



## Optimizing Equipment Maintenance & Replacement Decisions



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## Introduction:

Major world companies in the process and petrochemical industry have optimized their maintenance practices to enhance predictive maintenance management systems. This holistic approach entails consistent monitoring and detailed stationary and rotating equipment inspection. This optimization equipment maintenance and replacement decisions training encompasses managing spare parts, selecting tailored maintenance crew, and exploring potential outsourcing opportunities.

Maintenance optimization implies utilizing reliability data to inform Fitness for Service FFS assessments, ultimately guiding choices between continually running equipment, conducting repairs, or opting for equipment replacement. The economic and safety implications that dominate the equipment replacement decision process are critical to these decisions. Optimizing the equipment maintenance and replacement decision program leads to a more efficient and strategic approach.

This optimization equipment maintenance and replacement decisions training course is designed to immerse participants in optimizing decisions for equipment maintenance while incorporating an equipment replacement program. Participants will be versed in various maintenance optimization techniques and acquainted with the optimization criteria.

## Targeted Groups:

- The operation, technical production, and service professionals.
- Technical professionals responsible for the maintenance and repair of vital equipment.
- Professionals involved in inspection and reliability.
- Technical professionals in risk assessment and integrity analysis.
- Technicians focused on regulating, metering, and precision measurements.

## Course Objectives:

By the end of the optimization of equipment maintenance and replacement decisions course, participants will:

- Identify the causes of equipment failures and comprehend the impact on plant reliability.
- Understand the cost-benefit analysis of the Preventive/Predictive Maintenance program.
- Employ maintenance optimization techniques to enhance maintenance procedures.
- Determine the optimal work-crew size, spare parts inventory, and equipment replacement strategies.
- Execute critical decisions based on extensive cost-benefit analysis.
- Integrate safety objectives with repair or replacement optimization strategies in a maintenance optimization program.

## **Targeted Competencies:**

- Understanding significant types of equipment failure mechanisms.
- Grasping maintenance methodologies alongside their economic considerations.
- Modeling of spare parts handling and storage.
- Competence in risk assessment and management.
- Conducting equipment inspections and performing fitness for service analyses.

## **Course Content:**

### **Unit 1: Physical Asset Management and Failure Analysis:**

- Overview of Physical Asset Management.
- Exploring Maintenance Management: Preventive / Predictive Paradigm.
- Investigating Nature and Modes of Equipment Failure.
- Application of Failure Modes and Effect Analysis FMEA.
- Analyzing Component Failure data utilizing the Weibull Distribution.
- Advanced statistical tools: Censored Data, the 3-Parameter Weibull, and Kolmogorov-Smirnov Test.

### **Unit 2: Preventive Maintenance and Spare Parts Replacements:**

- Reliability and Availability Fundamentals: MTBF and MTTR.
- Enhancing Reliability by Downtime Reduction.
- Quantifying Maintenance Performance.
- Proactive Strategies for Preventive Maintenance and Spare Part Logistics.
- Spare Parts Forecasting: Predictive Models and Practical Techniques.
- Change Management in Spare Parts Inventory.

### **Unit 3: Equipment Inspection and Fitness for Service:**

- Condition Monitoring & Inspection Tactics.
- Risk-Based Inspection RBI Methodology.
- Utilizing Risk Matrix for Managing and Mitigating Measures.
- Boosting Reliability through Strategic Inspections.
- Balancing Inspection Scope and Frequency.
- Thorough Fitness for Service Analysis FFS.

### **Unit 4: Economics of Maintenance, Repair and Replacement:**

- Managing Maintenance Resources with Efficiency.
- Strategic Use of CMMS in Enhancing Maintenance Operations.
- Analysis of Maintenance Organization: Optimal Crew Size and Structure.
- Decision-making in Equipment Repair or Replacement with an Economic Lens.
- Economic Factors Influencing Maintenance Outsourcing and Subcontracting.
- Delving into the Economic Aspects of Equipment Replacement.



## **Unit 5: Total Productive Maintenance and Safety:**

- Navigating Capital Investment Decisions in Equipment and Maintenance for Maximum ROI.
- Implementing Total Productive Maintenance TPM Principles.
- Emphasizing Safety in the Maintenance Workplace.
- Utilizing KPI and OEE Metrics: Distinguishing Between Leading and Lagging Indicators.

## **Conclusion:**

In this optimization equipment maintenance and replacement decisions course, participants will understand how to incorporate equipment optimization, equipment maintenance training, and maintenance optimization techniques into strategic decision-making.