

# Maintenance in a small unit

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With passage of time maintenance of plant and equipment is assuming greater and greater importance. The Maintenance of equipment has direct relationship to equipment utilization and downtime as well as equipment life. Maintenance is a service to production and just sufficient maintenance must be done to ensure that the lowest cost of production is always achieved in the long run.

In a plant various form of maintenance practices are exercised which can be briefly described as follows :

In breakdown maintenance the equipment is allowed to remain in service as long as it continues to function normally and would be attended to only when it can no longer meet the process requirement. In cases where stand-by equipment is installed, this may be justified.

Scheduled maintenance would envisage regular inspection of certain parts of an equipment which are more prone to wear/damage to prevent a breakdown.

Preventive maintenance means systematic inspection of equipment on a routine basis to find any faults before they cause a breakdown.

Designing out maintenance is to carryout modifications in certain parts of an equipment which are more prone to damage with a view to improve their performance.

By their experience, the engineers in a plant would know how best an equipment can be maintained in the most economical manner.

In a pulp mill, generally it is possible to by-pass some equipment which might have gone out of order and maintain flow of pulp to the Machine House. But the same does not apply to a Paper Machine. If there is a breakdown on the paper machine in most of the cases it is not possible to run the paper and hence there cannot be any production. Therefore it is a must that schedule of preventive maintenance is religiously followed on the paper machine. E. g. It is a must that the drives

side bearings (anti-friction type) of the drying cylinders should be changed after maximum 10 years, assuming the life of a standard bearing to be 10 to 12 yrs. Because if this bearing gives way while the machine is in operation, would take minimum 18-24 hrs to put the machine back in operation after changing the bearing. Therefore a strict schedule should be made so that such bearings are not allowed to run beyond their recommended life spares.

Some applied to other equipments in the m/c house and pulp mill which can altogether hamper the process. The maintenance engineer should clearly mark out the equipment in his plant with the correct maintenance, performance of repairs and overhauling. For this schedule boards/charts are individual equipment cards play very important roles.

The visual chart shows all items on a single sheet or board arranged down the left hand edge with period of days, weeks or months extending along the top. It provides a clear picture of the position and progress at a glance. It is extremely simple and effective and highly helpful to the maintenance engineer.

The individual card is often preferred to the visual board because much more detail can be written in and it can be used for historical records. Whatever card system is used it must be capable of signalling the next date of maintenance attention.

Another very important aspect of simplifying maintenance work is to standardize the equipment. Advantages of maintaining one type of equipment from repairs/overhauling point of view are obvious. It also helps in having a control on the inventory of spares required for maintenance.

It should not be forgotten that for successful planning and scheduling of maintenance work, maintenance materials and machinery spare parts

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should be available as required, but at the same time it is necessary to control and regulate the inventory for keeping the capital investment on this to a reasonable figure. It should be kept in mind that it costs about 30% of the value of a spare part for its upkeep and maintenance of records etc. in the stores. So it is very important to have the optimum level of spares in the stores. For this an analysis of the spares should be carried out and spares should be classified into various categories like essential, regular block and temporary.

Essential spares are those spares which have a direct bearing on the production and should be always available in the stores. Their level is to be determined by the engineer with his experience and history of equipment.

Regular items would have regular consumption and maximum and minimum limits would be fixed keeping in view the yearly consumption, number required at a time and the lead period.

Block stores are of capital nature and is generally one time requirement. Temporary spares show a casual consumption pattern and are generally required to be procured to meet specific circumstances.

The storage areas should be properly located in relation to the respective plant or section. It is advisable to store all materials in regular storage buildings with proper handling facilities, but there may be large size spares for which it may not be possible to provide covers and handling facilities and spares have to be stocked in open. Where open storage is resorted to proper rust protective paints and compounds should be applied and rust proof tags with detail of part should be attached.

It is not possible to carryout maintenance work without the help of a back up mechanical workshop. The minimum of workshop facilities like lathes, shaping machines, grinding machines, cutting saws and welding sets in adequate number should be available. All day to day and urgently required simple jobs are done by this workshop which greatly facilitate the maintenance work.

Maintenance costs will be lower in a mill where space requirements to accommodate major overhauls have been given proper consideration. Ceilings should be high enough to accommodate monorails to facilitate installation and removal of larger machinery components.

In case of Bleach Plant the atmosphere in the Plant building is the most corrosive and it is important to have proper ventilation through wall

and roof openings. The mild steel sections for the roof structure should be properly selected and installed in a manner that these can be easily painted with a good quality antirust chloro-rubber paint.

Wherever necessary hoods etc. on the Washers etc. can be made out of fibre glass which has proved to be most effective. It is simple to assemble, easy to repair and due to light weight can be supported easily with light weight structural members wrapped and coated with fibreglass.

Due to the importance of air for general ventilation purposes, it is recommended that every floor in the bleach plant be adequately supplied with fresh air. To assure the intake of purest air possible an important consideration in the designing of the ventilation system is the direction of the winds and also danger of contamination from other processes.

One of the most important things for performing maintenance functions in a proper manner is the availability of adequately trained staff who must know their job and be reliable. In case of a small factory this is particularly important because generally the maintenance work is the responsibility of a foreman sort of a person who cannot oversee adequately each and every work being done in the Plant.

Many improvements can be made by using proper tools for a particular job. In a situation where there are many bolts to be removed, like end cover of a paper m/c drying cylinder, compare the time required between using an open end, a ratchet set or an impact wrench. Even simplest of improvements in use of tools and tackles would reduce the time required to do a job considerably thus bringing down the maintenance cost.

Also the tools should be available in a proper condition at the time and place needed. Many a people have a habit of keeping a lots of tools with them which are not readily available for general use. This is highly undesirable.

With pneumatic instruments a supply of clean dry air is the best insurance against maintenance trouble. Many types of dryers are available in the market which are easy in operation and economical to maintain. The pneumatic and electronic instruments should be periodically checked up to eliminate any potential trouble.

Wherever necessary fresh, clean water at the required pressure should be made available. At places where no dirt, sand or any foreign matters can be allowed, fine wire mesh filters should be used. A Duplex filter is of good use as its elements can be cleaned while in operation.

While selecting a site for electricals, be sure that those are away from water and proper coverings, guards should be provided for the control panels, motors etc. for this purpose. After a prolonged shut generators and motors should only be started after removal of condensed moisture and thorough cleaning. During this period the Commutators, brushes and doubtful bearings should be checked up.

A discussion on maintenance is not complete without including lubrication. All equipment should be lubricated in strict accordance with Manufacturers' instructions as to type of lubricant and at what intervals. All equipment should be properly lubricated after each repair or shut down has been completed.

A convenience which is used commonly is the colour coding of the grease fittings and oil filler caps with the corresponding colour for grease guns and oil cans to ensure the use of correct lubricant. To aid in insuring 100 percent lubrication all inaccessible gearse bearings should be equipped with extensions so that they can be serviced conveniently and quickly.

Before concluding I would like to mention that an equipment which is properly installed when received would give trouble free service for a number of years. The foundation should be built upon solid ground and should be of cement concrete. Steel bars imbedded in foundations, laying length wise and crosswise, add considerable strength. The equipment should be checked for levelness and alignment and commissioned strictly as per Manufacturer's recommendations. The size of foundation and foundation bolts should be adequate to absorb the vibrations transmitted by the rotating equipment. Whenever necessary, vibration absorbing cushy foot mountings can etc. also be used

Gentlemen, due to lack of space and time I have only been able to touch upon the salient aspects of maintenance briefly but is fundamental to the subject under reference and if given adgquate attenfion would help considerably in easing out this vital problem of the industry.