Asset Maintenance Management

Unit 1

Introduction to Asset Maintenance Management
Summary of Module

- **UNIT 1:** Introduction to Asset Maintenance Management
- **UNIT 2:** Asset maintenance policy making
- **UNIT 3:** Executing a maintenance policy
- **UNIT 4:** Maintenance projects, organisation & planning
- **UNIT 5:** Planning, monitoring & controlling the maintenance programme
- **UNIT 6:** Maintenance as a Life Cycle Cost
- **UNIT 7:** Case Study
- **UNIT 8:** Module Summary
Recommended Reading

**Building Maintenance Management**
Second Edition  
Barrie Chanter, Peter Swallow

**Lee’s Building Maintenance Management**
Fourth Edition  
Paul Wordsworth
Asset Maintenance Management

Learning Objectives:
- Nature of Maintenance and its importance
- Types of maintenance
- Planned maintenance objectives
- Benefits of maintenance
Asset Maintenance Management

- Is about the maintenance of an organisation’s asset base.
- Concerned with all aspects of the property fabric, including external works, infrastructure and equipment.
- Maintaining assets at an optimum level at optimum expenditure – Over or Under Maintenance.
- Establish a compromise between repair, replacement, servicing and useful function.
- Concerned with the acquisition, use and disposal of assets to make most of their service and to manage risks and costs.
Asset Maintenance Management

- AMM attempts to maximize the use of the assets by keeping them in good condition.
- Achieves greater value for money through economic evaluation of options, taking life cycle costs and value management techniques.
- Reduces unnecessary acquisition and maintenance.
- Focus attention on results by clearly assigning responsibility, accountability and reporting requirements.
Asset Maintenance Management

- Objectives of AMM – Maximize the use of assets by keeping them in good condition.

- Enable organization to meet its service delivery objectives efficiently and effectively.
Asset Maintenance Management

How?

- Ensure they are appropriately used and maintained
- Reduce unnecessary acquisition and maintenance
- Focus attention on results by clearly assigning, responsibility, accountability and reporting requirements
- Achieve greater value of money through LCC and VM** techniques.

**Techniques concerned with defining, maximising and achieving 'value for money'
Asset Maintenance Management

What is maintenance?

- The combination of all technical and associated administrative actions intended to retain an item in, or bring it to, a state in which it can perform its required function.

- Is a combination of both technical and administrative actions to ensure that a designated item is kept in adequate working condition.

- Can be relatively expensive and often cause disruption to the occupants of the building.
Life Cycle of Asset

NEED

DISPOSAL

SPECIFICATION

RECYCLING

DESIGN

INVESTMENT APPRAISAL

PURCHASE

INSTALLATION

COMMISSIONING

USE

Decision

Maintenance
Asset Maintenance Management

- Fig. 1.1, pg 4 – Life Cycle phases
- To ensure efficient of the facility, it is necessary to make sure the “Use” phase can continue with minimal interruption or unnecessary downtime.
- Buildings and equipment need to be monitored and maintained on a regular basis.
- Best way to do is to derive a maintenance programme, based on detailed planning.
- Life cycle cost appraisal, which considers the reliability, durability and maintainability is necessary to minimize total capital investment.
Types of Maintenance

- Maintenance can be planned, responsive or ad-hoc.
- Most organisations use a combination of the three.
- Planned maintenance more than recovers its cost by reducing consequent responsive maintenance.
  - “Deciding in advance the jobs, methods, materials, tools, labour, time required and timing of maintenance actions”.
  - “Maintenance actions organised and carried out with forethought, control and use of records, to a predetermined plan based on the results of previous conditioned surveys”.
Types of Maintenance

- **MAINTENANCE**
  - **PLANNED MAINTENANCE**
    - **PREVENTATIVE MAINTENANCE**
      - **SCHEDULE BASED MAINTENANCE**
    - **CORRECTIVE MAINTENANCE**
      - **CONDITION BASED MAINTENANCE**
  - **UNPLANNED MAINTENANCE**
Types of Maintenance

- Planned maintenance is the systematic inspection of buildings, equipment and all assets within an organisation with the objective to maximise the economic life and utility.

- It anticipates failures and sets in place appropriate procedures to prevent or rectify these.

- Involves a planned course of action for dealing with the inevitable consequences of deterioration caused by climate and user activities.
Types of Maintenance

- Can be planned and/or unplanned maintenance.
- Planned maintenance – Preventive and/or corrective maintenance.
- PM is a strategic plan to replace things before they fail as opposed to correcting them after they have failed.
- Can be a scheduled or condition based maintenance.
- Scheduled Maintenance – carried out on time irrespective of condition
- Condition based maintenance – the condition of the element is the trigger for precisely when it is replaced.
Preventive Maintenance – establishes an inspection and replacement procedure based on preventing failures from occurring.

Identifies the element lifespan based on the mean and then designing a maintenance plan which draws attention to that component on or around the critical date.

Plan to replace the component before many of them have failed.

Eg. Dental check every six months
Corrective Maintenance

- Replacing a component as part of a programme after it has failed.
- Eg. Going to dentist every two years and getting all cavities filled.
- Eg. Painting all windows that have not been painted for 10 years or more even though the cyclical programme calls for a five year painting cycle.
- There are less inspections, time and cost in planned corrective than in planned maintenance.
Preventive Scheduled Maintenance

- Inspection and replacement of components according to a schedule
- Eg. Inspecting and changing shock absorbers in a car. They get sloppy at 60,000 miles.
- It involves a certain level of waste as some good shocks will be replaced.
- However, it will result in less breakdown, less crashes and more continuity for the organisation that owns the fleet of cars.
Preventive Conditioned Based Maintenance

- Is also based on inspection.
- Idea is to pick out components for replacement before they fail outright.
- It uses an inspection to determine whether the component requires replacement at this particular time.
- Prevents failure by replacing at some kind of pre-calculated end of lifecycle date.
- Takes advantage of exceptional components that are still in a useable condition.
Emergency Maintenance

- Preventive maintenance reduce the risk of emergency failures regardless of attention to finer details.
- Emergencies occur due to:
  - Components failure prematurely cannot be eliminated
  - Vandalism due to accidental or weather related incidents
  - Maintenance failure or human error eg. Carelessness, forgetfulness or laziness – Thus need a careful monitoring and feedback
- Well-established, and practiced emergency routines are essential to the efficient running.
- Clear step-by-step instructions are important
## Lighting Maintenance Strategies

<table>
<thead>
<tr>
<th>Reactive maintenance (unplanned)</th>
<th>Proactive maintenance (planned)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Uneven light levels</td>
<td>• Uniform light levels</td>
</tr>
<tr>
<td>• Inefficient lighting system</td>
<td>• Optimum output and use of</td>
</tr>
<tr>
<td>• Increase in repairs to systems</td>
<td>installations</td>
</tr>
<tr>
<td>• Inefficient energy consumption</td>
<td>• Minimum repairs</td>
</tr>
<tr>
<td>• Negative implications regarding safety</td>
<td>• Efficient energy consumption</td>
</tr>
<tr>
<td>• Non compliant lamp disposal</td>
<td>• Ensures safe working</td>
</tr>
<tr>
<td>• Disruption to the workplace</td>
<td>environment</td>
</tr>
<tr>
<td>• Unknown and uncontrolled costs</td>
<td>• Compliant lamp disposal</td>
</tr>
<tr>
<td></td>
<td>• Minimal disruption</td>
</tr>
<tr>
<td></td>
<td>• Budgeted costs</td>
</tr>
</tbody>
</table>

Expensive

Cost efficient
Objectives of Planned Maintenance

- Clear evaluation of condition of the stock.
- Definition of maintenance standard.
- Calculation of a realistic budget plan.
- Definition of resource requirements.
- Establishment of reliable planning and management information.
- Establishment of control of workload.
- Calculation of monitoring performance against targets.
- Calculation of design performance.
- Indication of a logical procurement timetable (Pg10-12).
Objectives of Planned Maintenance

- Accurately survey the existing stock and evaluate the condition.
- Establish clear and stated maintenance standards.
- Define the programmes and measure it.
- Budget plan show work that is proposed to be carried out along with the corresponding estimated cost.

CLASS DISCUSSION
Objectives of Planned Maintenance

- Allows efficient use of the resources by planning the utilisation during peak and troughs.
- Planning information ensures programmes do not overstretch management and control resources.
- No restriction of resources that affects the rate of progression.
- Use of information to overcome future maintenance design problems.

CLASS DISCUSSION
Asset Management Strategy

- Step 1 – Formulate Strategy
- Step 2 – Assess existing Premises
- Step 3 – Identify Needs
- Step 4 – Determine Priorities
- Step 5 – Feasibility & Option Appraisal
- Step 6 – Implement & Review
Why Do Things Fail?

- **Design failures**: This class of failures take place due to inherent design flaws in the system. In a well-designed system, this class of failures should make a very small contribution to the total number of failures.

- **Infant Mortality**: This class of failures cause newly manufactured items to fail. This type of failures can be attributed to manufacturing problems like poor soldering, leaking capacitor etc. These failures should not be present in systems leaving the factory as these faults will show up in factory system burn in tests.

- **Random Failures**: Random failures can occur during the entire life of an item. These failures can lead to system failures. Redundancy is provided to recover from this class of failures.

- **Wear Out**: Once an item has reached the end of its useful life, degradation of component characteristics will cause hardware modules to fail. This type of faults can be weeded out by preventive maintenance and routing of hardware.
The Journey to Operational Excellence

- Don’t Fix it
- Reactive: Fix it after it breaks
- Planned: Fix it before it breaks
- Proactive: Don’t just fix it, improve it
- Strategic: Federal Behaviours
Why Is CM The Future?

- The development of **smart sensors, and other low-cost on-line monitoring systems** that will permit the cost-effective continuous monitoring of key equipment items
- The **increasing provision of built-in vibration sensors** as standard features in large motors, pumps, turbines and other large equipment items
- Increasingly sophisticated condition monitoring **software**, with rapidly developing "expert" diagnosis capabilities
- The **acceptance of Condition Monitoring** within the "mainstream" of Operations and Maintenance, with Production operators increasingly utilising Condition Monitoring technologies as part of their day-to-day duties
Why Is CM The Future?

- Increasing integration, and acceptance of common standards for interfacing Condition Monitoring software with BMS, CMMS and Process Control software
Why Is CM The Future?

- A reduction in the cost-per-point of applying Condition Monitoring technologies - possibly leading to more widespread use of these technologies.
Summary – The Purpose of Maintenance

- Nature of business dictates the objectives of maintenance.
- Due to minimise cost, maximise customer satisfaction, safety and reliability etc.
- In establishing maintenance objectives, we face a conflict between management and maintenance department, arising from unclear cost and operational objectives.
- Better results for less money vs Low budget
- Thus, need to define clearly the expected results and the means to achieve them.
Why Maintain?

- Improvement to a currently accepted standard and to sustain the utility and value of the building.
- Reduce future maintenance cost, increase physical and economic life, elevates physical condition & environment.
- The standard of maintenance has a direct consequence on the living environment and hence the quality of life of the occupants.
- In extreme case, people will shun the building & it may become a potential danger.