
Digital Maintenance Transformation with IIoT and AI Training Course

7 – 11 February 2027
Manama





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Programme Summary

Digital maintenance transformation with IIoT and AI is a one-week training course for maintenance, asset management and engineering technology leaders at advanced level, culminating in a digital maintenance roadmap with a business case for their own organisation. Many plants run pilots of sensors, drones or analytics that never scale because data, security, people and funding were not planned together. The approach moves from the technology landscape to architecture, use case selection, risk control and phased adoption. Mars Training Centre UK delivers this programme in digital maintenance transformation for oil, gas, power and process industries.

The Business Case

Digital tools can shorten inspection campaigns, remove people from hazardous work and warn of failures earlier, but each also adds cost, cyber exposure and change for maintenance crews. Leaders who select technologies against defined maintenance problems, and scale only what pilots prove, avoid stranded investments and build capability that lasts.

- Inspection and Maintenance Productivity: Rises as remote, robotic and mobile tools replace manual rounds and paperwork.
- Personnel Exposure: Falls as drones, crawlers and remote assistance reduce work at height and in confined spaces.
- Digital Investment Return: Improves as pilots are judged against agreed measures before scaling.

Principles and Evidence Base

- ISO/IEC 30141: Its Internet of Things reference architecture structures the connectivity and platform design in Session 2.
- ISO 23247: Its digital twin framework guides the definition of asset twins in Session 2.
- IEC 62443: Its security requirements for industrial automation and control systems frame the cyber controls in Session 4.
- ISO 55001: Its asset management system requirements anchor the roadmap and governance in Session 5.

Intended Participants

- Leaders who set maintenance technology direction and approve digital investments.
- Managers who sponsor pilots of sensors, analytics, robotics or mobile tools.
- Engineering technology heads who connect operational technology with enterprise systems.
- Asset managers who must show the value of digital spending to executive committees.



The programme serves upstream oil and gas, refining and petrochemicals, power generation and utilities.

Learning Outcomes

1. Participants will be able to evaluate digital maintenance technologies against specific maintenance problems.
2. Participants will be able to design an IIoT data architecture from sensor to edge, cloud and CMMS.
3. Participants will be able to prioritise AI and digital twin use cases by value, data readiness and risk.
4. Participants will be able to justify the use of drones, robotics and augmented reality for inspection and field work.
5. Participants will be able to specify OT cybersecurity and governance controls for connected maintenance systems.
6. Participants will be able to construct a phased digital maintenance roadmap with pilot measures and a business case.

Programme Structure

Day 1: Digital Maintenance Transformation Landscape

Which digital technologies address which maintenance problems?

- Maintenance 4.0 Concepts and Maturity Levels
- Problem-First Use Case Identification
- Wireless Sensors, LPWAN and Connectivity Options
- Mobile and Connected CMMS for Field Execution
- Digital Maintenance Maturity Assessment

Day 2: IIoT Architecture, Data Platforms and Digital Twins

How should data move from equipment to decisions?

- ISO/IEC 30141 IoT Reference Architecture
- Edge Computing, Historians and Cloud Data Platforms
- Data Quality, Context and Asset Hierarchy Alignment
- ISO 23247 Digital Twin Framework for Assets
- Integration Between Operational and Enterprise Systems

Day 3: AI, Robotics and Augmented Reality in Maintenance

Where do analytics and automation add value in the field?

- Machine Learning for Anomaly Detection and Prioritisation
- Drones, Crawlers and Robotic Inspection Platforms
- Automated NDT and Image Analytics
- Augmented Reality and Remote Expert Assistance
- Additive Manufacturing for Obsolete and Critical Spares



Day 4: Cybersecurity, Governance and People

How are connected maintenance systems kept secure and adopted?

- IEC 62443 Zones, Conduits and Security Levels
- Vendor, Cloud and Remote Access Risk Controls
- Data Ownership and Model Governance
- Workforce Skills and New Maintenance Roles
- Change Management for Crews and Planners

Day 5: Applying Digital Maintenance Transformation to the Organisation

Which initiatives should proceed, in what order and on what evidence?

- Ranking Day 1 and Day 3 Use Cases on Value and Readiness
- Pilot Design with Success Measures and Scale Gates
- Business Case Using Day 2 Architecture Costs
- ISO 55001 Alignment and Executive Governance
- Digital Maintenance Roadmap Completion

Methodology

The programme relies on case analysis of digital maintenance programmes in oil and gas, power and process plants, combined with structured exercises on participants' own use cases. Each session moves from a short briefing to group evaluation, and closes with a challenge in which proposals are tested for value, risk and readiness.

- Suggested activity: Selecting between drone and crawler inspection for a tank farm.
- Suggested activity: Designing a sensor-to-CMMS data flow for a compressor station.
- Suggested activity: Assessing remote access risks for a vendor monitoring service.

Capstone Output

Each participant completes a digital maintenance roadmap for their organisation or a case facility. It contains prioritised use cases, target architecture, pilot designs with success measures, cyber and governance controls, workforce actions and a phased business case.

Frequently Asked Questions

Is digital maintenance transformation training suitable for leaders without an IT background?

Yes. It is set at advanced level for maintenance and asset leaders who decide on technology investment. It assumes plant experience; architecture and analytics are explained at decision level.



Which standards does digital maintenance transformation with IIoT and AI rest on?

It rests on ISO/IEC 30141 for IoT architecture, ISO 23247 for digital twins, IEC 62443 for industrial cybersecurity and ISO 55001 for asset management governance.

How is the digital maintenance roadmap used at work?

You can use it to secure funding for pilots, set scale decisions in advance and align maintenance, IT and operations teams.

How does digital maintenance transformation differ from predictive maintenance programme training?

It covers the wider technology portfolio, architecture and adoption decisions, rather than designing condition monitoring tasks and alarm limits.