FRSB 2153
Maintenance Management

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Welcome to the class….

Maintenance Management
(FRSI 2153)

Lecture 1 : INTRODUCTION

Lecturer:

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Learning Outcomes

At the end of the course, students should be able to:

- **Explain the basic concept of maintenance management**
- **Solve problems of losses and failure associated with equipment and the manufacturing process**
- **Participate in a group and present challenges in maintenance management for facility business project**
- **Prepare and submit report of maintenance management.**

Assessment

Components	Percentage (%)
Group work	15
Quiz (2)	20
Test (1)	25
Post Module Assignment (PMA)	40
TOTAL	**100**

What is Maintenance?

- The maintenance department is one of the **greatest levers of profitability** that any capital intensive organization has.
- An average of 40 – 50% of a capital intensive industries **operating budget is consumed by maintenance expenditure**.
- With the advances today in technology affecting maintenance this figure can be greatly reduced. As such maintenance is often **an organizations largest single controllable expense.**

Maintenance Definition

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.

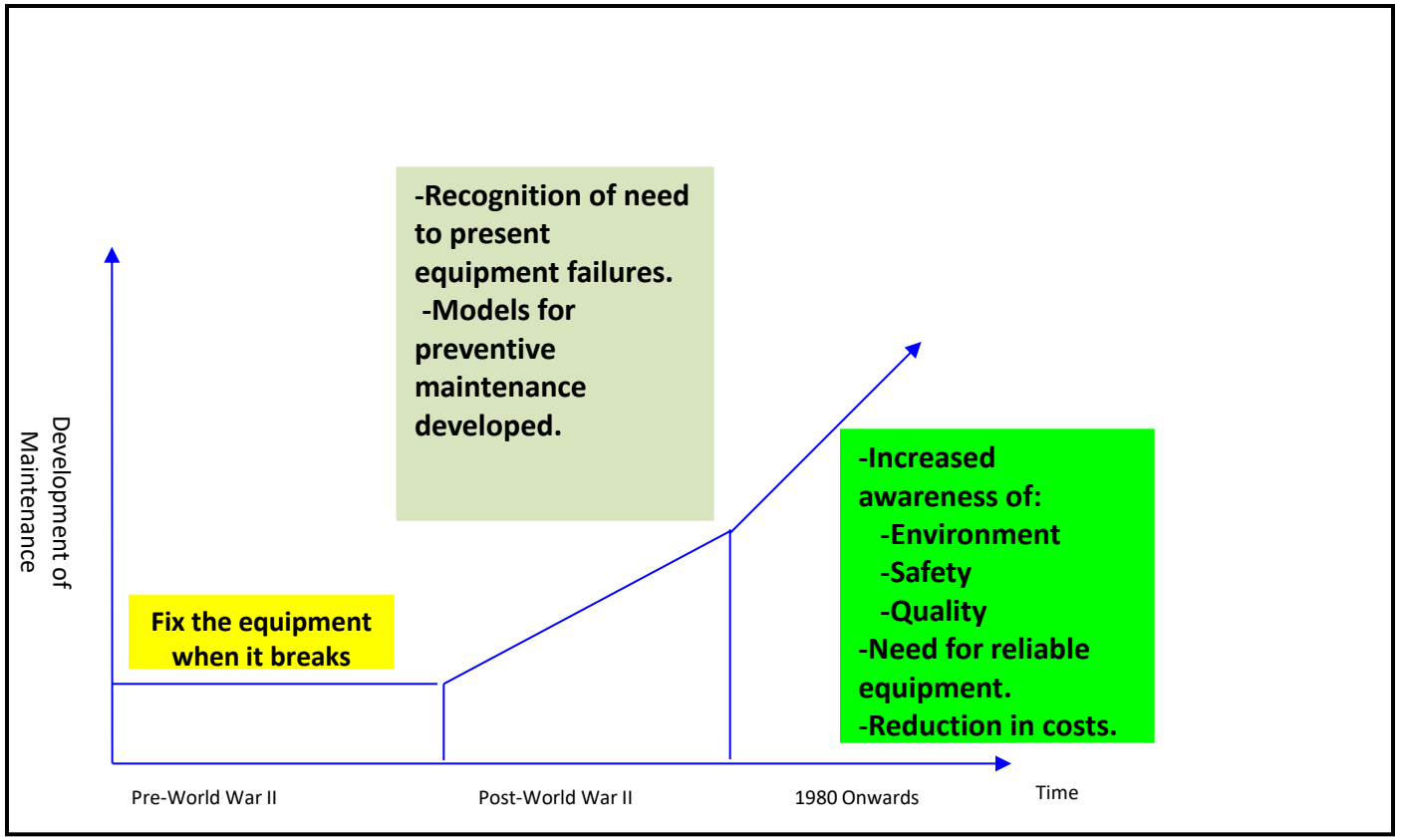
Maintenance Activities

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 Activities

- All actions necessary for retaining an item, or restoring to it, a serviceable condition, include servicing, repair, modification, overhaul, inspection and condition verification
- Increase availability of a system
- Keep system's equipment in working order

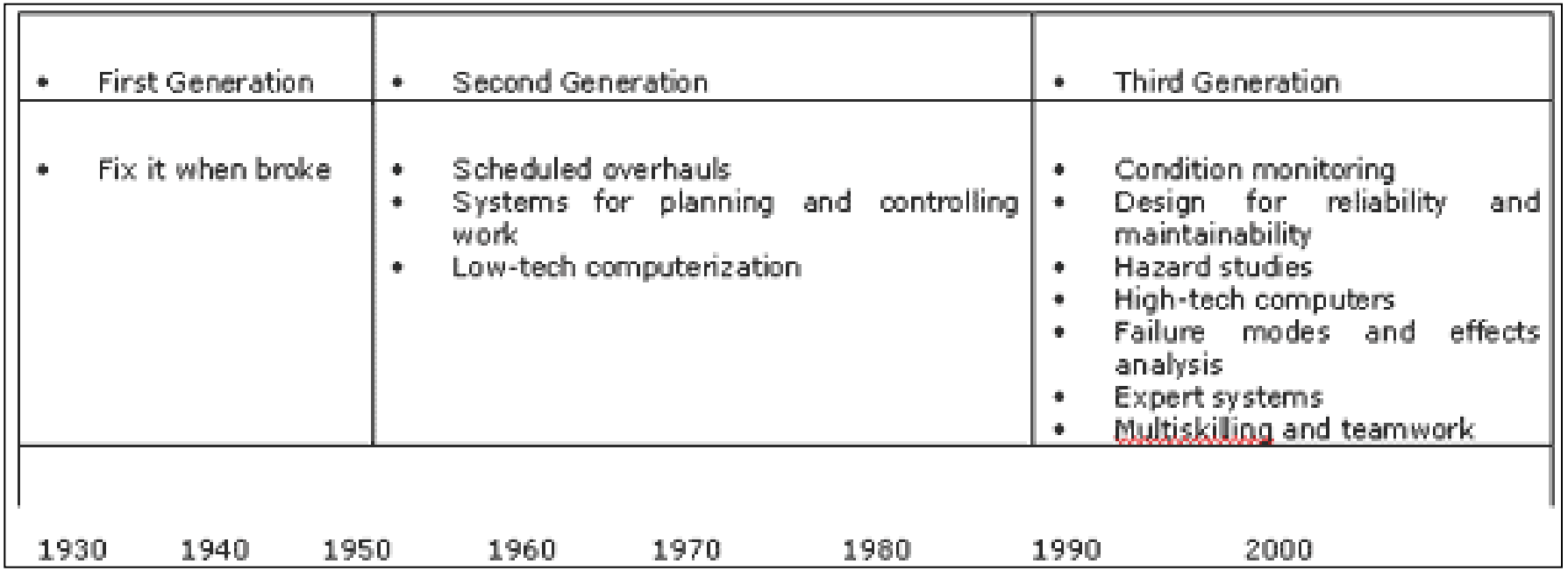
Maintenance History



Maintenance History
(Adapted From Shenoy, Bhadury 1998)

Maintenance History

The following figure summarized the evolution in maintenance strategy and the growing expectation of maintenance.



Maintenance History

The differences between the Second and Third Generation's maintenance are;

- Focus is on **availability** and **reliability**.
- A push towards **zero downtime** or **zero in-service breakdowns**.
- Improved **maintenance tools** such as Reliability Centered Maintenance (RCM), Total Productive Maintenance (TPM), Root Cause Failure Analysis (RCFA), Failure Modes and Effects Analysis (FMEA) and others are applied to achieve maintenance objectives.

Maintenance History

Under the Third Generation maintenance principles, many organizations have stated **zero breakdowns/zero in-service failures** as their maintenance goals.

However, since no amount of maintenance can guarantee the total elimination of failures (there is always probability of failing - but may be very close to zero) is no longer a realistic objectives that is achievable, a more **realistic approach is to avoid, reduce or eliminating the consequences of failures**.

Maintenance History

Fourth Generation Maintenance?

The basic principles of the fourth generation of maintenance will have some signified feature;-

- **Definite deliberation of risk**, notably at higher levels of organizations, when dealing with equipment design and maintenance strategies.

- Coherence between functional demand, equipment design and maintenance will be greater than the currently existing integration.

Maintenance History

- There will be swift development in information technology to **detect, predict, diagnose and prevent equipment failures** will.

- With these changes, the focus of maintenance will change and the new mission of maintenance department is more towards **providing an excellent support for their customers by reducing the need for maintenance.**

Maintenance History

- Another influential factor in the Fourth Generation trend of maintenance is the increasing **usage of computer modeling in maintenance strategy**.

- With the **rapid development of computer technology especially in the area of artificial intelligent and expert systems, computer simulations and modeling may provide the predictive tools** of the future.

Current Maintenance Techniques

Nowadays, increased awareness of such issues as environment safety, quality of product and services makes **maintenance as 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.

Current Maintenance Techniques

- Condition monitoring of equipment developed.
- Machines design based on reliability and maintainability
- Hazard studies carried out.
- Small fast computers & systems came into existence.
- Multi-skilling & Teamwork became the goal and practice.
- Need based training programs such as Industrial basic training, 5S, Total Proactive Maintenance etc.

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.

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.

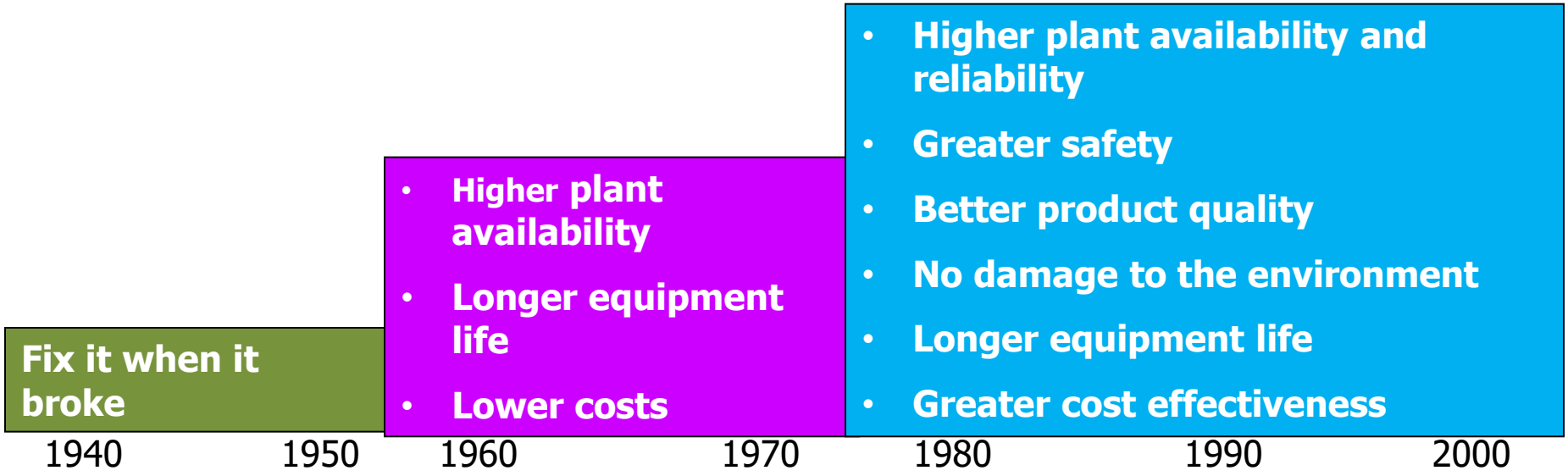
People in this era classified maintenance as a **function of the production system**.

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.

Growing Maintenance Expectations



Maintenance Objectives

Maintenance objectives should be consistent between top management 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.**

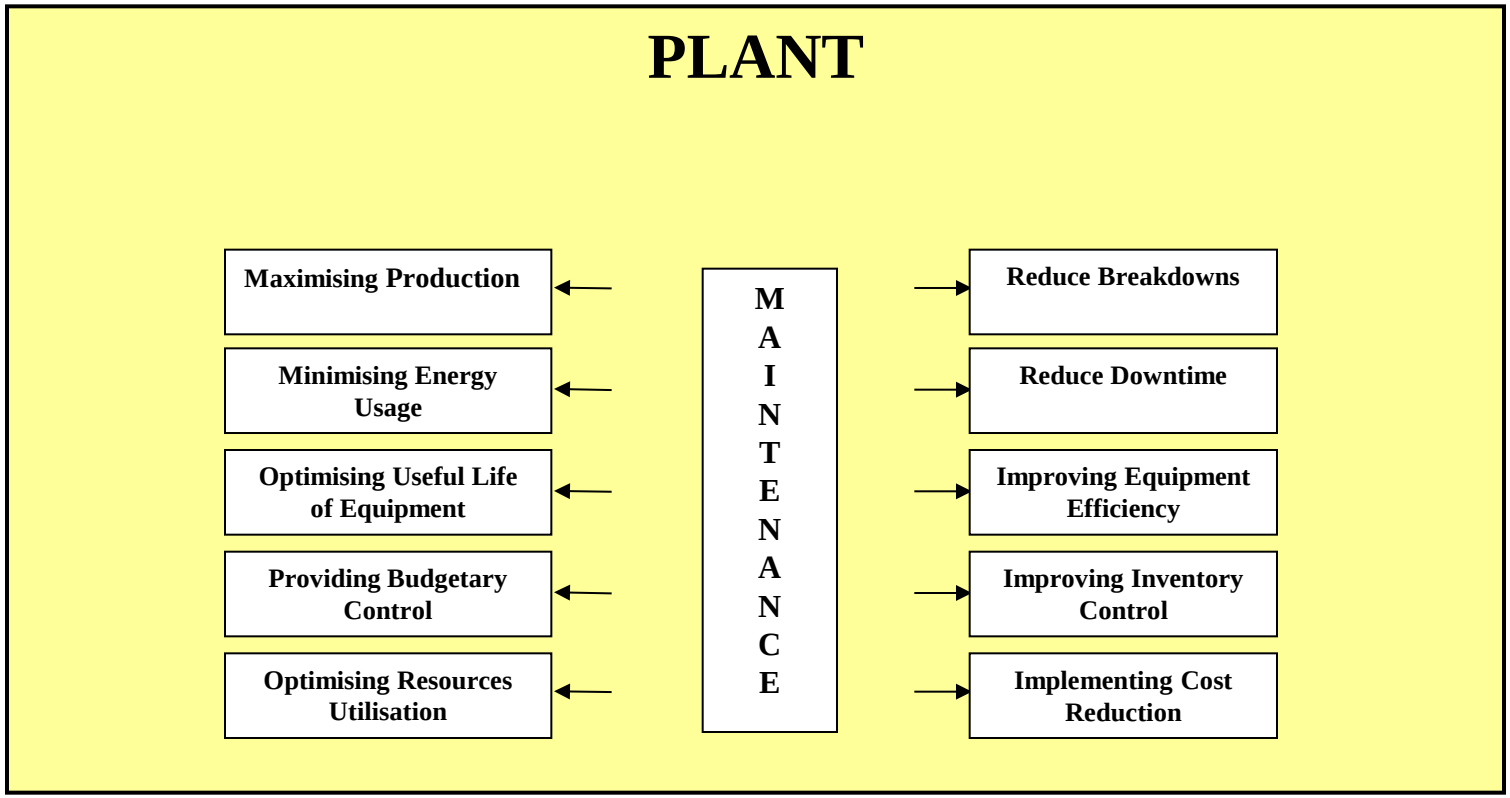
Maintenance Objectives

- Minimising energy usage.
- Optimising the useful life of equipment.
- Providing reliable cost and budgetary control.
- Identifying and implementing cost reductions.
- Satisfy rules and regulations set by authority.
- Fulfill the manufacturer's requirement for warranty purpose.
- Increases resale value of the equipment.

Maintenance Objectives

- Maximising production or increasing facilities availability at the lowest cost and at the highest quality and safety standards.
- Reducing breakdowns and emergency shutdowns.
- Optimising resources utilisation.
- Reducing downtime.
- Improving spares stock control.
- Save the users' life

Maintenance Objectives



Why Maintaining Equipment?

- Why Maintaining Equipment?

  Management wants it or you think it is an important activity.

- Group activity.

  Lists **five** reasons why we need to maintain equipment.

Why Maintenance is Important?

- **Cost saving** - Saves on the expenses that would be needed to buy new devices.
- **Efficiency** - Equipment that functions efficiently to ensure the accuracy of results and improve staff productivity.
- **Time saving** - As many of the vendors provide in-house services, we can save time that would be needed for off-site repair.

Why Maintenance is Important?

- **Accuracy** - Serving by expert, factory-trained technicians ensure that the job is done right. They can identify potential issues and take timely action to prevent further damage.

- **Warranty** - If the equipment is refurbished and re-certified, it is offered with proper warranty.

Consequences for Not Maintaining Equipment

- Unscheduled plant shutdown
- Usages are delayed.
- Overhead continues escalating.
- Cost per unit increases.
- Safety issues.
- Lost of reputation.

Effective Maintenance

Effect of Maintenance	
Effective Maintenance	Non-effective Maintenance
☐ Restore system productivity ☐ Avoid any unnecessary shutdown ☐ Increase the efficiency of equipment ☐ Prolong the system life ☐ Improve the overall plant productivity ☐ Essential to maintain product quality ☐ Increases plant profit	☐ Increased maintenance cost ☐ Reduced the system/equipment life ☐ Reduced the efficiency of heat transfer ☐ Induced the unwanted waste ☐ Additional cost to clean the system ☐ Can effect product quality ☐ Reduced the plant productivity ☐ Downgraded the system effectiveness. ☐ Decreased plant profit

Bottom Line

- Maintenance ensure equipment reliability and reduces down-time and costs.

- Prevention is better than cure.

Problems in Maintenance

- Lack of management attention to maintenance
- Little participation by accounting in analyzing and reporting costs
- Difficulties in applying quantitative analysis
- Difficulties in obtaining time and cost estimates for maintenance works
- Difficulties in measuring performance

Causes of Problem

- Failure to develop written objectives and policy
- Inadequate budgetary control
- Inadequate control procedures for work order, service requests etc.
- Infrequent use of standards
- To control maintenance work
- Absence of cost reports to aid maintenance planning and control system

Failures

- Failure – inability to produce work in appropriate manner
- Equipment / machine failure on production floor – worn out bearing, pump, pressure leaks, broken shaft, overheated machine etc.
- Equipment failure in office – failure of power supply, air-conditioned system, computer network, photocopy machine
- Vehicle failure – brake, transmission, engine, cooling system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GRACIAS
PALDIES
MERCI
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БЛАГОДАРЮ
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谢谢
THANK YOU