finishers) = 160. However for counting alone 63 mandays/month are required.

When a mobile automaticcounting machine is used, operation "Sorting" can be done at the Duplex/Simplex Cutter and counting on the proposed machine. With this machine running at normal speed and working one shift/day 23 man-days will be required per month for a production of 200 MT. This leaves us with saving of 40 men per month.

The approximate cost of this machine is Rs.2,60,000/- (Quotations attached with pamphlet of the manufacturer) and saving arising per annum is arround Rs.39,000/- (Details in Annexure). The straight pay back period is more than six years.

For only copier paper this machine will not be fully utilised. However if other qualities of paper are counted and finished in the similar fashion the proposal might work out to be more useful and profitable.

PORTALS ENGINEERING LIMITED

SULBY VACUUMATIC DIVISION

10-12 Lombard Road
London England SW19 3XN
Telephone 01-540 9782
Telex 8955041

Pro Forma Invoice No

Invoice To

Ballarpur Industries Ltd
124, Janpath
Thapar House
New Delhi-110 001

Despatch To Bombay

ITC Policy 1985-88
OGL
Appendix 1 Part B(11)-18
ITC No.726.7209
CTI No.84.35

Your Order No	Our Order No	Terms
		LETTER OF CREDIT
Despatched By	Carriage	Invoice Date / Tax Point
MARITIME	Paid	23 Jan 1987

Quantity	Part No	Goods	Price £
ONE		VACUUMATIC MARK SIX PAPER STACK COUNTER	
	Description	A mobile paper counting and tabbing machine designed to count stacks of paper up to 122 cms high on a pallet. The paper can be stacked up to 10 cm. inside the pallet edge.	
	Specifications		
	Performance	Counting speed up to 1500 sheets per minute (variable)	
		Substance range 30-170 g/m2 approx. subject to paper quality.	
		Electronic tabbing at any number from 20-999	
		Stack capacity 122 cm on a 15 cm pallet	
		Sheet size from 300 x 560 mm upwards.	
	Electrical Control Console	220 ~~110~~ volts, 50 ~~60~~ Hz., 1 ph. 12 amp. 6 digit total sheet count, batch counter, 3 digit display read-out, tape on/off switch.	
	General	Machine weight 296 kg.	
		Machine dimensions 1980 x 1450 x 910 mm.	
		Packing case spec. Gross 635 kg.	
		Meas: 122x142x 219 cm.	
	Delivery	4 weeks to vessel/carrier.	£ STERLING
	Price	Machine including Tool Kit.	
		Recommended spares set and 480 rolls insert tape.	
		Export packed.	
		Total FOB UK port.	£12,670.--
		+ cif charges	880.--
		Total cif Bombay	£13,550.--
	Payment	By Irrevocable Letter of Credit confirmed at sight on the National Westminster Bank Limited, Overseas Dept., Bloomsbury Parks Branch, 126 High Holborn, London, Account No 36944416, Portals Engineering Limited.	

SALE

VAT at 15%

E & OE

THIS QUOTATION IS VALID FOR 60 DAYS

VAT Registered No 318 3677 41

FOR PORTALS ENGINEERING LIMITED

SULBY VACUUMATIC DIVISION

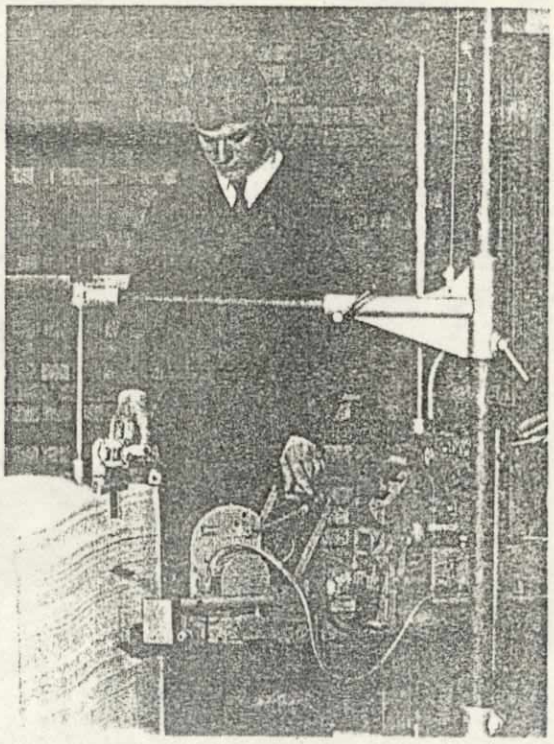
PORTALS ENGINEERING LTD.

PF/MARK6/ENG

A member of the Portals Group
Registered number 1327078 England
Registered office Havelstoke Mill
Whitchurch
Hants RG28 7NR

1982 The Queen's Award for Export Achievement to Portals Holdings PLC

MARK 6 for speed and accuracy



As paper and production costs have soared over the last few years, printers everywhere are finding it vital to reduce waste at each and every stage of the printing process. Vacuumatic's sophisticated suction blade and wiper pin mechanism offers you extremely precise counting right throughout the job — a degree of accuracy unrivalled by other counting methods.

Consider what inadequate sheet quantity control is doing to *your* business — then take a look at some of the areas where the Mark 6 stack counter can help:

- Incoming paper supplies: Ensure you only pay for what you get.
- Off press: Reduce overs and eliminate shortages before the press is broken down.
- Book production: Post press stack counting gives you accurate signature balance to the bindery.
- Outside finishing: Check the quantity before you send to finishers.
- Eliminate disputes: Avoid delayed delivery and disruption of production schedules for shortfalls.

Features:

Fully mobile.
Infinitely variable tabbing, with total and batch quantity indicators.
Table attachment for small sheets, with stacks up to 300 mm (12") high.
Exceptionally high degree of accuracy on paper, film and foil.
Extended height option for stacks up to 1525 mm (5') from ground level.

Specification

Maximum Counting Speed
1500 (sheets/minute)

Substance Range 30 — 170 (gsm)

Minimum Sheet Size 560 × 300 mm (12" × 12")

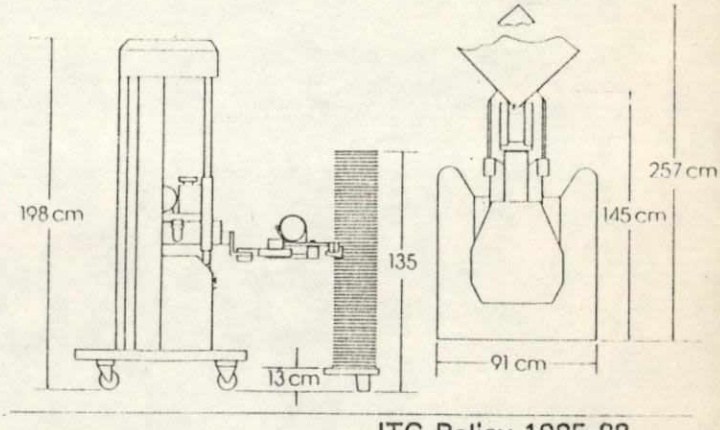
Paper Height 1220 mm (4')

Tabbing Range 20 — 999

Electrics: 220V 50Hz — 6 Amp 110V 60Hz — 12 Amp

Options:

Extended height version to 1220 mm (4')



ITC Policy 1985-88
O.G.L.
Appendix 1 Part B(11)
ITC No. 726.7209
CTI No. 84.35.

A DIVISION OF PORTALS ENGINEERING LIMITED

SULBY VACUUMATIC

10-12 Lombard Road, London SW19 3XN
Telephone: 01-540 9782. Telex: 8955041

ANNEXURE

Mobile Automatic Counting Machine vis-a-vis present system of counting :

Present system Details :

Present production of copier = 200 MT/Month

Copier Finished (Sorted, counted and packed) = 1.25 MT/Finisher/Shift.

Monthly production is 80:20 for nominal wts 9.2 kg. and 11.2 kg.

$$\text{Avg Nominal wt} = \frac{80 \times 9.2 + 20 \times 11.2}{100}$$

$$= 9.6 \text{ kg.}$$

$$\text{No. of reams to be counted/month} = \frac{200 \times 10^3}{9.6}$$

$$= 20833 \text{ reams.}$$

Counting time/finisher/ream = 65 secs.

$$\text{No. of man days for counting} = \frac{20833 \times 65}{60 \times 60 \times 6}$$

= 63 man days assuming 6 hrs work/shift.

Details with Proposed Machine :

Max Speed of Mobile counting M/c = 1500 sheets/min.

Let us assume 1250 sheets/min. to be the normal counting speed.

No. of reams counted in 1 min. = 2.5

Time taken for 20833 reams $= \frac{20883}{2.5 \times 60} = 138.9$ hrs.

= 23 days (1 Shift/day)

The above has been calculated considering 6 hrs work on machine in a shift.

Contd....

Saving :-

Net saving in terms of Man Days = 40 men/month.
Cost of skilled labour/month = Rs.2100/-

Saving/month $\frac{40 \times 2100}{26}$
= Rs.3230/-

Saving/year = Rs.38,770.00

Total cost of M/c cif Bombay = Rs.2,44,000/-
Total cost with other expenditures = Rs.2,60,000/-
Straight pay back period = 6½ years.

The above machine is not worthwhile to be purchased under present conditions.

Study of Copier Paper Cutting with Guillotine M/c at FH-III.

1. Gang size - 4 men (1 operator and 3 shramiks)

2. Present Work System :

The shramiks bring paper from Finisher's table to the quillotine m/c with the help of a pallet truck. One shramik (the supply shramik) supplies the paper reams to the m/c operator after evening out the edges. The operator trims all the sides and then cuts it in to smaller reams. ANOther shramik (take off shramik) removes the cut reams from the machine and stacks them on a pallet. The third shramik removes the broke pallis by head load from FH-III to Pulp Mill I on his head. (Distance 350 metres approx.)

3. Rationalization :

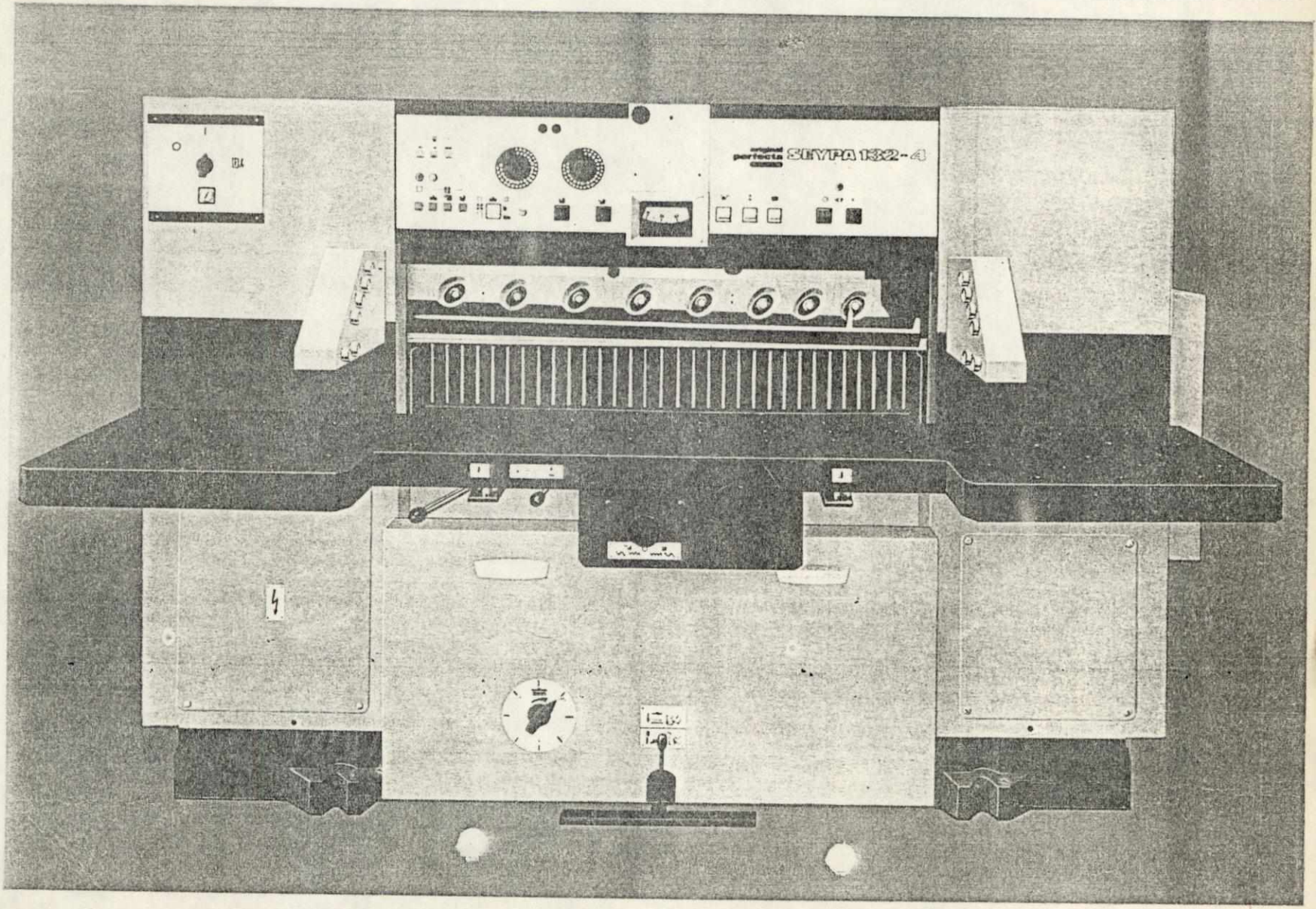
The utilisation of the third shramik who removed broke pallis was very low. The broke Pallis are now kept aside by the two shramiks to be removed by Finishing House Broke removers. The third shramik has been released.

Rationalized Gang size - 3 men (2 operator, 1 shramik).

4. Productivity :

Two reams (75/80 gsm) are cut into 8 reams of nominal wt varying between 2.3 kg. to 3.7 kg. in one cycle of the programmable Guillotine machine.

The productivity has been arrived through time study (Annexure I). The productivity of the gangsize of 3 men is 1616 reams/shift and hence the minimum productivity of the gang will be 3.7 MT/Shift considering a nominal wt of 2.3 kg/Ream.



Guillotine machine on which 'Time Study' was carried out for setting 'Productivity Norms' for cutting of Copier Paper.

ANNEXURE

Time Study :- The entire operation was broken into small elements for the purpose of time study.

The job elements for time study were as follows :-

1. Lifting of two reams from pallet to table (by Shramik-I)
2. Setting and evening out the edges of two reams (by Shramik-I)
3. Supply of the reams to operator (Shramik-I and Operator)
4. Cutting of reams into smaller precise reams (Operator)
5. Handing over reams to the other shramik for removal (Operator and Shramik-II)
6. Disposal of Cut reams from table to pallet. (Shramik-II)

N.B : The person(s) working during a particular elementle time are shown in bracket.

TIME STUDY IN A TABULAR FORM IS GIVEN BELOW :

S.No.	1.	2.	3.	4.	5.	6.
1.	3 sec.	5 sec	4 sec	64 sec	5 sec	22 sec.
2.	7 sec	15 sec	5 sec	55 sec	5 sec	20 sec
3.	3 sec	17 sec	5 sec	57 sec	7 sec	28 sec
4.	4 sec	20 sec	4 sec	59 sec	7 sec	26 sec
5.	7 sec	28 sec	5 sec	68 sec	8 sec	27 sec
6.	10 sec	27 sec	4 sec	64 sec	8 sec	20 sec
7.	7 sec	25 sec	5 sec	70 sec	6 sec	30 sec
8.	10 sec	25 sec	5 sec	74 sec	7 sec	32 sec
9.	13 sec	23 sec	4 sec	75 sec	7 sec	20 sec
10.	15 sec	25 sec	5 sec	65 sec	9 sec	30 sec
11.	8 sec	20 sec	4 sec	70 sec	7 sec	29 sec
12.	14 sec	22 sec	5 sec	65 sec	7 sec	25 sec
13.	15 sec	21 sec	4 sec	62 sec	8 sec	24 sec
14.	13 sec	26 sec	6 sec	66 sec	9 sec	25 sec
15.	14 sec	23 sec	4 sec	65 sec	8 sec	26 sec.
16.	7 sec	15 sec	5 sec	70 sec	7 sec	22 sec
17.	10 sec	17 sec	4 sec	69 sec	8 sec	23 sec
18.	9 sec	21 sec	5 sec	66 sec	7 sec	25 sec
19.	13 sec	19 sec	3 sec	64 sec	9 sec	23 sec
20.	7 sec	23 sec	4 sec	68 sec	7 sec	27 sec
Avg. value	9 sec	21 sec	4.5 sec	66 sec	7 sec	25 sec

Total Cycle Time = Avg. ((3)+(4)+(5)) = 78 sec.
Time for which shramik-I is busy = Avg. ((1)+(2)+(3)) = 35 sec.
Time for which Shramik-II is busy= Avg. ((5)+(6)) = 32 sec.

Time for which operator is busy = Total Cycle Time.

One pallet load has got approx. 70 reams. These can be cut in 35 cycles because 2 reams are cut into 8 reams of smaller size in one cycle.

Time for cutting one Pallet load of paper = 35 x 78
= 2780 sec.
= 45.5 mts.

Time for shifting cut pallet load to the packing sight and bringing new pallet load for cutting (Shramik-I and Shramik-II do the above shifting) = 10 mts.

Total Time taken/pallet load = 55.5 mts

Assuming a 100% rating factor Normal Time = 56 mts.

Rest and Personal Allowances - 1½ hours have been kept for personal needs eg Lunch, tea and other needs.

Process Allowance :- Nil . Since utilisation of both shramiks is much less during the whole of cycle time i.e. out of 78 secs of the cycle time the supply shramik is busy for 35 secs and the take off shramik for 32 secs so the question of forced idleness on the part of the operator does not arise.

Interferance Allowance : Since wrapper material for packing of reams is also cut on the guillotine machine so an interference allowance of ¾ hours - 1 hour is being provided.

Contd.

Monthly allowance -:

This ia applicable to only the operator but he gets a rest of 10 minutes after cutting of each pallet load . These 10 mts accounts for his fatigue relief which is very less otherwise.

Productivity :

Considering a work of 5½ hours or 330 mts.

No. of reams that can be cut $= \frac{330 \times 35}{560}$

= 206 reams

= 206 x 8 smaller rms

= 1648 -do-

Since nominal wt varies between 2.3 kg. to 3.7 kg. and 80% of the production is of the reams having nominal at 2.3 kg., we recommend the minimum productivity/shift as the Norm.

Minimum Productivity : 1648 x 2.3 = 3.79 MT

Or 1648 reams.

Norms for packing of Copier Reams in Corrugated Boxes:

The wrapped copier reams are packed in 5-ply corrugated boxes. Each box contains 12 reams.

Major Box Sizes :

44.5x36x30 cms
44.5x36x32 cms
52.5x37x32 cms

1. Optimum Gang size - 3 men (1 operator, 2 Shramiks)

2. Work System :-

The labels are pasted on the corrugated flats. Then a flat is converted into a box by one shramik and he also puts 12 reams into this box and supplies to the Operator and 2nd shramik. The operator strops the box with polypropylene strip at three pts. The strip is tightned with the help of a tightner and the metal clip holds the polypropylene strip which is fixed with the help of a strappler. The packed boxes are then kept on a pallet by the Shramik & operator . The supply of the wrapped reams in pallet = fulls is also done by these shramiks.

3. Productivity :

Productivity of the Gang = 130 boxes/shift with 12 reams packed per box. Working time has been considered as 6.5 hrs in a shift. The time study and calculations to arrive at this productivity is given in Annexure-II.

4. A heat sealing machine for tightening and sealing of Polypropylene tape is lying with the Department and is presently out of order. If this machine can be repaired and used, it will enhance the productivity substantially and also save manpower. The saving will be due to its speed and requirement of a Gang-size of 2 men.

The time study of the Cycle-time for packing of copier boxes is as below :-

Time taken for One Cycle :-

2 min 30 sec.	2 min 49 sec	2 min 12 sec
2 min 27 sec	2 min 50 sec	1 min 50 sec
1 min 48 sec	2 min 46 sec	2 min 31 sec
2 min 39 sec	2 min 42 sec	2 min 40 sec
2 min 14 sec	2 min 34 sec	

Av. packing time for complete cycle = 2 min 29 sec.
Packing time for one pallet load (35 boxes) = 2 min 29 x 35
= 86.91 mints.

Time for shifting of packed box pallet to the loading sight and bringing of pallet load of reams for packing = 10 mts.

Total time taken for packing of one pallet load = 97 mts.

Working Time considered = 6.5 hrs out of which ½ hour has been kept for label pasting. Labels are to be pasted on corrugated flats at the start of shift by operator and two shramiks.

No. of boxes packed by above gang size = $\frac{6 \times 60 \times 35}{97}$
= 130 boxes.

Productivity for the given gang size = 130 boxes.

Allowances :-

Rest and Personal Allowances :- 90 mts or 1½ hour has been kept for personal needs and rest i.e. Lunch, tea etc.

Shrink Wrapping of Copier Reams instead of their packing in corrugated boxes.

Present work System :-

Presently about 200 MT of copier paper is packed in Corrugated Boxes (12 Reams of copier are packed in one corrugated box). The present packing cost (material only) is Rs.9.08/box or Rs.0.76/ream. The corrugated boxes presently used are 5-ply boxes.

Shrink Wrapping :-

It is proposed that 12 reams of copier paper are shrink ~~x~~ wrapped since, the packing cost of copier as percentage of cost of paper is quite high as compared to other varieties of paper. It is proposed that a 300 gauge LDPE sheet is used along with corrugated boards (3 ply) on all the sides and bottom. Corrugated boards on the sides and bottom has been kept togive it a box-shape and provide protection at corners.

Expected packing cost (Material & Electricity) = Rs.6.00/box.
= Rs.0.50/ream
Saving per ream of paper = Rs.0.26/ream
(Due to change in packing material).
Saving per month (200 MT copies paper) = Rs.20,000/-
(77000 reams of copier paper)
Saving of casual labour due to above method = 80 mandays/month
Cost of Casual Labour = @ Rs.30/manday
Saving in terms of casual labour = Rs.2400/month.

Total saving per month = Rs.22,400/-
Total saving per annum = Rs.2,70,000/-.

The cost of shrink wrapping machine is about Rs. 3,50,000/- so the straight pay back period will be

Contd.

a little more than one year. Additionally since the machine will be utilised for 8 to 10 days a month for copier paper, it will be available for packing other varieties of paper for 20 to 22 days.

The present packing cost details and proposed packing cost details are given in Annexure No.
The Project was discussed with the Head Sales Department and following necessary steps need to be taken before implementation of the above projects :

a) A small scale trial be made by the way of shrinkwrapping copier packs and these should be sent to cosumers for assessment of the Market reaction.

b) After analysing the reaction of the small scale trial, a large scale trial to be conducted. On the basis of the results of the above trial shrink wrapping to be adopted instead of packing of copier paper in Corrugated boxes.

Calculations and Details :-

A) PRESENT PACKING COST DETAILS :-

1. Cost of Box	Rs.8.00	Rs.8.00
2. Cost of Polypropylene tape/box		Rs.0.78
3. Cost of metal clips/box	Rs.0.30	Rs.0.30
Total		Rs.09.08/box.

Since in one box No. of reams = 12

Packing cost/ream Rs.0.76

B) Proposed cost details using shrink Wrapping Machine(Capitals)

1. a) Ream size = 29.7 x 21.5 cm h = 5.5 cms

Nominal at 2.5 kg.

b) Size of LDPE for the above ream size :

L = 30+30+36+36+10 = 142 cms

B = 44+36+10 = 90 cms

c) Wt of above size sheet :

Formula (Wt in gms) = $\frac{L \times B}{Z} \times \frac{\text{Gauge}}{3300}$ such that L,B are in inches.

$$\text{Wt.} = \frac{142 \times 90}{(2.54)^2 \times 2} \times \frac{300}{3300} \quad \text{(300 gauge)}$$

= 90.04 gms.

d) Cost of LDPE Sheet = Rs.33/kg.

Cost of the calculated sheet size = 0.090 x 33

= Rs.2.97/bundle of 12 rms

2. Cost of 3 ply corrugated board (for all the sides) = Rs.2.80/bundle of 12 rms

3. Cost of Electricity = Rs.0.23/bundle of 12 rms

Total packing cost = Rs.6.00/ -do-

Packing cost/ream = Rs.0.50

Note : The shrink w...
3 packs/minute. Cons...ping machine will shrink wrap
a shift about 8 shifts/mont... about 5 hours working in
wrap 200 MT (6500 bundles of no...l be required to shrink
...t 30 M.approx.)

Man Power Saving :-

1. Present Work System :-

Gang size = 3 men

Optimum productivity norm for above gang size = 130 boxes/...

No. of shifts required $= \frac{6500}{130}$ = 50 shifts/month.

No. of mandays/month = 50 x 3 = 150

2. Proposed Work System :-

Gang size = ~~8~~ 7 men

No. of shifts required for packing 6500 bundles = 10

No. of mandays required/month ~~= 8 x 8 = 64~~
= 7x10 = 70

3. Mandays saved/month = 150 - ~~64~~ 70
= 80 mandays/month.
(@ Rs.30/- per manday)

Saving/month = Rs.30 x 80
~~= 2580/- (Rs.)~~
= Rs 2400/-