



Measurement Systems Analysis

(8 hours)

Audience and Purpose:

Course is for Engineers and Managers who have direct responsibility for measurement evaluation, selection, and control. Course covers the basic concepts associated with Measurement Systems Analysis, repeatability, reproducibility, accuracy, linearity, stability, standards selection and use, calibration and compensation and measurement control.

Software:

JMP, Excel

Course Objectives:

As a result of the course, the participant will be able to:

1. Determine gage capability
2. Assess accuracy, linearity, stability, repeatability and reproducibility in test equipment
3. Design and deploy SPC for measurement control
4. Select and establish standards
5. Describe proper methods for instrument calibration and compensation
6. Conduct gage capability for inspection activities
7. Discuss how MSA impacts customer satisfaction

Course Outline:

Section I Introduction to MSA

MSA is a key to systematic product development
Background statistical principles
Sources of error
Focus on the measurement process

Section II Terms & Definitions

Repeatability
Reproducibility
Accuracy
Linearity
Stability

Section III R&R, Linearity, & Accuracy

2 factor crossed design for Variables MSA
Repeatability & Reproducibility
R&R and Capability Example
Accuracy example
Linearity example

Section IV Correlation, Calibration and Compensation

Correlation and compensation
Soft compensation versus standard calibration
Scatterplot Method
Problems with r^2



Section V SPC for Measurement Control

- Selection and utilization of Standards
- SPC for Measurement Control
- SPC using stable standards
- SPC using unstable standards

Section VI MSA for Attributes

- Operational Definitions
- Effectiveness, P(miss), P(false alarm)
- Kappa, escape rate and bias