

Predictive Maintenance and Asset Performance Management Training

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Overview

Industrial organizations face increasing pressure to prevent unplanned downtime, extend equipment life, and extract measurable value from physical assets. The Predictive Maintenance and Asset Performance Management Training provides structured methods to transition maintenance operations from reactive firefighting to predictive and prescriptive strategies. Participants explore Industrial IoT architecture, sensor deployment, anomaly detection, machine learning models, and digital twins, bridging the operational gap between field instrumentation and enterprise asset management software. Practical frameworks equip engineering teams to analyze asset criticality, establish reliable failure mode models, and calculate return on investment. This course is delivered by Agile Leaders Training Center.

Who Should Attend

- Maintenance managers and plant supervisors seeking to transition from preventive schedules to condition-based intervention.
- Reliability engineers and condition-monitoring specialists responsible for vibration analysis, thermography, and oil diagnostics.
- Asset managers and plant engineers overseeing equipment lifecycle planning and criticality evaluations.
- Operations engineers and automation specialists integrating field operational technology with enterprise platforms.
- Digital transformation leads and Industrial IoT professionals designing connected asset strategies.

Departments and Industries

This program supports technical teams managing heavy rotating equipment, continuous production lines, and high-capital infrastructure across asset-intensive sectors.

- Maintenance and Reliability Engineering Teams in Manufacturing and Industrial Production
- Plant Operations and Integrity Divisions in Oil, Gas, and Process Industries
- Asset Management Units in Energy, Power Generation, and Utilities
- Condition Monitoring and Technical Services Teams in Mining and Heavy Industry
- Engineering and Automation Divisions in Logistics, Transportation, and Pharmaceuticals

Learning Objectives

By the end of this course, participants will be able to:

- Contrast reactive, preventive, predictive, and prescriptive maintenance operating models.
- Evaluate asset criticality and lifecycle degradation to prioritize monitoring investments.
- Deploy appropriate wired and wireless sensors alongside Industrial IoT network architectures.
- Apply condition-monitoring technologies including vibration, thermography, ultrasonics, and lubricant testing.
- Implement machine learning algorithms for anomaly detection and remaining useful life estimation.
- Integrate digital twins and CMMS platforms with enterprise asset performance management solutions.
- Execute root cause analysis and failure mode and effects analysis on critical production assets.
- Formulate an asset performance management roadmap that incorporates cybersecurity and energy efficiency.

Course Agenda

Day 1: Condition Monitoring and Industrial IoT Architecture

- Evolution of Maintenance Strategies: Reactive, Preventive, Predictive, and Prescriptive Models
- Core Principles of Asset Performance Management and Operational Asset Lifecycle Stages
- Asset Criticality Assessment Frameworks and Failure Consequence Scoring
- Financial Justification, Return on Investment Calculations, and Business Case Formulation
- Industrial IoT Architecture: Smart Sensors, Gateways, Data Acquisition, and Legacy Integration
- Condition-Monitoring Methods: Vibration, Thermography, Ultrasound, Lubricant Analysis, and Acoustic Emission

Day 2: Maintenance Analytics, Digital Twins, and Systems Integration

- Maintenance Data Governance: Ingestion, Cleaning, Normalization, and Quality Control
- Descriptive, Diagnostic, Predictive, and Prescriptive Maintenance Analytics
- Machine Learning Algorithms for Failure Pattern Recognition and Fault Detection
- AI-Driven Anomaly Detection and Remaining Useful Life Estimation Principles
- Digital Twin Foundations: Creating Virtual Representations of Critical Production Assets
- Edge and Cloud Architecture, CMMS Integration, Interoperability, and Scalability

Day 3: Reliability Engineering and Risk-Based Prioritization

- Structured Root Cause Analysis Methodologies for Mechanical and Electrical Failure
- Failure Mode and Effects Analysis for Identifying Failure Mechanisms
- Reliability Data Collection: Weibull Analysis and Failure Distribution Modelling
- Risk-Based Maintenance Planning and Dynamic Work Prioritization
- Resource Allocation, Labor Balancing, and Maintenance Cost-Benefit Analysis
- Asset Performance Metrics: Tracking MTBF, MTTR, Availability, and OEE on Dashboards

Day 4: Operational Cybersecurity, Sustainability, and APM Roadmap

- Connected Asset Cybersecurity: Protecting Industrial IoT and IT/OT Convergence Layers
- Sustainable Maintenance: Energy Consumption Reduction and Decarbonization Targets
- Implementation Planning: Work Streams, Pilot Projects, and Agile Deployment Phases
- Change Management: Operator Buy-In, Skill Gap Analysis, and Workforce Readiness
- Enterprise Scaling: Harmonizing IoT Sensors, AI Models, CMMS, and APM Software
- Capstone Project: Developing an Integrated Predictive Maintenance and Asset Performance Management Roadmap

Practical Exercises

Participants apply classroom concepts through structured analytical exercises focused on industrial applications.

- Suggested activity: Conduct an asset criticality assessment on rotating machinery to define monitoring priorities.
- Suggested activity: Select appropriate condition-monitoring technologies based on specific mechanical failure modes.
- Suggested activity: Evaluate sensor data streams to identify operational anomalies and estimate remaining useful life.
- Suggested activity: Construct an asset performance management roadmap outlining technical integration and governance milestones.

Frequently Asked Questions

What specific qualifications or prerequisites are needed before enrolling in the course?

Participants should have a foundational understanding of industrial maintenance practices, mechanical equipment operation, engineering fundamentals, or plant supervision. Prior experience working with maintenance databases, condition monitoring tools, or automation systems is helpful but not required.

How long is each day's session, and what is the total course duration?

Each training day runs for five to six hours, encompassing lectures, technical case discussions, and practical exercises. The full program spans four days, delivering 20 to 24 instructional hours.

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Differentiating Features

Unlike standalone vibration or thermography courses, this program unites field condition monitoring with enterprise asset performance management, digital twins, and machine learning analytics. Participants examine the entire data pipeline from sensor placement and Industrial IoT networking to predictive algorithms and CMMS work order triggering. The curriculum addresses IT/OT cybersecurity and sustainability alongside reliability engineering, concluding with an operational roadmap that aligns technical execution with organizational maintenance budgets.

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