

A Modernization Procedure for the Maintenance of Printing Machinery

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Abstract – To Examine the Maintenance of Printing machine so that they can work without any failure for the longer period of time. There are different techniques and methods defined for the threatening to the machines and developed a model for the maintenance of the machine. The Scheduling of the Maintenance is also defined in this paper.

Key Words: Breakdown, Machines, Lubrication, Scheduling, Maintenance.

1.INTRODUCTION

The problems of maintenance have accompanied and 'threatened' the working people ever since the application of equipments. It was experienced from the beginning that equipments could go wrong and machines could break down. Humans have been and still are working on solutions to these problems, so it is not an exaggeration to say that maintenance is the same age as humanity and manufacturing activities. [6]

Maintenance techniques have changed over time from correction (breakdown) to prevention to prediction and pro-active continuous improvement. Effective maintenance is a series of progressive steps to improve operational effectiveness and the key step in this process is the transition of pro-active working. Companies that optimize their maintenance select and combine the techniques that match the needs of their equipment and operations.

Moving up the maintenance stairway requires a planned approach that brings together the right procedures, tools, training and the knowledge the feature and history of our machines' breakdowns. [5]

Maintenance Management

The basic principle of maintenance is to extend the useful life of an asset. A proper Maintenance will improve the production capacity with only existing capacity utilization. Maintenance is usually viewed, as a repair function of maintenance is composite in nature. A wide range of activities are involved in it. In fact maintenance keeps our entire system to be reliable, productive and efficient. There

is no definite maintenance procedure for a particular plant. It varies from one plant to others.

Objectives of Maintenance

The principal objectives of maintenance activity are as follows.

- 1.To minimize the breakage and maximize the plant availability
2. To extend the useful life of assets by minimizing wear & tear and deterioration
3. To ensure the operational readiness of all equipment.
4. To ensure the safety of workers.
5. To establish a satisfactory working condition.

By systematic maintenance, it is possible to achieve Substantial savings in money, material & manpower.

Types of Equipment Maintenance

- Restoration Maintenance
- Preventive Maintenance
- Prediction Maintenance

Restoration Maintenance

Restoration maintenance, also called repair and corrective maintenance, is the most common maintenance performed. Restoration maintenance consists of repairing a broken or damaged piece of equipment to restore necessary operation conditions. Another part of restoration maintenance includes replacing abnormal or worn parts that are causing films, plates, or production sheets to be out specification. Restoration maintenance is basically a fix-it when-it breaks function, addressing irregular and sudden equipment losses, which are actually unscheduled equipment downtime.

Preventive Maintenance

Preventive maintenance is naturally carried out before any interruption of production and major breakdown. This maintenance is carried out in predetermined intervals. Preventive maintenance will not only prevent the breakdown, but also it will improve the output quality of the product, and condition of the machine. This preventive maintenance is most successful one, and it is adopted in

many organizations. The best way to perform preventive maintenance consistently is to develop operational checklists. The checklists should be designed with the maintenance-activity steps in proper order for easy understanding. The checklists should be initialed and dated by the person performing the maintenance. Establishing maintenance checklists and procedures for each piece of equipment maximizes the preventive maintenance program, and helps accelerate training as well.

Prediction Maintenance

Prediction maintenance takes preventive maintenance to a higher level. Prediction maintenance utilizes more state of the art technology to predict when equipment components will need maintenance before they fail. Major maintenance and overhaul intervals are now being determined by scientific methods and accurate data analysis. Prediction maintenance requires monitoring specific elements that could cause terrible failure of the equipment.

Scheduling

It is the time phase of the sequential activities. A maintenance schedule generally includes activities as shown in figure 1.

- Inspection
- Repair (Major/minor repair)
- Overhauling

Maintenance Features of Printing Machines

The similarities between the manufacturing processes, raw materials and products of printing machines result in similar defective, corrective and maintenance features, which should be considered during management and organizational tasks. Therefore sources of faults and damaging processes, with which we struggle during the operation of printing machines. The major cause (46%) of maintenance events is the unexpected breakdown. This big proportion also means

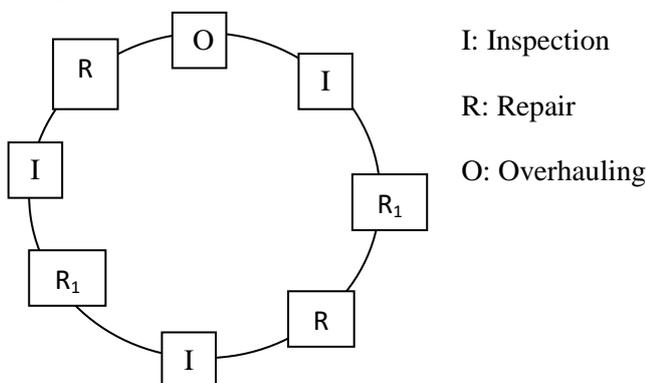


Figure 1: Maintenance Scheduling

that this is the most influential factor of designing and managing tasks. Therefore, the knowledge about unexpected breakdowns, as a phenomenon, is extremely important for the maintenance management. [1] A computer-assisted system could continuously record the basic data of the important processing machines. The historical datasets were set as the starting point for our analysis. The continuous data collection was carried out on the most important processing machines of Printing Plant. During the monitoring the machines were replaced from time to time following the technological development. In Figure 2, the model to develop a maintenance organization system for the machines is explained.

2. Lubrication & Reconditioning

Lubrication is a procedure to separate the surfaces with a film of lubricant to minimize friction and to restrict wear & tear. The substances used for purpose is called "Lubrication".

Purpose of Lubrication

1. It minimizes the friction, wear & tear of the surfaces.
2. It dissipates heat generated as a result of friction and acts as a coolant.
3. It prevents rusting and controls corrosion.
4. It prevents entry of moisture, dust and dirt between the moving parts and thus acting as a seal.
5. It acts as cleaning agent.
6. It acts as electric insulator in transformers, switches, gears, etc.
7. It lengths the service-life of the components.

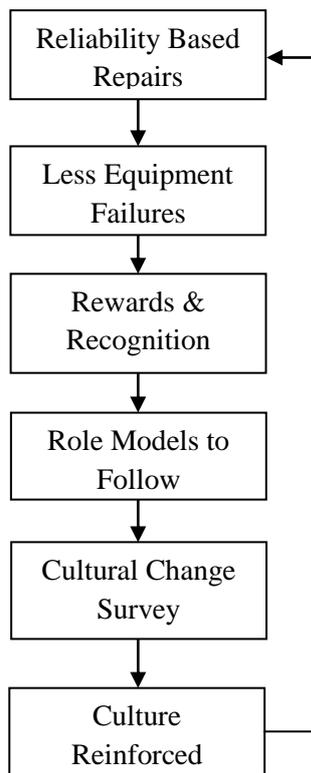


Figure 2: Model to develop a maintenance organization system

Mechanism of Lubrication

Following are the mechanism of lubrication, by which lubrication film is formed.

1. Boundary lubrication
2. Fluid film lubrication
3. Mixed lubrication.

Types of Lubrication

On the basis of physical state the lubricants can be classified as follows.

1. Solid lubricants
2. Semi solid lubricants
3. Liquid lubricants

Solid Lubricants

Solid lubricant are used either in the form of dry power or mixed with water or oil so that they can stick firmly to the metal surfaces. Solid lubricants are used in special condition. When a liquid or semi-solid lubricant film cannot be maintained. When the operating temperature and pressure are too high to use liquid lubricants. Solid

lubricants are used at low or high temperature also at very high loads. Examples of solid lubricants: Soap stone, graphite, talc, chalk, mica Teflon, molybdenum disulphide etc.

Semi-Solid Lubricants

Greases and Vaseline are the most important semi-solid lubricants. 1. These lubricants are used for machines at slow speed and high pressure. 2. When bearing and gears to be lubricated at high temperature. 3. When sealing is required against dust, or moisture. 4. When oil-film cannot be maintained due to high load, slow speed, sudden jerks. Example: Grease, Vaseline and etc.

Liquid Lubricants

Since the liquid lubricants provide separation when correctly applied. They have high cooling ability when circulated through bearing area. They also act as sealing agent and prevent corrosion. Example: Animal and vegetable oils, Mineral oils, Synthetic oils, Blended oils.

3. Maintenance of Auxiliary Equipment

Electrical Components Maintenance

The majority of equipment in the printing plant is electrically operated. Only qualified electrical technicians should be allowed to work on the electrical systems, in order to ensure safety and help eliminate electrical component failure.

Common Problems with Electricity

3.1 Voltage Fluctuation

One of the most frequently overlooked items in most plants is voltage fluctuation, which can cause major problems in many areas of a printing plant. Perhaps the most obvious example is changes in exposure density of a timed exposure due to voltage fluctuation. Voltage fluctuation is also a problem in a plate making and can be detrimental to computers and other solid-state equipment. Voltage fluctuation can be overcome by the rather the simple combination of a voltage meter and audio transformer. Computer equipment should also be equipped with uninterruptible power systems (UPS).

3.2 Proper Installation

A critical factor leading to efficient electrical operation is the correct installation of electrical components, which requires

timely consultation with the equipment's with the equipment's manufacturer prior to and during the installation process. Poor installation of an electrical component could result in safety hazards, the component's failure, and negate any manufacturer guarantees and warranties. Correct wiring and grounding of equipment cannot be stressed too much.

3.3 Power Requirements

When a printer is looking for a new building, one of the biggest considerations should be the power available in the building. Never assume that power is available. Always check with your utility representative and make sure you have the right power and, if not, when the utility will be able to schedule the installation. Never sign a lease until this is clearly established in writing.

When buying new equipment, always check with the manufacturer as to its electrical power requirements. Sometime, the purchaser of a new piece of equipment finds that the voltage requirement to operate it is not same as the voltage level presently in the building. This is not an infrequent occurrence. It can cost thousands of dollars to bring the proper power lines to your plant –if the power company can even to it. The printing equipment manufacturer and the equipment purchaser should never assume that there will be no problem with operating voltages. Power requirements should be one of the first items checked before purchasing equipment.

4. Maintenance Check List for Machines

4.1 Recommended Maintenance Schedule

Maintenance schedule of induction motors, as recommended by Indian Standard Institution (ISI) are

4.2 Daily Maintenance

- Examine visually earth connections and machines leads.
- Check motor windings for overheating
- Examine control equipment
- In the case of oil-ring lubricated motors

4.3 Monthly Maintenance

- Overhaul controllers
- Inspect and clean oil-circuit breakers
- Renew oil in high speed bearing of brushes of slip ring motors

- Check the grease in ball and roller bearings and make it up where necessary and take care of avoiding overfilling
- Drain all oil from bearings, wash with lubricating oil and refill with clean oil.

4.4 Half-yearly Maintenance

- Clean winding of the motors subjected to corrosive or their elements. Also bade and varnish, if necessary
- Blow out all motor windings thoroughly with clean dry air. Make sure that the pressure is not so high as to damage the insulation
- In the case of slip -ring motors, check slip-rings for grooving on unusual wear
- Renew switch and fuse contacts, if damaged
- Check grease in ball and roller bearings and make it up where necessary and take care of avoiding overfilling
- Drain all oil from bearings, wash with petrol to which a few drops of oil have been added flush with lubricating oil refill with clean oil. Annual Maintenance
- Overhaul varnish dirty and oily windings
- Overhaul motors, which have been subjected to severe operating conditions

5. Conclusion

For the productivity maintenance of printing machines the detailed knowledge of relations of failures are crucial. Reparation of unexpected breakdowns generally requires management of short/reactive reparation. Knowledge about the typical failure rates of major parts of printing machines is the fundamental pillar to apply pro-active maintenance management.

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