Advanced Root Cause Analysis in Manufacturing Systems 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 Root Cause Analysis (RCA) in Manufacturing Systems Training Course is a high-impact, industry-focused program designed to equip professionals with cutting-edge skills in defect elimination, process optimization, failure analysis, and continuous improvement. In today's competitive smart manufacturing and Industry 4.0 environment, organizations demand engineers and quality professionals who can go beyond surface-level problem solving and identify the true systemic causes of production failures, downtime, and quality losses.

Advanced Root Cause Analysis in Manufacturing Systems Training Course provides a structured approach to mastering data-driven RCA techniques, predictive failure analysis, lean manufacturing integration, Six Sigma methodologies, and AI-enabled diagnostics. Participants will learn how to systematically investigate recurring issues, reduce operational inefficiencies, improve equipment reliability, and enhance overall manufacturing performance using globally recognized frameworks.

Programme Curriculum

Advanced Root Cause Analysis in Manufacturing Systems Training Course

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Course Objectives

1. Master Advanced Root Cause Analysis (RCA) frameworks for manufacturing environments
2. Apply Lean Manufacturing and Six Sigma DMAIC tools for defect elimination
3. Develop expertise in Failure Mode and Effects Analysis (FMEA)
4. Enhance OEE (Overall Equipment Effectiveness) optimization strategies
5. Use data-driven decision-making for process improvement
6. Implement predictive maintenance and reliability engineering techniques
7. Identify and eliminate recurring production bottlenecks
8. Integrate Industry 4.0 and smart factory analytics into RCA
9. Strengthen quality control and assurance systems
10. Apply 8D problem-solving methodology effectively
11. Reduce scrap rate, rework, and operational waste
12. Improve equipment failure diagnostics and downtime reduction
13. Build a culture of continuous improvement (Kaizen & Lean Thinking)

Target Audience

- Manufacturing Engineers
- Quality Assurance & Quality Control Professionals
- Production Managers & Supervisors
- Maintenance and Reliability Engineers
- Industrial Engineers
- Process Improvement Specialists
- Plant Operations Managers
- Supply Chain & Operations Analysts

Course Modules

Module 1: Fundamentals of Root Cause Analysis

- RCA principles and concepts
- Types of manufacturing failures
- Symptom vs root cause distinction
- Problem identification techniques
- Introduction to RCA tools
- **Case Study:** Repeated machine breakdown in an automotive assembly line

Module 2: Advanced Problem-Solving Frameworks

- 5 Whys technique deep dive
- Fishbone (Ishikawa) diagrams

- Fault tree analysis
- Structured thinking models
- Problem framing methods
- **Case Study:** Defective packaging in FMCG production

Module 3: Lean Manufacturing Integration in RCA

- Waste identification (TIMWOOD)
- Value stream mapping
- Process flow optimization
- Lean diagnostics tools
- Kaizen implementation
- **Case Study:** High rejection rate in electronics manufacturing

Module 4: Six Sigma DMAIC for RCA

- Define-Measure-Analyze-Improve-Control
- Statistical process control
- Process capability analysis
- Defect reduction strategies
- Root cause validation methods
- **Case Study:** Variability in pharmaceutical tablet weight

Module 5: Failure Mode and Effects Analysis (FMEA)

- Risk priority number (RPN)
- Failure identification techniques
- Severity-occurrence-detection analysis
- Preventive action planning
- Design vs process FMEA
- **Case Study:** Conveyor belt failure in packaging plant

Module 6: Equipment Failure Diagnostics

- Machine health monitoring
- Vibration and thermal analysis
- Condition-based monitoring
- Predictive indicators
- Failure pattern recognition
- **Case Study:** Unexpected CNC machine shutdown

Module 7: Data Analytics in RCA

- Data collection techniques
- Statistical analysis tools
- Trend analysis and visualization
- Root cause modeling
- Big data in manufacturing
- **Case Study:** Yield loss in semiconductor production

Module 8: Industry 4.0 & Smart Manufacturing RCA

- IoT-based monitoring systems
- AI-driven diagnostics
- Digital twin applications
- Smart sensors in RCA
- Automation insights
- **Case Study:** Smart factory downtime optimization

Module 9: 8D Problem Solving Methodology

- Team formation (D1)
- Problem description (D2)
- Interim containment actions (D3-D4)
- Root cause identification (D5)
- Permanent corrective actions (D6-D8)
- **Case Study:** Customer complaint escalation in automotive parts

Module 10: Process Variation Reduction

- Common vs special cause variation
- SPC charts interpretation
- Process stability analysis
- Variation control techniques
- Standardization methods
- **Case Study:** Inconsistent weld quality in fabrication unit

Module 11: Maintenance RCA Techniques

- Preventive vs corrective maintenance
- Breakdown analysis
- MTBF and MTTR optimization
- Spare parts failure tracking
- Reliability-centered maintenance
- **Case Study:** Hydraulic system failure in heavy machinery

Module 12: Human Error & Operational RCA

- Human factor analysis
- Training gap identification
- Work instruction optimization
- Ergonomic considerations
- Behavioral RCA models
- **Case Study:** Operator error causing production delay

Module 13: Quality Management Systems Integration

- ISO 9001 alignment
- Audit-based RCA
- Non-conformance handling
- CAPA systems
- Documentation control
- **Case Study:** Audit failure in food processing plant

Module 14: Cost of Poor Quality (COPQ) Reduction

- Scrap and rework analysis
- Cost impact modeling
- Waste elimination strategies
- ROI of RCA initiatives
- Financial tracking systems
- **Case Study:** High scrap rate in plastic molding process

Module 15: Continuous Improvement & RCA Leadership

- Kaizen culture building
- Leadership in quality systems
- RCA team management
- Performance dashboards
- Sustainability in manufacturing
- **Case Study:** Plant-wide efficiency improvement initiative

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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Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com