

MAINTENANCE AND REPAIRS OF MECHANICAL EQUIPMENT

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ABSTRACT

The problem of automobile industry is inability to adopt good maintenance and repairs of mechanical equipment practices fully to their advantage due to technological challenges and mainly due to tight production schedules. This leads to the discussion of the maintenance and repairs of mechanical equipment. Thus, this chapter is divided into two: the first focused on the types of maintenance and how they apply to the various system in a motor vehicle or plant and the second identify the type of overhauling and how to dismantle, replacement of parts and coupling them appropriately.

Keywords: Equipment, Maintenance, Mechanical and Repairs

1.1 OBJECTIVES

At the end of this chapter one, the students should be able to identify types of maintenance and how they apply to the various system in a motor vehicle or plant.

1.2 INTRODUCTION

Maintenance of plant and equipment in good working order is essential to achieve satisfying levels of reliability and effective working. The best plant and equipment will not work satisfactorily unless it is cared for, the cost of a breakdown in the system can be very high, not only for customers. The working force and the materials or tools must also be maintained through handling, motivation, health care and even entrainment for the people and proper storage and handling of materials or tools.

1.3 MAIN TEXT

In engineering, the term maintenance is used to describe the process of sustaining construction elements in a safe and useable condition. There are also benefits to be gained from regular attention, in appearance and cleanliness. From the time of production, the construction of components begins to decline as a result of weathering, use, and changes occurring in physical and chemical conditions.

The maintenance aims to carry out protective and repair measures designed to limit the detrimental effects of these natural or imposed processes, thereby prolonging the useful life of the construction or plant. The effectiveness of maintenance is to be improved if action is taken before major deterioration takes place, and likely to be most efficient if done in a pre-planned manner.

1.3.1 MAINTENANCE SYSTEM

The reason for operating maintenance engineering group is to attend to the day-to-day problems of keeping the physical plant (machinery and buildings services) in a good operating condition.

Although in practice the scope of the activities of the maintenance department is different each case, it is possible to group their activities into two general classifications:

1.3.2 PRIMARY FUNCTION

Primary functions that required day-to-day work and secondary functions that are assigned to the department

i. MAINTENANCE OF EXISTING PLANT EQUIPMENT

This activity required very little definition. It is the main physical reason for the existence of the maintenance group.

The responsibility here is simple to make repairs of production machinery as quickly and economically as possible and to anticipate these repairs use preventive maintenance where possible.

ii. MAINTENANCE OF EXISTING WORKSHOP BUILDING AND GROUND

The repair to the workshop building and the internal property of the plant such as roads, trucks, sewers and water systems are generally assumed to the maintenance group.

Repairs or minor alterations to buildings roofing, painting, glass replacement and the core of electrical, plumbing and other items are handled by the group.

1.3.3 MAINTENANCE INSPECTION LUBRICATION

In some small scale industries, these functions may be handled by the production department but for the more standardized and impartial follow up the job is best handled by the maintenance group.

1.3.2. UTILITY GENERATION AND DISTRIBUTION

These involve generation of electricity, which is most important, and air steam e.g. use in the plant workshop

1.3.3 SECONDARY FUNCTION

1.3.3 STORE KEEPING:

In most plants, there is a difference between mechanical stores and general stores. In such instances, the administration of mechanical stores normally falls in the maintenance group because of those relationships of this activity with other maintenance operations.

1.3.3 PLANT PROTECTION

This involves mainly the fire service department. Since in many plants majorly of its members are drawn from the crafts groups.

1.3.3 INSURANCE ADMINISTRATION

This category may include claims, process, equipment and pressure-vessel inspection liaison with under writers' representation and handle of insurance recommendation.

1.3.4 TYPES OF MAINTENANCE

There are different types of the maintenance system. These include preventive, planned, Breakdown, Corrective, Routine, predictive opportunistic e.t.c

1.3.4 PREVENTIVE MAINTENANCE

This involves periodic inspection of plant assets and equipment to uncover conditions leading to production breath 'down or harmful depreciation, up keeping of plant to avoid such conditions or to adjust or repair them while they are still minor.

1.3.4 MERITS OF PREVENTIVE MAINTENANCE

1. Less production downtime
2. Less overtime pay for maintenance men on ordinary adjustment and repairs than for breakdown repairs
3. Fewer large scale repairs and fewer repetitive repairs
4. Better quantity product
5. Better spare part control
6. Lower repairs costs
7. Greater safety for workers

1.3.4 PLANNED MAINTENANCE

To effectively plan the maintenance and of the plant, are need to know the following concept

- (i) What equipment is to be maintained?
- (ii) How to maintain the equipment

(iii) When the job is to be done.

The benefit of planned maintenance are listed below .

1. Release front-line foremen from major planning duties and allow them more time to supervise their crews
2. It provides procedures to plan, execute, monitor, and control maintenance resources
3. It reduces delays in waiting for men, material, tools after a job is in progress
4. It provides for systematic collection of materials before planned jobs
5. It provides procedures to implement and continue a preventive maintenance programme
6. It provides a communication link between maintenance and operations.
7. It also provides a daily plan for front-line supervisors
8. It allows hourly employees to be 100% work loaded
9. It helps field repairs coordinate work with shop and construction forces
10. Performance reporting allows upper management to judge maintenance progress
11. It reduces the time required for critical shutdowns and overhands
12. It reduces maintenance cost
13. It provides a tool for operations to assign priorities
14. It reduces emergency breakdowns

1.3.4 BREAKDOWN MAINTENANCE

It is repairs or replacements performed after a particular system or machine has failed to function. It also means that people wait until equipment fails and repair it. Such a thing could be used when the equipment failure does not significantly affect the operation or generate any significant loss other than the repair cost

1.3.4 CORRECTIVE MAINTENANCE

Corrective maintenance is repair work carried out when equipment or vehicle has broken down. For example, in a motor vehicle, if the piston inside the cylinders are stuck, the engine will not perform or turn until necessary repairs have been carried out. This is a form of corrective maintenance.

1.3.4 MERITS OF CORRECTIVE MAINTENANCE

1. It prolongs equipment/machine life span
2. It increased plant safety
3. Spare parts handling is optimized

1.3.4 DEMERITS OF CORRECTIVE MAINTENANCE

1. It reduces vehicle output
2. Increases chances of accidents and less safety for workers and machine
3. Faster plant deterioration
4. More spoil of materials

1.3.4 PREDICTIVE MAINTENANCE

Predictive maintenance is the method of using modern devices to predict or to see an impending breakdown in a machine. With this prediction, the maintenance can reach conclusions as to whether an overhaul of the engine has become necessary.

MERITS OF PREDICTIVE MAINTENANCE

1. It prevents the breakdown/catastrophic premature failure
2. It increases safety, reliability and availability
3. Less maintenance cost
4. Less downtime
5. Proper planning to avoid failure

DEMERITS OF PREDICTIVE MAINTENANCE

1. It required skilled personnel
2. It required costly monitoring equipment

1.3.5 ROUTINE MAINTENANCE

This is the simplest form of planned maintenance, which is very important. Routine maintenance means carrying out minor works at regular intervals. It involves minor repairs such as cleaning, lubrication, inspection and minor adjustment. Example of Routine maintenance activities includes some of the following;

1. Checking of the radiator water level
2. Checking of engine oil level by removing the dipstick
3. Checking of the tyres for correct pressure and its condition
4. Checking of brake fluid

5. Checking of battery electrolyte level and its condition
6. Checking of light and horn etc

MERITS OF ROUTINE MAINTENANCE

1. It minimizes premature engine or any other component failure
2. It improves the performance of a system
3. It improves safety
4. It maintains the value of the vehicle.
5. It enhances reliability

1.3.4 OPPORTUNIST

This is the type of maintenance when a piece of equipment or vehicle is taken down for maintenance/changing of one or a few worn parts, the opportunity can be utilized for changing maintaining other parts which are wearing out even though they have not yet failed. This maintenance system is useful for non-monitored components

1.4.0 SUMMARY

Maintenance in engineering work is defined as the functions that should be carried out every day to keep the machine or vehicle or any engineering equipment in good operating condition.

It is an important aspect of every manufacturing industry. For example, anyone who has been delayed on a journey because of a breakdown of the vehicle be it plane, train, bus or motor car, will experience inconveniences and frustration.

Maintenance and Repairs of Automobiles are helpful and time-saving, provided up-to-date equipment is being employed and the force is skilled

maintenance for all engineering equipment are also discussed

1.5.0 EXERCISES

1. Why maintenance is so important when it comes to engineering equipment?
2. Name three (3) types of maintenance and explain each one
3. Differentiate between repair and maintenance

1.6.0 REFERENCES

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