Engineering Statistics & Data Analysis

(24 hours)

Audience and Purpose:

Course is for Engineers, Scientists, and Managers who routinely analyze data for product development, qualification and control. Areas of focus include analysis of data for basic product development and manufacturing applications including foundation statistics, distribution analysis, capability assessment, sensitivity prediction, comparison tests, sample size selection and model fitting.

Software: JMP

Prerequisites: None

Course Objectives:

Upon completion of the course the participants will be able to:

1. Understand the ideas associated with sampling and data collection
2. Demonstrate the ability to evaluate distributions
3. Select appropriate sample sizes for performance evaluation
4. Conduct comparative tests using data
5. Use regression techniques in order to analyze the results and make process/product improvements
6. Select appropriate analysis technique based on type of data

Course Outline:

Section I: Introduction to the Analytical Software (JMP)

Table commands

Column commands

Row commands

Subset, Stack and Join commands

Saving data and graphs

Section II: Statistics Foundations & Distribution Analysis

Measures of center and spread

Standard error and central limit theorem

Normal distribution, t distribution and confidence intervals

Test for Normality

Prediction and tolerance intervals (normal)

Process capability (normal) and non-normal distribution fitting

Section III: Nominal X, Continuous Y

Contour plots, Components of Variance and REML

Sample size for the mean and standard deviation

t test - one sample, two sample and paired

Test for differences in variances

One-way ANOVA and N way ANOVA

Section IV: Continuous X, Continuous Y

Simple linear regression, correlation

Multiple Regression and ANCOVA

Section V: Nominal X, Nominal Y

Mean and Sigma for proportion defective

Sample size and statistical tests for proportion defective

Mean and Sigma for defect per unit

Chi-square test for defects and proportion defective

Pareto graphs and cross tabs analysis

Section VI: Continuous X, Nominal Y

Logistic regression