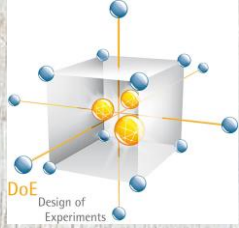

Design of Experiments with Minitab

Overview

Unlike ‘One-Factor-At-A-time (1FAT), Design of Experiments (DOE) is a powerful tool that enables you to investigate and manipulate multiple key process input variables concurrently in order to optimize a specific output or response variable.

This course will expose learners to key knowledge required to design and analyse statistical experiments using Minitab.

Pre-requisite

Basic Statistics with Minitab will be a distinct advantage. However, the first day of the course will be a review of basic statistical concepts relevant to DOE.

Course Outline

Day 1 – DOE Statistics

1. Understand key statistical concepts and definitions
   - ✓ Population, sample, types of data etc
   - ✓ Measures of process variation and central tendency
   - ✓ Descriptive and inferential statistics.
2. Understand the distribution of your data
   - ✓ Distribution parameters
   - ✓ Difference between PDF and CDF
   - ✓ Probability Distributions – normal, t, binomial, Poisson, F, Chi-square.
3. Review of Statistical Inferences with Minitab
   - ✓ Confidence Intervals.
   - ✓ Hypothesis testing.
   - ✓ Analysis of Variance.
   - ✓ Goodness-of-fit test.
   - ✓ Individual Distribution Identification.
4. Review of Regression Analysis with Minitab.

Course Outline

Day 2 DOE Fundamentals

1. Understanding DOE terms and concepts
   - ✓ independent and dependent variables,
   - ✓ factors and levels,
   - ✓ treatment, error, replication,
   - ✓ full and fractional designs,
   - ✓ screening experiments,
   - ✓ confounding, etc
   - ✓ covariates and analysis of covariates (ANCOVA).
3. Experimental Planning
   - ✓ Measurement systems analysis,
   - ✓ Identifying your objectives,
   - ✓ Identifying factors and responses of interest,
   - ✓ Design type selection,
4. Creating a Design In Minitab
   - ✓ Create a Full Factorial Design,
   - ✓ Understand Design Table,
   - ✓ Modify your design to Fractional Factorial,
   - ✓ Understand Aliasing and Alias Structure.
5. Manually Analyse A Full Factorial Design
   - ✓ Understand Main Effects,
   - ✓ Understand Interaction Effects,

Course Outline

Day 3 Design and Analysis of Experiments

1. Create and Analyse A Screening Experiment
   - ✓ Definitive Screening Design.
   - ✓ Plackett-Burman Design
     - Analyse Design Summary,
     - Analyse Pareto Effects,
     - Analyse Effects Plot,
     - Analyse Main Effects,
2. Create and Analyse A Two-level Full Factorial Design
   - ✓ Create and store your design.
   - ✓ Analyse your design using available tools in Minitab
     - Four-in-One plot, probability plot,
     - ANOVA, Pareto, main and interaction plots etc.
   - ✓ Reduce model by screening out factors that are not statistically significant.
   - ✓ Optimise your design.
   - ✓ Identify optimum settings using
     - Contour plot (Plant Flag)
     - Surface Plot
     - Response Optimiser
   - ✓ Use your model to make predictions.
3. Create A Response Surface Design.
   - ✓ Central Composite Design.
   - ✓ Box-Behnken Design.
   - ✓ Response Surface with Categorical a factor.