

# TE 4225

## Machine Maintenance, Materials Handling and Safety

# Maintenance Definition **IMPORTANT**

British Standard Glossary of terms (3811:1993)  
defined maintenance as:

The combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function.

# Maintenance Definition

Maintenance is a set of organised activities that are carried out in order to keep an item in its best operational condition with minimum cost acquired.

# Maintenance Activities

Activities of maintenance function could be either **repair or replacement** activities, which are necessary for an item to reach its **acceptable productivity condition** and these activities, should be carried out with a **minimum possible cost**.

# Maintenance History

1. In the period of **pre-World War II**, people thought of maintenance as an added cost to the plant which did not increase the value of finished product.

Therefore, the maintenance at that era was restricted to fixing the unit when it breaks because it was the cheapest alternative

# Maintenance History

2. **During and after World War II** at the time when the advances of engineering and scientific technology developed, people developed other types of maintenance, which were much **cheaper** such as **preventive maintenance**.

In addition, people in this era classified **maintenance as a function of the production system.**

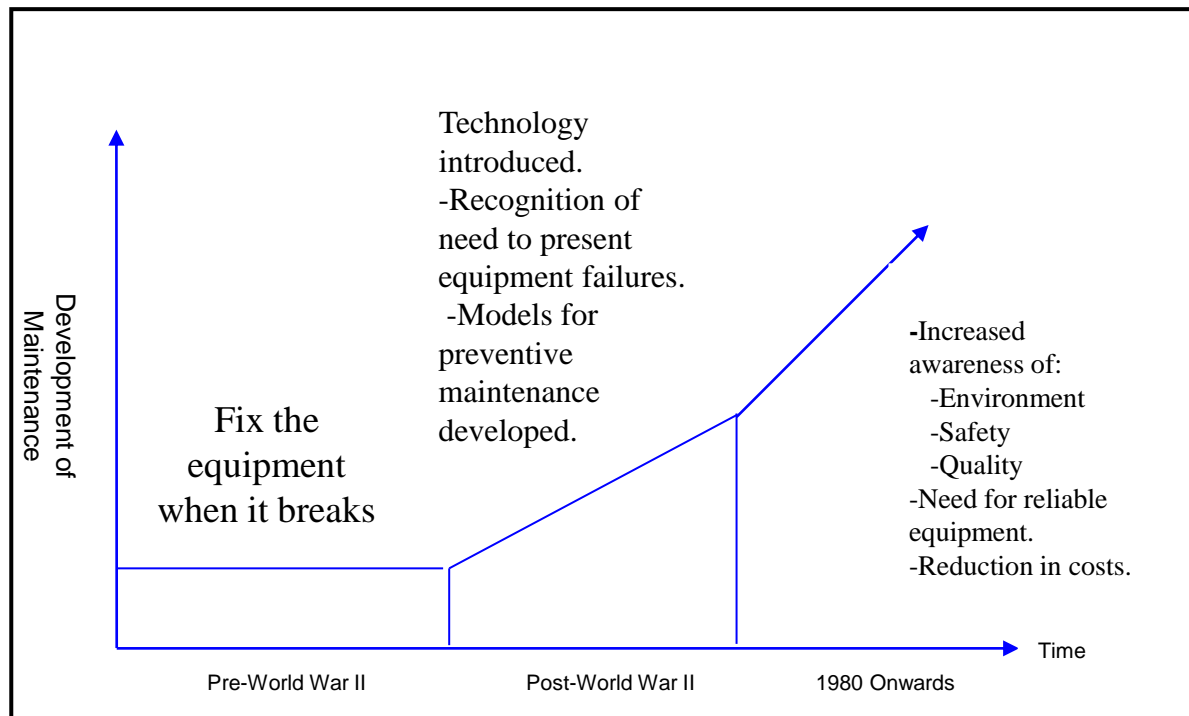
# Maintenance History

3. **Nowadays**, increased awareness of such issues as **environment safety, quality of product** and services makes maintenance one of the most important functions that contribute to the success of the industry.

World-class companies are in continuous need of a very well organised maintenance programme to compete world-wide.

# Maintenance History

## Graph IMPORTANT



**Figure: Maintenance History**  
(Adapted From Shenoy, Bhadury 1998)



# Maintenance Objectives

Maintenance objectives should be consistent with and subordinate to **production goals**.

The relation between maintenance objectives and production goals is reflected in the action of keeping production machines and facilities in the best possible condition.

# Maintenance Objectives ( Previous )

- ✓ Maximizing production or increasing facilities availability at the lowest cost and at the highest quality and safety standards.
- ✓ Reducing breakdowns and emergency shutdowns.
- ✓ Optimizing resources.
- ✓ Reducing downtime.
- ✓ Improving spares stock control.
- ✓ Improvement equipment efficiency.
- ✓ Minimizing energy usage.
- ✓ Optimizing the useful life of equipment.
- ✓ Providing reliable cost and budgetary control.
- ✓ Identifying and implementing cost reductions.

# Purpose of Maintenance

- ▶ Attempt to maximize performance of production equipment efficiently and regularly.
- ▶ Prevent breakdown or failures.
- ▶ Minimizing production loss from failures.
- ▶ Increase reliability of the operating systems.

# Problems Associated

- ▶ Lack of management attention to maintenance.
- ▶ Little participation by accounting in analyzing and reporting costs.
- ▶ Difficulties in obtaining time and cost estimates for maintenance work.
- ▶ Difficulties in measuring performance.

# Economic aspects of maintenance

( Previous )

Maintenance does not directly earn profit. It is represented as an element of cost on the accounting records of a company. The only way it can contribute to the profitability of a company is by reduction of the total costs.

# Elements of costs influenced by maintenance ( Previous )

## ▶ 1. Downtime cost:

It is made up of-

- a. Loss of profit for the period that the machine remains stopped for attention by maintenance.
- b. Wages paid to the direct workers while they remain idle.
- c. Depreciation of the machine for the same period of time.
- d. Overheads proportioned for the period of machine idleness as per the company policy.
- e. Loss due to scrapping or reworking of material that may be spoiled due to maintenance stoppage.

# Elements of costs influenced by maintenance....

2. Cost of spares and other materials used for repairs.
3. Cost of maintenance labor and overheads of the maintenance department.
4. Losses due to inefficient operations of the machines.  
These losses arise because machines can either not turn out the requisite quantity or its condition creates problems relating to quality of products.
5. Capital expenditure required for replacement of machines.