
AI-Driven Quality Assurance and Smart Factory Analytics Training Course

15 – 19 February 2027
Tokyo





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Programme Summary

AI-driven quality assurance and smart factory analytics is the subject of this five-day training course for quality, manufacturing and operations leaders at advanced level, culminating in an AI quality roadmap for one plant. Late defects, scrap and fatigued manual inspection erode margin, while production data sits unused. The approach moves from data readiness and model choice to validation, governance and scaling. Mars Training Centre UK delivers this programme in AI-driven quality assurance.

The Business Case

Most plants hold years of sensor, image and inspection data, yet quality decisions still follow the defect. Leaders who select the right AI use cases, test them against existing inspection and govern them once live move quality control upstream, catching drift while the process can still be corrected.

- Cost of Poor Quality: Falls as scrap and rework are traced to process causes earlier.
- First Pass Yield: Rises as anomaly detection flags drift before parts go out of tolerance.
- Inspection Escape Rate: Drops as machine vision is validated against human inspection.

Principles and Evidence Base

- ISO 9001: Its process approach and risk-based thinking place AI inspection within the quality management system in Session 1.
- ISO/IEC 42001: Its requirements shape the governance model built in Session 4.
- Statistical Process Control SPC: Control charts provide the baseline that anomaly detection must outperform in Session 3.
- Cost of Poor Quality Analysis: Prevention, appraisal and failure costs structure the business cases in Session 2.

Intended Participants

- Leaders accountable for product quality and quality system performance across plants.
- Executives deciding which AI investments a manufacturing operation should fund.
- Heads of operations responsible for yield, scrap and line efficiency targets.
- Leaders standardising inspection and analytics practice across a multi-site network.

The programme serves quality, production and digital functions in automotive, food, pharmaceutical and process industries.



Learning Outcomes

1. Participants will be able to diagnose where AI can reduce the cost of poor quality.
2. Participants will be able to evaluate the readiness of image and sensor data for modelling.
3. Participants will be able to prioritise machine vision, anomaly detection and predictive quality use cases by value and feasibility.
4. Participants will be able to justify acceptance criteria for an AI inspection model against human and SPC baselines.
5. Participants will be able to construct a governance model for AI quality systems.
6. Participants will be able to design a plan that scales a proven use case across plants.

Programme Structure

Day 1: Quality Performance and the Role of AI

Where does poor quality cost the organisation most, and where can AI change it?

- Cost of Poor Quality Mapping Across the Value Stream
- ISO 9001 Process Approach and Risk-Based Thinking
- Inspection Points, Escape Routes and Detection Gaps
- AI Capability Map: Vision, Anomaly Detection and Prediction
- Smart Factory Maturity Self-Assessment

Day 2: Data Readiness and Use-Case Selection

Is the plant's data good enough, and which use cases deserve funding?

- Quality Data Sources: Historians, MES, LIMS and Image Archives
- Data Labelling, Defect Taxonomies and Ground Truth
- Data Quality Profiling and Gap Remediation
- Value and Feasibility Matrix for AI Quality Use Cases
- Business Case Structure Using Prevention and Failure Costs

Day 3: Machine Vision, Anomaly Detection and Predictive Quality

How do the main AI techniques perform against existing inspection and SPC?

- Automated Visual Inspection: Cameras, Lighting and Edge Deployment
- Defect Classification Models and Their Failure Modes
- Multivariate Anomaly Detection Compared With SPC Control Charts
- Predictive Quality Models Linking Process Parameters to Outcomes
- False Accept and False Reject Trade-Offs



Day 4: Validation, Governance and Model Drift

How is an AI quality system proven, controlled and kept reliable once live?

- Validation Protocols Against Human Inspection Baselines
- ISO/IEC 42001 AI Management System Controls
- Model Drift Monitoring and Retraining Triggers
- Roles, Decision Rights and Operator Override Rules
- Integrating AI Records Into Quality System Audits

Day 5: Scaling AI-Driven Quality Assurance Across Plants

Is the AI quality roadmap realistic and ready for sponsor approval?

- Prioritising the Day 2 Use Cases for a First Pilot
- Setting Day 4 Acceptance Criteria for the Pilot
- Replication Playbooks for Lines and Sites
- Workforce Skills and Change Plan for Inspectors and Engineers
- Completing the AI Quality Roadmap

Methodology

The programme is built around data workshops and case analysis. Participants profile sample production datasets, compare AI and SPC results on the same process and test acceptance criteria. Cases come from discrete assembly, food processing and pharmaceutical packaging.

- Suggested activity: Scoring five candidate AI use cases on value and data readiness.
- Suggested activity: Comparing anomaly detection with control chart alarms on one dataset.
- Suggested activity: Drafting a validation protocol for a machine vision station.

Capstone Output

Each participant completes an AI quality roadmap for one plant. It contains a cost of poor quality map, a data readiness assessment, a ranked use-case portfolio, pilot acceptance criteria and a scaling plan. It is presented to the sponsor as the basis for a funded pilot.

Frequently Asked Questions

Is AI-driven quality assurance training suitable for senior quality and plant leaders?

Yes. It is set at advanced level for leaders who own quality or production results and assumes familiarity with quality management systems, but no programming background.



Which standards does the AI-driven quality assurance programme rest on?

It rests on ISO 9001, ISO/IEC 42001, statistical process control and cost of poor quality analysis.

How is the roadmap from AI-driven quality assurance training used at work?

You can use it to secure funding for a first pilot and set governance before any model goes live.

How does AI-driven quality assurance differ from a general quality engineering programme?

It focuses on selecting, validating and governing AI models, while quality engineering programmes concentrate on statistical tools.