Advanced Quality Engineering in Manufacturing Training Course

Professional Development Training Course Outline

Category	Manufacturing	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The Advanced Quality Engineering in Manufacturing Training Course is a comprehensive, industry-aligned program designed to equip professionals with cutting-edge capabilities in quality assurance, lean manufacturing, Six Sigma methodologies, AI-driven quality control, and smart factory integration. As manufacturing evolves under the influence of Industry 4.0, IoT-enabled production systems, predictive analytics, and digital transformation, organizations require engineers who can ensure zero-defect production, optimize process capability, and maintain global compliance standards such as ISO 9001:2015, IATF 16949, and AS9100.

Advanced Quality Engineering in Manufacturing Training Course empowers participants with advanced tools in statistical process control, Failure Mode and Effects Analysis, Advanced Product Quality Planning, Measurement System Analysis, and real-time quality monitoring systems. It blends traditional quality engineering principles with modern technologies such as machine learning for defect detection, digital twins for process simulation, and automated CAPA systems. The course is designed to transform manufacturing professionals into strategic quality leaders capable of driving operational excellence, cost reduction, and continuous improvement in highly competitive global markets.

Programme Curriculum

Advanced Quality Engineering in Manufacturing Training Course

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Course Duration

10 days

Course Objectives

1. Master Industry 4.0 Quality Engineering frameworks
2. Apply advanced Six Sigma Black Belt methodologies
3. Implement AI-powered defect detection systems
4. Optimize Lean Manufacturing & waste reduction strategies
5. Design robust Statistical Process Control (SPC) systems
6. Conduct advanced FMEA risk mitigation analysis
7. Develop APQP & product lifecycle quality planning
8. Strengthen Measurement System Analysis (MSA) accuracy
9. Enable predictive quality analytics using Big Data
10. Integrate IoT-based smart manufacturing systems
11. Ensure compliance with ISO 9001:2015 & IATF 16949 standards
12. Build zero-defect manufacturing strategies
13. Implement real-time CAPA and continuous improvement systems

Target Audience

1. Quality Engineers & Quality Managers
2. Manufacturing Engineers & Process Engineers
3. Production Supervisors & Plant Managers
4. Industrial Engineers & Operations Managers
5. Six Sigma Green Belt / Black Belt Professionals
6. Supply Chain & Vendor Quality Specialists
7. Automotive & Aerospace Manufacturing Professionals
8. Engineering Graduates entering Quality Assurance roles

Course Modules

Module 1: Fundamentals of Advanced Quality Engineering

- Evolution of quality engineering systems
- Quality paradigms in Industry 4.0
- Role of digital transformation in manufacturing
- Overview of global quality standards

- Integration of lean and Six Sigma systems
- **Case Study:** Transition from traditional QA to smart quality systems in automotive plants

Module 2: Lean Manufacturing & Waste Elimination

- 7 types of manufacturing waste
- Value stream mapping techniques
- Kaizen continuous improvement
- Just-in-Time (JIT) production systems
- 5S workplace optimization
- **Case Study:** Lean transformation in electronics manufacturing facility

Module 3: Six Sigma Advanced Applications

- DMAIC vs DMADV frameworks
- Process capability optimization
- Sigma level improvement strategies
- Statistical tools for defect reduction
- Control plan development
- **Case Study:** Reducing defect rate in injection molding process

Module 4: Statistical Process Control (SPC)

- Control charts and interpretation
- Process variation analysis
- Cp, Cpk, Pp, Ppk metrics
- Real-time SPC monitoring tools
- Out-of-control process handling
- **Case Study:** SPC implementation in FMCG production line

Module 5: Failure Mode and Effects Analysis (FMEA)

- Design vs Process FMEA
- Risk Priority Number (RPN) calculation
- AI-enhanced FMEA models
- Risk mitigation strategies
- Documentation best practices
- **Case Study:** FMEA application in aerospace component manufacturing

Module 6: Advanced Product Quality Planning (APQP)

- APQP phases and structure
- Cross-functional team integration
- Product validation planning
- Supplier quality alignment
- Launch readiness assessment
- **Case Study:** APQP execution in automotive new product launch

Module 7: Measurement System Analysis (MSA)

- Gauge R&R studies
- Measurement bias and linearity

- Calibration systems
- Data reliability improvement
- Inspection system validation
- **Case Study:** MSA improvement in precision machining industry

Module 8: AI & Machine Learning in Quality Engineering

- Predictive defect detection models
- Computer vision inspection systems
- Machine learning in process optimization
- Neural networks for anomaly detection
- Data-driven decision systems
- **Case Study:** AI-based visual inspection in semiconductor manufacturing

Module 9: Industrial IoT (IIoT) in Smart Manufacturing

- Sensor integration in production lines
- Real-time data acquisition systems
- Machine connectivity protocols
- Smart dashboards and monitoring
- Edge computing in manufacturing
- **Case Study:** IoT-enabled predictive maintenance in assembly line

Module 10: Digital Twins in Manufacturing

- Concept of digital twin technology
- Virtual process simulation
- Real-time process replication
- Performance optimization models
- Integration with ERP systems
- **Case Study:** Digital twin implementation in automotive assembly

Module 11: Root Cause Analysis (RCA) Techniques

- 5 Whys methodology
- Fishbone (Ishikawa) diagrams
- Fault tree analysis
- Data-driven RCA tools
- Corrective action systems
- **Case Study:** Eliminating recurring defects in packaging industry

Module 12: CAPA (Corrective & Preventive Actions)

- CAPA lifecycle management
- Non-conformance handling
- Risk-based corrective actions
- Compliance documentation
- Continuous improvement loop
- **Case Study:** CAPA system improvement in pharmaceutical manufacturing

Module 13: Supplier Quality Management

- Vendor qualification systems
- Supplier scorecards
- Incoming inspection strategies
- Supply chain risk mitigation
- Collaborative quality improvement
- **Case Study:** Supplier defect reduction in electronics supply chain

Module 14: Advanced Quality Auditing Systems

- Internal & external audit frameworks
- Process audit techniques
- Compliance verification systems
- Audit scoring methodologies
- Digital audit tools
- **Case Study:** ISO audit success in automotive Tier-1 supplier

Module 15: Smart Factory Quality Integration

- End-to-end digital quality systems
- Automation in inspection processes
- Cloud-based quality platforms
- Real-time KPI tracking
- Future of autonomous quality systems
- **Case Study:** Fully automated smart factory quality system deployment

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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

Ready to enroll or request a customized program? Book online or contact us:

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