SYSTEM PREVENTIVE MAINTENANCE

Chapter 5

INTRODUCTION TO SYSTEM PREVENTIVE MAINTENANCE

Preventive maintenance is the act of performing regularly scheduled maintenance activities to help prevent unexpected failures in the future. (ibm.com)

Types of Preventive Maintenance

- Usage-based preventive maintenance
- Calendar/time-based preventive maintenance
- Predictive maintenance
- Prescriptive maintenance

- *Usage-based preventive maintenance*

Usage-based preventive maintenance is triggered by the actual utilization of an asset. This type of maintenance takes into account the average daily usage or exposure to environmental conditions of an asset and uses it to forecast a due date for a future inspection or maintenance task.

- *Calendar/time-based preventive maintenance*

Calendar/time-based preventive maintenance occurs at a scheduled time, based on a calendar interval. The maintenance action is triggered when the due date approaches and necessary work orders have been created.

- *Predictive maintenance*

Predictive maintenance is designed to schedule corrective maintenance actions before a failure occurs. The team needs to first determine the condition of the equipment in order to estimate when maintenance should be performed. Then maintenance tasks are scheduled to prevent unexpected equipment failures.

- *Prescriptive maintenance*

Prescriptive maintenance doesn't just show that failure is going to happen and when, but also why it's happening. This type of maintenance helps analyze and determine different options and potential outcomes, in order to mitigate any risk to the operation.

Importance of Preventive Maintenance

- Minimizes Downtime
- Cost Savings
- Extended Equipment Lifespan
- Enhanced Efficiency
- Asset Reliability
- Saves Time and Resources

- *Minimizes Downtime*

Regular maintenance helps identify and address potential issues before they turn into major problems.

- *Cost Savings*

Preventive maintenance is often more cost-effective than reactive maintenance. Fixing a problem before it escalates into a major issue can save on repair costs, as well as reduce the expenses associated with emergency repairs and replacement of damaged components.

- *Extended Equipment Lifespan*

Regular maintenance helps extend the lifespan of equipment and assets.

- *Enhanced Efficiency*

Well-maintained equipment tends to operate more efficiently. Cleaning, calibrating, and optimizing components ensure that they function at their best, leading to improved energy efficiency and overall performance.

- *Asset Reliability*

Preventive maintenance builds reliability into the assets and systems of an organization. This reliability is essential for meeting production schedules, delivering services, and maintaining the overall operational integrity of a business.

- *Saves Time and Resources*

Planning maintenance activities in advance allows organizations to schedule downtime at times that least disrupt operations. This strategic approach helps in optimizing resources and minimizing the impact on productivity.

Goals of System Preventive Maintenance

- *Minimizing Unplanned Downtime*. Reduce or eliminate unexpected system failures.
- *Improving Reliability*. Enhance the overall reliability of the system.
- *Optimizing System Performance*. Maintain or improve the efficiency and performance of the system.

- *Extending Equipment Lifespan*. Prolong the life expectancy of system components.
- *Cost Reduction*. Minimize overall operational costs.
- *Improved Planning and Scheduling*. Facilitate better planning of maintenance activities.
- *Documentation and Asset Management*. Maintain accurate records of maintenance activities and manage assets effectively.

Developing a Preventive Maintenance Plan

- Developing an effective preventive maintenance plan involves a systematic approach to identify, schedule, and perform maintenance activities.

Step-by-step guide to developing a preventive maintenance plan:

1. Asset Inventory and Criticality Assessment

   Create a comprehensive inventory of all assets that require maintenance.

2. Data Collection and Analysis

   Gather historical data, manufacturer recommendations, and industry best practices for each asset.

3. Define Preventive Maintenance Tasks

List specific tasks for each asset based on data analysis and equipment specifications.

4. Establish Maintenance Frequencies

Determine the optimal frequency for each preventive maintenance task.

5. Create a Maintenance Schedule

Develop a schedule that outlines when each preventive maintenance task will be performed.

6. Resource Planning

Identify and allocate the necessary resources, including personnel, tools, and spare parts.

7. Documentation and Recordkeeping

Implement a system for documenting maintenance activities and keeping records.

8. Training and Skills Development

Ensure that maintenance personnel are adequately trained for their responsibilities.

9. Continuous Improvement

Regularly review and update the preventive maintenance plan based on feedback and performance data.

10. Integration with CMMS (Computerized Maintenance Management System)

If applicable, integrate the preventive maintenance plan with a CMMS for automated scheduling, tracking, and reporting.

11. Communication and Collaboration

Foster communication between maintenance teams, operators, and other relevant stakeholders.

12. Compliance with Regulations

Ensure that the preventive maintenance plan aligns with industry regulations and standards.

Documentation and Record Keeping

- Documentation and record-keeping are crucial aspects of an effective preventive maintenance (PM) program for a system. Proper documentation helps in tracking maintenance activities, ensuring compliance with schedules, and analyzing the performance of the system over time.

Guide on what to include in your documentation for system preventive maintenance:

- Asset Information

Asset Identification: Clearly label and identify each system component or asset.
Equipment Specifications: Include detailed specifications for each asset, including model numbers, serial numbers, capacity, and any other relevant information.

- Preventive Maintenance Schedule

Maintenance Calendar: Develop a schedule outlining when each preventive maintenance task is due. This could be a monthly, quarterly, bi-annual, or annual schedule.
Task Lists: Specify the tasks to be performed during each maintenance cycle. Include step-by-step instructions for technicians.

- Work Order Documentation:

Work Order Forms: Create standardized forms for recording each preventive maintenance task.
Technician Information: Include the name and signature of the technician performing the maintenance.
Date and Time: Document when the maintenance was performed.

- Inspection and Testing Results:

Checklists: Develop checklists for inspections and testing procedures.
Results and Findings: Record the results of inspections and tests, noting any abnormalities or issues discovered.

- Replacement and Spare Parts:

Inventory List: Keep an updated inventory of replacement parts and spare components.
Part Replacements: Document any parts that were replaced during preventive maintenance, including the reason for replacement.

- Condition Monitoring Data:

Sensor Data: If applicable, include data from sensors and monitoring systems that track the condition of the system.
Trend Analysis: Use historical data to identify trends in system performance and anticipate potential issues.

- Documentation of Repairs and Upgrades:

Repair Records: Keep records of any repairs or upgrades performed during preventive maintenance.
Upgraded Components: Document any components that were upgraded and the reasons for the upgrade.

- Training Records:

Training Documentation: Keep records of training provided to maintenance personnel for handling preventive maintenance tasks.

- Performance Metrics:

Performance Reports: Generate regular reports on the performance of the system based on preventive maintenance data.
Key Performance Indicators (KPIs): Define and track KPIs to assess the effectiveness of the preventive maintenance program.

Emergency Procedures:

Emergency Contacts: Include a list of contacts and procedures to follow in case of emergencies or unexpected issues during preventive maintenance.

- Review and Continuous Improvement:

Review Reports: Regularly review maintenance records and reports to identify areas for improvement.
Feedback Mechanism: Establish a feedback mechanism for technicians to report observations and suggestions for improving the preventive maintenance process.