Statistical Process Control (SPC): Control Charts, MSA and Process Capability

17 – 21 October 2027
Dammam - Eastern Province five-star



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Introduction:

Statistical Process Control SPC lets a line or service team decide from data when to adjust a process and when to leave it alone. Without it, operators chase normal variation, tamper with stable settings and miss genuine shifts until scrap, rework or complaints appear. This Core Concept course trains quality engineers, supervisors and process owners to select and build the right control chart, trust the gauge behind it, judge capability and act on signals through a defined reaction plan. Each participant builds an SPC Deployment Pack for one critical characteristic.

Course Objectives:

- Distinguish common-cause from special-cause variation and decide when a process needs adjustment, investigation or no action
- Design a sampling and rational subgrouping plan that makes control charts sensitive to the shifts that matter
- Build and interpret variables and attributes control charts using Shewhart limits and Western Electric detection rules
- Evaluate a measurement system for repeatability, reproducibility, bias, linearity and stability before trusting chart data
- Calculate and explain Cp, Cpk, Pp and Ppk for a stable process and recognise when non-normal data needs a different approach
- Produce an SPC Deployment Pack with chart selection, reaction plan and out-of-control action plan for one critical characteristic

Target Audience:

- Quality engineering staff responsible for inspection data, capability studies and customer quality requirements
- Production and shift supervisors accountable for daily process stability and operator response to signals
- Process owners in manufacturing and service operations accountable for output consistency
- Metrology and laboratory staff responsible for gauge performance and measurement studies
- Process and manufacturing engineering staff who set machine parameters and approve process changes

Course Outline:

Day 1: Variation, Sampling and Data Collection

- Common-Cause and Special-Cause Variation in the Shewhart Model
- Tampering and Over-Adjustment: Funnel Experiment Demonstration
- SPC Vocabulary and Symbols per ISO 3534-2:2006
- Rational Subgrouping, Subgroup Size and Sampling Frequency Plan
- Characteristic Selection Matrix for Critical-to-Customer Features

Day 2: Control Charts for Variables and Attributes

- Shewhart Chart Principles and Three-Sigma Limits per ISO 7870-2:2023
- X-bar and R and X-bar and S Charts: Construction and Limit Calculation
- Individuals and Moving Range I-MR Chart for Low-Volume Processes
- p and np Charts for Proportion and Count of Defective Units
- c and u Charts for Defects per Unit and per Inspection Area

Day 3: Chart Interpretation and Measurement System Analysis

- Western Electric Rules: Runs, Trends and Zone Tests
- Phase I Limit Setting Versus Phase II Ongoing Monitoring
- Gage R&R Study: Crossed ANOVA Method per the AIAG MSA Manual
- Bias, Linearity and Stability Studies for Gauges
- Attribute Agreement Analysis for Go/No-Go and Visual Inspection

Day 4: Process Capability, Special Cases and Response to Signals

- Cp and Cpk Short-Term Capability Calculation and Interpretation
- Pp and Ppk Long-Term Performance Indices and Minimum Targets
- Non-Normal Data at Overview: Box-Cox Transformation and Distribution Fitting
- CUSUM and EWMA Charts for Small Sustained Shifts
- Out-of-Control Action Plan OCAP Flowchart and Reaction Plan Design

Day 5: Modelling Build: SPC Deployment Pack

- Machining Diameter Dataset: X-bar and R Chart and Capability Build
- Service Turnaround-Time Dataset: I-MR Chart and Signal Review
- Software Configuration in Minitab or JMP: Chart Templates and Alerts
- SPC Rollout Roadmap: Operator Training, Audits and Chart Reviews
- SPC Deployment Pack Presentation and Peer Challenge

Skills You Will Gain:

- Variation Analysis
- Rational Subgroup Design
- Control Chart Construction
- Signal Interpretation
- Gauge Capability Assessment
- Capability Index Calculation
- Reaction Plan Design
- SPC Software Configuration

Why Attend This Course:

- Return with an SPC Deployment Pack for one critical characteristic from your own line or service process
- Stop operators adjusting stable processes and start reacting only to real statistical signals
- Know whether your gauges can be trusted before capability figures reach a customer
- Build charts on manufacturing and service datasets alongside peers from different sectors and countries

Conclusion:

Statistical Process Control pays back when every chart has a clear purpose, reliable measurement behind it and a defined response when it signals. The course moves from variation, sampling and subgrouping, through variables and attributes charts, detection rules and measurement system analysis, to capability and performance indices, non-normal data and out-of-control action plans. The final day builds charts and capability studies on working datasets and assembles an SPC Deployment Pack ready to put into daily use.