Condition-Based Monitoring in Manufacturing Training Course

Professional Development Training Course Outline

Category	Manufacturing	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Condition-Based Monitoring (CBM) is a critical pillar of modern smart manufacturing, enabling organizations to shift from reactive maintenance to intelligent, data-driven asset management. Leveraging technologies such as IIoT (Industrial Internet of Things), AI-driven predictive analytics, vibration analysis, and real-time condition monitoring, CBM empowers manufacturers to detect equipment degradation early, reduce unplanned downtime, and optimize maintenance cycles. Condition-Based Monitoring in Manufacturing Training Course provides a comprehensive, hands-on understanding of CBM systems, integrating Industry 4.0 principles, edge computing, and machine learning models for next-generation industrial reliability.

In today’s competitive manufacturing landscape, asset reliability and operational efficiency are directly linked to profitability. This course equips professionals with the tools and frameworks to implement smart maintenance strategies using digital twins, sensor-based diagnostics, and real-time analytics dashboards. Participants will gain practical insights into failure mode detection, anomaly identification, and predictive maintenance workflows that align with global smart factory transformation initiatives.

Programme Curriculum

Condition-Based Monitoring in Manufacturing Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Understand Industry 4.0-enabled Condition Monitoring systems
2. Apply AI-driven Predictive Maintenance strategies
3. Implement IIoT sensor integration for real-time data acquisition
4. Analyze machine health using vibration analysis and thermal imaging
5. Develop asset reliability optimization frameworks
6. Utilize machine learning for fault detection and anomaly prediction
7. Design smart manufacturing maintenance architectures
8. Interpret real-time analytics dashboards for decision-making
9. Deploy edge computing solutions in industrial environments
10. Build digital twin models for equipment lifecycle monitoring
11. Reduce downtime using failure prediction algorithms
12. Improve efficiency through data-driven maintenance scheduling
13. Enhance operational performance with smart factory automation tools

Target Audience

- Maintenance Engineers and Technicians
- Reliability Engineers
- Manufacturing Plant Managers
- Industrial Automation Engineers
- Data Analysts in Manufacturing
- Mechanical and Electrical Engineers
- Operations and Production Supervisors
- IoT and Smart Factory Solution Architects

Course Modules

Module 1: Fundamentals of Condition-Based Monitoring

- CBM principles and evolution from reactive to predictive maintenance
- Overview of Industry 4.0 and smart manufacturing ecosystems
- Types of condition monitoring techniques
- Key performance indicators (KPIs) in asset health
- Role of IoT in modern maintenance systems
- **Case Study:** Implementation of CBM in an automotive assembly plant reducing downtime by 30%

Module 2: Industrial IoT (IIoT) in CBM

- Sensor technologies for manufacturing equipment
- Data acquisition systems and connectivity protocols
- Wireless vs wired industrial sensor networks
- Edge vs cloud computing in CBM systems
- Data integrity and cybersecurity considerations
- **Case Study:** IIoT-enabled predictive maintenance in a steel manufacturing facility

Module 3: Vibration Analysis & Fault Detection

- Basics of vibration signatures in rotating machinery
- FFT (Fast Fourier Transform) analysis for fault diagnosis
- Bearing and motor fault identification
- Signal processing techniques
- Condition thresholds and alert systems
- **Case Study:** Early fault detection in industrial pumps using vibration analytics

Module 4: Thermal Imaging & Infrared Diagnostics

- Infrared thermography fundamentals
- Heat signature interpretation in equipment
- Electrical and mechanical fault detection
- Calibration and imaging best practices
- Integration with CBM systems
- **Case Study:** Preventing electrical failure in a manufacturing plant using thermal imaging

Module 5: Machine Learning for Predictive Maintenance

- Supervised vs unsupervised learning models
- Anomaly detection algorithms
- Training datasets for industrial equipment
- Predictive modeling techniques
- AI model deployment in CBM systems
- **Case Study:** Machine learning-based failure prediction in CNC machines

Module 6: Digital Twins in Manufacturing

- Concept and architecture of digital twins
- Real-time simulation of physical assets
- Data synchronization between physical and virtual systems
- Lifecycle monitoring of equipment
- Integration with CBM platforms
- **Case Study:** Digital twin implementation in an aerospace manufacturing line

Module 7: Real-Time Analytics & Edge Computing

- Role of edge computing in industrial environments
- Real-time data processing techniques
- Dashboard design for maintenance teams
- KPI visualization and alert systems
- Data latency reduction strategies
- **Case Study:** Real-time monitoring system in a beverage production plant

Module 8: Smart Maintenance Strategy Implementation

- Developing maintenance maturity models
- Cost optimization in predictive maintenance
- Workflow automation in maintenance operations
- Integration with ERP and CMMS systems
- Continuous improvement strategies
- **Case Study:** Enterprise-wide CBM deployment in a global FMCG manufacturer

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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