

Preventive Maintenance in Pulp & Paper Mills

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Abstract

Electrical equipment deterioration is normal, but equipment failure is not inevitable. As soon as new equipment is installed, a process of normal deterioration begins. Un-checked, the deterioration process can cause malfunction or an electrical failure. Deterioration can be accelerated by factors such as a hostile environment, overload, or severe duty cycle.

INTRODUCTION

From the raw material handling to the dispatch of the finished product in a Pulp & Paper Mills, every piece of Electrical equipment plays an important role. Since most of these equipments almost operate 24 hours a day & 365 days in a year, a well planned & organized preventive measures have to be taken in order to prevent forced outages

Preventive maintenance

An effective Preventive Maintenance program identifies and recognizes factors and provides measures for coping with them. It's a managed program of inspecting, testing, analyzing, and servicing electrical systems and equipment. Its purpose is to maintain safe operations and production by reducing or eliminating system interruptions and equipment breakdowns.

Preventive Maintenance relies on the knowledge of the electrical systems and equipment being maintained, and on knowing the operating experience, loss exposures, potential for injury, and maintenance resources.

Other areas of concern

In addition to normal deterioration, there are other potential causes of equipment failure that can be detected and corrected through Preventive Maintenance. Among these are load changes or additions, circuit alterations, improperly set or improperly selected protective devices, and changing voltage conditions.

Without an Preventive Maintenance program, management assumes a much greater risk of a serious electrical failure and its consequences.

Benefits of preventive maintenance program

A well-administered Preventive Maintenance program will reduce accidents, save lives, and minimize costly breakdowns and unplanned shutdowns of production equipment. Impending troubles can be identified and solutions applied before they become major problems

requiring more expensive, time-consuming solutions.

Benefits of an effective Preventive Maintenance program fall into twogeneral categories.

- (a) **Direct, measurable, economic benefits are derived by reduced cost of repairs and reduced equipment downtime.**

Experience shows that equipment lasts longer and performs better when covered by a Preventive Maintenance program. In many cases, the investment in Preventive Maintenance is small compared to the cost of equipment repair and the production losses associated with an unexpected equipment shutdown.

Careful planning is the key to economic success of a Preventive Maintenance program. With proper planning, maintenance costs can be held to a practical minimum, while production is maintained at a practical maximum.

- (b) **Less measurable but very real benefits result from improved safety.**

To understand fully how personnel and equipment safety are served by a Preventive Maintenance program, the mechanics of the program inspection, testing, and repair procedures should be understood.

Such an understanding explains other intangible benefits such as improved employee morale, better workmanship and increased productivity, less absenteeism, reduced interruption of production, and improved in surance considerations. Improved morale will come with employee awareness of a conscious management effort to promote safety by reducing the likelihood of electrical injuries or fatalities, electrical explosions, and fires. Reduced personnel injuries and property loss claims can help keep insurance premiums at favorable rates.

Although the benefits that result from improved safety are difficult to measure, direct, measurable, economic benefits can be documented by equipment

repair cost and equipment downtime records after an Preventive Maintenance program has been implemented.

Preventive maintenance or breakdown repairs

The maintenance of industrial electrical equipment is essentially a matter of business economics. Maintenance costs can be placed in either of two basic categories Preventive Maintenance or Breakdown Repairs. The money spent for Preventive Maintenance will be reflected as less money required for breakdown repairs. An effective Preventive Maintenance program holds the sum of these two expenditures to a minimum.

Frequency of preventive maintenance

As the interval of time between Preventive Maintenance inspections is increased the cost of the Preventive Maintenance will diminish and the cost of breakdown repairs and replacement of failed equipment will increase. The lowest total annual expense is realized by maintaining an inspection frequency that will keep the sum of repair/Replacement and Preventive Maintenance costs at a minimum.

Planning a preventive maintenance program

The following basic factors should be considered when planning a prevented maintenance program.

- (a) Personnel Safety. Will an equipment failure endanger or threaten the safety of any personnel? What can be done to ensure personnel safety?
- (b) Equipment loss. Is installed equipment both electrically and mechanically complex or so unique that required repairs would be unusually expensive?
- (c) Production economics. Will breakdown repairs or replacement of failed equipment require extensive downtime? How many productions in Rupees will be lost in the event of an equipment failure? which equipment is most vital to production?

Main parts of Preventive Maintenance Program

A Preventive maintenance program consists of the following essential ingredients.

(a) Responsible and qualified personnel

A well-qualified individual should be in charge of the program. Personnel assigned to inspection and testing duties should be selected from the best maintenance personnel in the plant.

(b) Survey and analysis of electrical equipment and systems to determine maintenance requirements and priorities

A survey and analysis should cover equipment and systems that have been previously determined to be

essential in accordance with a priority plan. All electrical equipment motors, transformers, circuit breakers, controls, and the like should receive a thorough inspection and evaluation. Evaluating equipment condition and the operating environment will permit the Preventive Maintenance supervisor to make a qualified judgment as to how, where, and when each piece of equipment should be fitted into the program.

In addition to determining the physical condition, the survey should determine if the equipment is operating within its rating. In the course of the survey, it is imperative that the condition of electrical protective devices be checked. Such devices include fuses, circuit breakers, protective relays, and motor overload relays. These devices are the safety valves of an electrical system. They should be in proper operating condition to ensure safety of personnel, protection of equipment and reduction of economic loss.

Programmed routine inspections and suitable tests

After the survey has been completed, data should be evaluated to determine equipment condition. Equipment condition will reveal repair work to be done, as well as the nature and frequency of required inspections and tests.

Accurate analysis of inspection and test reports so that proper corrective measures can be prescribed

Inspection and testing procedures should be carefully tailored to requirements. In some plants, regularly scheduled tests will call for schedule outages of production or process equipment. In such cases close coordination is required between maintenance and production personnel.

Performance of necessary work

Concise but complete records

Records should be accurate and contain all vital information. Care should be taken to ensure that extraneous information does not become part of the record, because excessive record keeping can hamper the program.

Preventive maintenance support procedures

(a) Design for Ease of Maintenance

The maintenance supervisor should have open lines of communication with design supervision. Frequently, an unsafe installation or one that requires excessive maintenance can be traced to improper design or construction methods or misapplication of hardware.

(b) Training for Safety and Technical Skills.

(c) Type of Training.

(d) Emergency Procedures.

Emergency procedures should list, step by step, the action to be taken in case of emergency or for the safe shutdown or start-up of equipment or systems. Optimum use of these procedures is made when they are bound for quick reference and posted in the area of the equipment or systems. Some possible items to consider for inclusion in the emergency procedures are interlock types and locations, interconnections with other systems, and tagging procedures of the equipment or systems. Accurate single line diagrams posted in strategic places are particularly helpful in emergency situations.

Training Scope

Employees should be trained and be knowledgeable of the following:

- (a) Construction and operation of equipment
- (b) Specific work method
- (c) Electrical hazards that can be present with respect to that equipment or work method.
- (d) Proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools and test equipment
- (e) Skills and techniques necessary to distinguish exposed, energized parts from other parts of electrical equipment.
- (f) Skills and techniques necessary to determine the nominal voltage of exposed energized parts. Decision-making process necessary to determine the degree and extent of hazard
- (g) Job planning necessary to safely perform the task.

Outside Service agencies

Some maintenance and testing operations, such as relay and circuit-breaker inspection and testing, require specialized skills and special equipment. In small organizations, it might be impractical to develop the skills and acquire the equipment needed for this type of work. In such cases, it might be advisable to contract the work to firms that specialize in providing such services.

Tools and instruments

Proper tools, instruments, and other equipment will ensure maximum safety and productivity from the maintenance crew. Where specialized instruments and test equipment are needed only

occasionally they can be rented from a variety of sources.

Success of preventive maintenance

The success of a Preventive Maintenance program depends on the caliber of personnel responsible for its implementation. The primary responsibility for program implementation and its success should lie with a single individual. This individual should be given the authority to do the job and should have the cooperation of management, production, and other departments whose operations might affect the Preventive Maintenance program. Ideally, the person designated to head the Preventive Maintenance program should have the following qualifications.

Technical Competence

Personnel should, by education, training, and experience, be well rounded in all aspects of electrical maintenance.

Administrative and supervisory skills

Personnel should be skilled in the planning and development of long-range objectives to achieve specific results and should be able to command respect and solicit the cooperation of all persons involved in the program.

Work Centre

This work center should contain the following:

- (a) All of the inspection and testing procedures for that zone.
- (b) Copies of previous reports
- (c) Single-line diagrams
- (d) Schematic diagrams
- (e) Records of complete nameplate data
- (f) Vendors catalogs
- (g) Plant stores catalogs
- (h) Supplies of report forms

CONCLUSION

To summarize the company can prosper by the systematic approach of a Preventive Maintenance Program. Such a approach will prevent the forced outages, increases the equipment life, improves employee morale, enhances workman's skills, increases productivity, promotes safety by reducing the likelihood of electrical injuries or fatalities, electrical explosions and fires, reduces interruption in production.