CONCEPT

AI for Predictive Maintenance: Condition Monitoring, Anomaly Detection and RUL

8 – 12 February 2027
London - Central London four-star



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Introduction:

Unplanned equipment failures remain a significant source of maintenance cost, yet many plants already collect vibration, temperature and oil data that nobody turns into early warnings. AI for predictive maintenance promises to close that gap, but projects stall on poor sensor data, unclear value and alerts that never reach the work order queue. This Core Concept course prepares maintenance and operations managers to select assets, judge condition monitoring data, interpret anomaly detection and remaining useful life outputs without coding, and connect them to CMMS workflows. Participants leave with a Predictive Maintenance Pilot Charter and business case.

Course Objectives:

- Select a maintenance strategy per asset class by comparing reactive, preventive, condition-based and predictive approaches against failure behaviour and criticality
- Specify the condition monitoring data a predictive use case needs, from vibration, temperature and oil analysis to IoT sensor streams, using ISO 17359 and ISO 13374 as the reference structure
- Assess sensor data pipelines for completeness, labelling and failure history quality before a model is commissioned
- Interpret anomaly detection scores and remaining useful life estimates, and set alert thresholds that maintenance planners can act on
- Build a predictive maintenance business case covering avoided downtime, spares, labour and platform costs
- Produce a Predictive Maintenance Pilot Charter that links model alerts to CMMS work orders and a team adoption plan

Target Audience:

- Managers accountable for maintenance budgets, planning and equipment availability
- Reliability leads who define failure modes and condition monitoring programmes for critical assets
- Plant and operations managers responsible for production continuity and downtime targets
- Digital transformation and industrial IoT leads who sponsor analytics initiatives on the plant floor
- Asset data and CMMS administrators who manage equipment hierarchies, failure codes and work order records

Course Outline:

Day 1: Maintenance Strategies and the Case for Predictive Analytics

- Reactive, Preventive, Condition-Based and Predictive Maintenance Compared by Cost and Risk
- P-F Curve and Warning Time as the Basis for Predictive Intervention
- Failure Mode Selection: Which Failures Give Detectable Precursors
- Asset Criticality Screening to Shortlist Predictive Candidates
- Predictive Maintenance Readiness Scorecard for Data, People and Systems

Day 2: Condition Monitoring Data and Reference Architecture

- ISO 17359 Condition Monitoring Programme Steps and Measurement Selection
- Vibration Severity Evaluation Under ISO 20816 for Rotating Machinery
- Oil Analysis, Thermography and Motor Current Signals as Model Inputs
- ISO 13374 Data Processing Layers from Sensor Acquisition to Advisory Output
- Industrial IoT Architecture: Edge Gateways, Historians and Cloud Analytics Platforms

Day 3: Data Pipelines, Anomaly Detection and Remaining Useful Life

- Sensor Data Quality Checks: Gaps, Drift, Sampling Rate and Timestamp Alignment
- Failure History Labelling with ISO 14224 Failure Mode and Cause Taxonomy
- Anomaly Detection Outputs: Baselines, Health Scores and Threshold Setting
- Remaining Useful Life Estimation Concepts Under ISO 13381-1 Prognostics Guidance
- No-Code and Low-Code Predictive Analytics Tools: Evaluation Checklist

Day 4: Business Case, Alert Governance and Workflow Integration

- Predictive Maintenance Business Case: Avoided Downtime, Spares and Labour Savings Model
- False Alarm and Missed Failure Trade-Off: Precision, Recall and Alert Fatigue
- Alert-to-Work-Order Workflow Design in the CMMS
- Model Drift Monitoring and Retraining Triggers After Equipment Changes
- Change Management for Maintenance Crews: Trust, Roles and Feedback Loops

Day 5: Pilot Case Work and the Predictive Maintenance Pilot Charter

- Pump and Compressor Fleet Case: Reviewing Vibration Trends and Anomaly Alerts
- Wind Turbine Gearbox and Conveyor Case: Judging RUL Evidence Before Intervention
- Pilot Scope, Success Metrics and Go or No-Go Criteria Drafting for an Own Asset
- Predictive Maintenance Pilot Charter Assembly with Business Case and Workflow
- Charter Presentation and Peer Challenge

Skills You Will Gain:

- Maintenance Strategy Selection
- Condition Monitoring Programme Design
- Sensor Data Quality Assessment
- Anomaly Alert Interpretation
- Prognostics and RUL Literacy
- Predictive Maintenance Value Modelling
- CMMS Workflow Integration
- Maintenance Team Change Leadership

Why Attend This Course:

- Return with a Predictive Maintenance Pilot Charter, business case and alert-to-work-order workflow for a real asset
- Challenge vendor and data science proposals with clear questions about data quality, false alarms and RUL confidence
- Avoid pilots that produce dashboards but no maintenance action by designing the planner and technician response first
- Compare predictive maintenance experience with peers from oil and gas, utilities, manufacturing, mining and facilities across several countries

Conclusion:

Predictive maintenance delivers value only when reliable sensor data, sound failure knowledge and a disciplined work order response come together. This course moves from maintenance strategy choice and the P-F curve, through condition monitoring standards and industrial IoT architecture, to data quality, anomaly detection and remaining useful life, and then to the business case, alert governance, CMMS integration and crew adoption. The final day applies these methods to multi-sector cases and produces a Predictive Maintenance Pilot Charter ready for sponsor review.