Connected Electrical Assets Training Course: Sensors, Edge Intelligence and Condition Analytics

13 – 17 September 2027
Dubai - Marriott Hotel Al Jaddaf, Dubai

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Programme Summary

Connected electrical assets are the subject of this one-week training course for electrical engineers and engineering managers, ending in a monitoring design for one electrical system. Switchgear, transformers, motors and distribution boards can now report their own condition, yet many projects fail because sensors are poorly placed, data is unreliable or the connected devices are not secured. The programme builds a method for choosing sensors, placing edge computing, detecting anomalies and securing devices, applied to a system the participant selects. Mars Training Centre UK delivers this programme on connected electrical assets to mixed-organisation cohorts.

The Business Case

Electrical failures often give warning in heat, vibration, current or voltage signals long before an outage, but these signals are missed when equipment is checked only on a fixed round. Connecting assets can reveal early faults and power quality problems, provided the data is sound and the devices are protected. Engineers who design the sensing, data route and analytics together avoid costly rework after installation.

- Unplanned Outages: Fall as early fault signals are detected and acted on in time.
- Inspection Effort: Falls as routine rounds give way to condition-based checks.
- Data Reliability: Rises as sensor placement, signal quality and time stamps are specified before purchase.

Principles and Evidence Base

- IEC 62443: This series on the security of industrial automation and control systems guides the device and network security review in Session 4.
- Baseline and control limit thinking: Session 3 uses statistical baselines to separate normal variation from early faults.
- Edge and cloud placement trade-off: Session 2 weighs latency, bandwidth and cost to decide where each analysis runs.

Intended Participants

- Electrical engineers who specify and install monitoring on power equipment.
- Maintenance and reliability engineers who act on condition findings.
- Controls and automation engineers who connect devices to networks.
- Project engineers who deliver pilots of connected equipment.
- Engineering managers who approve technical designs for monitoring projects.

Typical settings include power utilities, manufacturing plants, building services and transport operators.

Learning Outcomes

1. Participants will be able to prioritise electrical assets for monitoring by criticality and failure mode.
2. Participants will be able to select sensors and measurement points for a chosen asset.
3. Participants will be able to design a data route that places analysis at the edge or in the cloud with reasons.
4. Participants will be able to evaluate anomaly detection methods against a baseline profile.
5. Participants will be able to diagnose security weaknesses in connected electrical devices.
6. Participants will be able to justify a pilot scope and handover plan to project sponsors.

Programme Structure

Day 1: Connected Electrical Assets and Sensing

What should be measured on electrical assets, and with which sensors?

- Asset Criticality Register
- Sensor Selection Matrix
- Measurement Point Plan
- Signal Quality Checklist
- Failure Mode Signal Map

Day 2: Communication, Edge Computing and Data Pipelines

How does sensor data travel, and where is it processed?

- Protocol Selection Guide
- Edge and Cloud Placement Sheet
- Data Pipeline Diagram
- Time Synchronisation Check
- Data Retention Rules

Day 3: Condition Analytics and Anomaly Detection

How do models find early signs of faults and power quality problems?

- Baseline Profile Method
- Anomaly Detection Comparison
- Power Quality Event Classification
- Alert Threshold Sheet
- Model Validation Log

Day 4: Security and Project Delivery

How are connected electrical systems secured and delivered?

- IEC 62443 Requirements Review
- Device Access Control Sheet
- Remote Update Plan
- Pilot Scope Statement
- Handover and Support Checklist

Day 5: Applying the Tools to One Electrical System

Do the sensing, data, analytics and security tools form one working design?

- Applying the Session 1 Sensor Selection Matrix
- Using the Session 2 Data Pipeline Diagram
- Checking the Session 3 Alert Threshold Sheet
- Running the Session 4 Device Access Control Sheet
- Completing the Monitoring Design

Methodology

The programme uses a data workshop method built on anonymised sensor traces, single-line diagrams, network drawings and alert logs from power, manufacturing and building settings. Participants work in small engineering teams on one shared system, challenge each other's designs and thresholds, and receive written facilitator feedback on every artefact they produce.

- Suggested activity: Choosing sensors and measurement points for a switchgear panel.
- Suggested activity: Reading a current and temperature trace to separate a fault signal from normal load change.
- Suggested activity: Reviewing a device network drawing for weak access points.

Capstone Output

Each participant completes a monitoring design for one electrical system. It holds an asset priority list, a sensor and measurement plan, a data route with edge and cloud placement, an anomaly detection approach with thresholds, a security review and a pilot scope. The design is used at work to brief project sponsors, specify equipment and plan the first pilot.

Frequently Asked Questions

Is connected electrical assets training suitable for engineers new to data science?

Yes. The connected electrical assets programme assumes a working knowledge of electrical equipment but no data science background, and it builds each analytics step through worked examples and checklists.

Which standard do connected electrical assets rest on in this programme?

Connected electrical assets are covered with the IEC 62443 series for security, together with baseline and control limit thinking and the edge and cloud placement trade-off.

How is the design from connected electrical assets training used at work?

You use the monitoring design to brief project sponsors, specify sensors and network equipment, set alert thresholds and plan the first pilot.

How do connected electrical assets differ from a general industrial IoT programme?

Connected electrical assets concentrate on electrical equipment, power quality and condition signals, while a general industrial IoT programme covers connected machines and platforms across all sectors.