Management of planned maintenance in small pulp and paper mills

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SUMMARY

Due to lower capital investment, depleting forest wealth and lesser gestation period number of small mills based on agricultural residues are increasing. The small paper mills in India, hence are playing a vital role in the development of Industry. One of the major problems being faced by the small mills is planning the maintenance to reduce the down time and improve the efficiency of the mill. In this article emphasis has been laid on preventive maintenance to avoid major break down. Suggestions have been given as to how preventive maintenance can be implemented with minimum cost.

The small paper mills in India will have to play a vital role in the development of industry. This will be basically due to following reasons:—

- 1. Depleting forest wealth creating shortage of forest based raw materials for expansion of large integrated pulp and paper mills.
- 2. Availability of sufficient quantity of fibrous raw materials. Such as agricultural residues, secondary raw materials at economic cost concentrated in various areas to sustain small paper mills.
- 3. Lower capital investment.
- 4. Lesser gestation period.
- 5. More employment opportunities in the form of direct and indirect employment.

One of the major problems being faced by the small mills is the down time due to mechanical failure of various equipments. Needless to say that the small mills with lower cost of installation, comparatively lower working capital and lack of proper infrastructure can not afford this, leading at times to serious set backs. Today almost all the small mills are suffering from this problem.

To overcome the above problem management has to play a vital role. No doubt prevention is the best cure - but is in general missing in small mills. The attention is paid only when a breakdown occurs. This results in, at time complete closure of mill for longer periods. To achieve higher industrial productivity, greater out turn with maximum degree of safety, ensuring maximum output, all equipments of the paper mill should receive regular attention. All the equipments and machinery provided for production should work with full efficiency with in specified limits through out its working life. To achieve this goal, the wear and tear of the machine should not exceed certain minimum limits. Proper care of machine ensures steady production and eliminates costly delays.

The two ways of conducting maintaince are-

(a) Adopting a regular plan of inspection tests and recording the details along with probable reasons and attending to it while the plant is in operation i. e. before breakdown. This is referred to as preventive maintenance.

(b) To wait untill the trouble or breakdown occurs and then attending to it. This is, at times no doubt, unavoidable but is very expensive and hampers the financial health of the mill.

In this article we would like to confine ourselves to preventive maintenance only.

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The Need of Preventive Maintenance :

Preventive maintainance is a planned and organised way to avoid or minimise breakdowns, excessive wear and excessive depriciation resulting from neglect. It is taken before the need arises and aims to minimise the possibility of unanticipated production interruptions. The major object of preventive maintainance is a direct contribution to profitability. It can be achieved by the following ways:—

a. Periodic inspection of all equipments and machinery by operators to avoid conditions leading to breakdown. Any abnormality to be recorded and brought to the notice of concerned person.

b. To attend the overhauling and repairs and equipments and machinery in such a condition while it is still in minor stage.

C. To provide proper guidelines about conditions during running as suggested by the manufac turer. For this every section should be provided with a check list indicating the critical parts of the machine and a log book for recording the condition of such critical parts.

D To have a planned shutdown of the mill at regular interval and check, repaid and replace, where ever essential, all defective parts which are likely to give problems.

In case the planned preventive maintenance is programmed the following objectives leading to improvement. in the contribution of profitability can be obtained :—

- 1. It can lead to uninterrupted scheduled production
- 2. It reduces cost of repairs.
- 3. Less stand by equipment increases.
- 4. It leads to greater safety of workers.
- 5. Expected life of plant and equipment increases
- 6. It reduces larges breakdowns leading to longer shuts.
- 7. It leads to better and reduced spare part inventory.
- 8. It leads to better control of inputs which is a must for the survival of any small mill.

Suggestions to start Preventive Maintenance Programme

Preventive maintenance programme should be planned right from the incept of the mill, Unfortnately the young entrepreneurs starting small

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paper mills neglect such an important aspect of management.

To achieve the basic activity of preventive maintainance the following plan is suggested to the management :

(a) Preliminary Planning and Organisation of Maintenance Deptt. :

The section should be directly under the management and should be responsible for safe and smooth running of all the equipments of the mill. the planning of preventive maintainance should, infact, be in consultation of production staff. A small group of young, dedicated staff members should be assigned such a job.

(b) Preparation of case history Card for every Machinery :

It is essential to have a different case history cards for machinery of similar type. This should give all the important informations supplied by the manufactures, changes/alterations done by the mill to suit the individuals need, complete specifications of various parts, list of essential/critical spares including the stock position of critical spares in the stores. One of the sample of case history card proposed is given in Annexure. Every case history card file, as far as possible. should be based on the past experience of operative staff and guidance of other mills operating such equipments. At the first oportune moment the working of critical equipments should be checked. The case history file of the machinery shouid be supplemented by :

(i) Active Job Requisitions :

It should include a copy of each work order or list the periodicity of attendance of machine. As far as possible a small description of work done probable cause of failure of equipment/reason for attending the case, number of manhours estimated and actually spent, the team of trade workers required to attend the work, the facilities required/ available in the mill for such job should be recor ded. One of the sample of requision card is given in Annexure II. In case it is felt that immediate shut down can save major breakdown it should be take a.

If the work to be attened can be postponed for scheduled shut an instruction to this regard should be recorded.

(ii) Completion Cards/Files :

This should contain copy/card indicating the date/time man hours spent including all possible including list of materials used, actual manhours

used converted into monitory terms. A sample completion card is given in Annexure III.

(iii) Operating equipment Records:

Records of all maintenance and operating efficiency of the equipments kept should contain the following information:—

-Location and code number of equipment.
-Manufactures name and technical specifications.

.....Production efficiency of the equipment.

-Number of breakdowns and amount spent for repairs,
- factures recommendations/planned initially. If not the reasons there of.
-The expenditure done on the equipment in proportion to the total cost of equipment.

.....Does the equipment requires major change in design or replacement one of the sample of operation equipment, record card is given in Annexure IV.

(c) Implementation of Preventive Maintenance

It is essential for inplementation of preventive maintenance to know.

......What to inspect/check

......How to inspect/check

......When to inspect/check

What to Inspect: When the list of items for preventive maintenance is prepared, the inspection point can be worked out by joint efforts of maintenance force, also the service manual supplied by the equipment manufacturers can guide what and when to inspect.

How to Inspect: A supervisor/Inspector who has the ability to test, adjust and repair the machine and equipment can be put for inspection work. The operation department staff can also provide the information regarding defects and faults. The observation of supervisor/inspector may be send to maintenance department alongwith inspection and job requistation card.

When to Inspect: With the list of items and records, the methodology of inspection can be worked out. The descrision as to how often the inspection should be done depends on several factors and the management. The staff can only be considered as the best judge to avoid extravagant expenditure. It may however be pointed out here the inspection is an essential part of preven-

tive maintenance and under no eircumstances it should be ignored.

Suggested plan for Implemention of work :

To full fill the need of preventive programme one of the important at aspect is planned lubrication. The breakdowns can considerably be lowered and troubles avoided if a proper planned lubrication programme is introduced. It is essential to consider the following points while planning lubrication programme :

-Method of application i.e. by gravity or pressure, should be adequate.

......Frequency of lubrication.

-Quantity of lubricant to be used.
-Surrounding conditions i.e. heat. cold, humid, dusty etc.
-Type or class of items being served i.e. plain bearing, antifriction bearings, gear boxes, paper machine drive spuragears, sceens, digesters, conveyors etc. It is important that the operators should know the correct specifications of the lubricants to be used, as often not adhering to correct specification can cause of problems.

The above are just a few example. The exact check list, however, has to be prepared by the individual mills. It may be worth mentioning that for all such jobs listed above, once the specification of various lubricants are made final for implementation, it is just the job of one person per shit. The list, thus prepared should also be made available to every department to ensure its implementation.

The inspection and job cards prepared by the supervisor/Inspector for the repair of machines and equipments while they are still in minar stage should also be with maintenance staff. The maintenance department have to conduct two type of repairs.

(i) Minor Repairs :—Such as replacement of demaged nut & Bolts, Keys, tighting loose nut & bolts, attending to leakage from joints of water ? steam, chemical and pulp lines, leakage of glands of pumps, replacement of repairs of guards and protective devices and welding of crackes etc.

(ii) Medium Repairs :- These the repairs requirs shut down for a short time. These jobs are replacement of Belts, Screen plates, knives of rag cutters,

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replacement of Bushes & Bearing, repairs/replacement of refiner tackles, bearing of rolls on wire part, guide rolls, stretch rolls, felt rolls, Press Rolls, Calender rolls, replacement of lining of brakes of hoist craine, clutches Adjustment of mechanism etc.

To carry out the periodic overhauling of machinery & equipment careful consideration of past experience and suggestion of manufacturs should be considered. To carryout such works the planned shutdown of mill at a regular interval should be taken. The operation and maintenance department should set up the shutdown dates in advance for entire mill. The planning should be such that the maintenance man power can be used more efficiently, where ever possible operational staff should be used to fullest extent during this time.

The jobs covered under this head are also know as major repair such as replacement and modifications of the pipe lines replacement of suction boxes, replacement of pullies and gear boxes and overhauling of machine drive, replacement and overhauling of vacuum pumps, stock pumps, agitators, screen etc.

The planning should be such that the shut down should be taken when wire/felts of machine are to be replaced. Infact it is felt that a planned shut for preventive maintenance must be taken once a month. The digester, pulp mill and driers/ M. G. on paper machine works under steam pressure and high temperature, periodically Hydroulic test of these may be conducted so that they work under perfect condition and safe operation.

Conclusion :

The authors, based on experiences on working of small mills, have emphasised on planned preventive maintenance, which is missing quite to few mills. In case a proper planned preventive maintenance programme is undertaken by these mills, the production efficiency of the mills is bound to increase leading to improved profitability. It should be borne in mind that prevention is always better than cure simple suggestions for implemention of planned preventive maintenance programme in such mills are discussed in brief.

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ANNEXURE-1

History Card of Machine and Equipments

1.	Name	2.	Modal
3.	Make	4.	Serial No
5.	Lubrication	6.	Years of manufacture
7.	Specifidation of various parts.		

8. List of spare parts.

Essential parts	Location.	Critical Parts	Location

9. Drawing and Manuals,

10. Important In formation supplied, if any,

11. Changes or altertion done, if any,

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Date.	Name of equipment	Probab of failu	le cause Est ire. hou	imated ma irs required	n No. of trac required.	le workers	Spare parts required.
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`	ANNEXURE—III Job Completion Card						
Date	Time of attending job	Name of equipment.	Description of repairs done.	Actual manhour spend.	'Actual No. of trade workers used.	List of spar parts used.	e Remarks,
			AN I Operating	NEXURE— Equipment	IV Record.		

ANNEXURE—II

Inspection/Job Requisation Card.

1.	Name and code No
2.	Location of Equipment
3.	Manufacturers
4.	Normal operating hours
5.	Class of lubrication
6.	production efficiency
7.	Specifications

Repairs Records.

SI No	Type of renairs/	No. of manhours	List of spare	Cost of
51. INU	breckdown.	spend.	parts used.	repairs

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