

Course No. 1602

Quality Engineering Fundamentals Training Course

**QUALITY ENGINEERING & QUALITY MANAGEMENT
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS**

DURATION

5 Days

DELIVERY

Classroom



Course Overview

Quality Engineering provides the technical foundation for designing, controlling, and improving processes so that quality is built into products and services rather than inspected only after problems occur. It combines engineering principles, process analysis, statistical methods, risk management, and problem-solving techniques to achieve consistent and reliable performance.

Modern Quality Engineering plays a critical role in reducing defects, process variation, failures, rework, and operational costs. It enables organizations to identify potential quality risks early, understand the causes of process variation, establish effective controls, and improve overall process capability.

This course provides a practical introduction to the core principles and tools of Quality Engineering, covering process capability, statistical thinking, quality control, measurement systems, failure analysis, risk assessment, root cause analysis, and continuous improvement.

Participants will develop practical skills for analyzing quality problems, evaluating process performance, selecting appropriate quality tools, and implementing effective controls that support reliable processes and sustainable quality improvement.

Objectives

- By the end of this course, participants will be able to:
- Understand the fundamental principles and role of Quality Engineering.
- Apply engineering-based approaches to quality planning and process control.
- Analyze process variation and its impact on quality performance.
- Apply basic statistical methods to quality-related problems.
- Evaluate process capability and stability.
- Understand the principles of Statistical Process Control.
- Assess measurement system performance and reliability.
- Identify potential process and product failure risks.
- Apply structured root cause analysis techniques.

- Develop effective inspection, testing, and process control approaches.
- Reduce defects, variation, rework, and quality-related costs.
- Select appropriate Quality Engineering tools for different problems.
- Support continuous improvement and process optimization.
- Develop practical quality controls based on risk and process performance.

Who Should Attend

This course is designed for Quality Engineers, Manufacturing Engineers, Process Engineers, Quality Control and Quality Assurance Professionals, Production Engineers, Maintenance Engineers, and technical specialists involved in quality and process improvement.

It is also suitable for supervisors, operations professionals, inspectors, technicians, and managers who require a strong understanding of engineering-based quality methods and process control.

The course is particularly valuable for professionals seeking to strengthen their technical quality skills and apply structured engineering methods to improve process stability, reduce defects, and enhance operational performance.

Learning Outcomes

- Upon successful completion of this course, participants will be able to:
- Explain the role and responsibilities of Quality Engineering.
- Identify the key sources of process variation.
- Apply basic statistical techniques to quality data.
- Evaluate process stability and capability.
- Develop and interpret Statistical Process Control charts.
- Understand measurement system accuracy and reliability.
- Identify potential failure modes and quality risks.
- Apply structured root cause analysis methods.
- Develop appropriate process controls and inspection strategies.
- Analyze defect patterns and identify improvement opportunities.

- Reduce process variation, defects, and rework.
- Select appropriate Quality Engineering tools for specific quality problems.
- Support data-driven quality improvement initiatives.
- Establish practical controls to maintain improved process performance.
- Targeted Competencies
- Quality Engineering Fundamentals.
- Process Quality Control.
- Statistical Thinking.
- Statistical Process Control.
- Process Capability Analysis.
- Measurement Systems.
- Quality Data Analysis.
- Root Cause Analysis.
- Failure Analysis.
- Risk-Based Quality Control.
- Defect Prevention.
- Process Improvement.
- Quality Tools.
- Inspection and Testing.
- Continuous Improvement.

Course Outline

DAY 01

Foundations of Quality Engineering and Process Quality

- Understanding Quality Engineering and its role in organizational performance.
- Quality Engineering versus Quality Assurance and Quality Control.
- Principles of prevention-based quality management.
- Understanding products, processes, specifications, and customer requirements.
- Identifying critical quality characteristics.
- Process inputs, outputs, controls, and sources of variation.

DAY 01 — CONTINUED

- Common causes and special causes of process variation.
- Quality planning and engineering-based process control.
- Identifying defect opportunities and quality risks.
- Building quality into processes rather than relying on final inspection.

PRACTICAL APPLICATION

Mapping a process and identifying critical quality characteristics and potential failure points.

DAY 02

Statistical Methods, Process Variation and Control

- Understanding statistical thinking in Quality Engineering.
- Collecting and organizing quality data.
- Basic statistical measures for quality analysis.
- Understanding variation and process distribution.
- Process stability and control.
- Fundamentals of Statistical Process Control.
- Selecting appropriate control charts.
- Interpreting control chart signals and patterns.
- Identifying special causes of variation.
- Responding to out-of-control conditions.

PRACTICAL APPLICATION

Analyzing process data and developing an appropriate control chart.

DAY 03

Process Capability and Measurement Systems

- Understanding process capability and performance.
- Comparing process variation with specification requirements.
- Capability indices and their practical interpretation.

DAY 03 — CONTINUED

- Identifying processes that are stable but incapable.
- Improving process capability.
- Measurement system fundamentals.
- Accuracy, precision, repeatability, and reproducibility.
- Sources of measurement error.
- Evaluating the reliability of inspection and measurement systems.
- Improving measurement processes and data quality.

PRACTICAL APPLICATION

Evaluating process capability and assessing measurement system performance.

DAY 04

Failure Analysis, Risk and Root Cause Problem-Solving

- Identifying product and process failure modes.
- Introduction to Failure Mode and Effects Analysis.
- Assessing severity, occurrence, and detection.
- Prioritizing quality risks and improvement actions.
- Structured problem-solving methodology.
- Root cause analysis techniques.
- Cause-and-effect analysis.
- The Five Whys approach.
- Developing corrective and preventive actions.
- Verifying the effectiveness of improvement actions.

PRACTICAL APPLICATION

Conducting a failure and root cause analysis for a real-world quality problem.

DAY 05

Quality Improvement, Defect Prevention and Process Optimization

- Building an integrated Quality Engineering improvement approach.
- Defect prevention versus defect detection.
- Selecting quality tools based on problem type.
- Process optimization and performance improvement.
- Reducing variation, defects, and rework.
- Developing effective process control plans.
- Linking quality controls with operational performance.
- Monitoring and sustaining improved process capability.
- Using quality data to support continuous improvement.
- Benchmarking and applying engineering quality best practices.
- Developing a practical Quality Engineering improvement roadmap.

PRACTICAL APPLICATION

Preparing a 90-day action plan to improve process quality, stability, and defect prevention.

Register or Request More Information

Course page: <https://quest-training.com/courses/quality-engineering-fundamentals-training-course>

Website: <https://quest-training.com>

Email: info@quest-training.com

Phone: +905016771440