



SCB Associates Ltd
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Design of Experiments – Practitioner Training

Pre-requisites for training: Delegates should be familiar with basic statistics and some familiarity with Minitab statistical analysis software would be of benefit (see optional primer day below). A self-assessment test can be provided if required.

Learning Objectives:

At the end of this session, delegates will be able to:

- Develop a linear or polynomial regression model of $y=f(x)$ for a single x
- Test the model for statistical significance and determine how well it fits the data
- Use the model to make predictions of y (with confidence intervals) for given values of x
- Understand the advantages and disadvantages of “one-factor-at-a-time”, fractional and full factorial experimentation
- Design, run and analyse full factorial experiments (using Minitab software)
- Design, run and analyse fractional factorial experiments (using Minitab software)
- Carry out a Screening Experiment to identify the important factors
- Carry out a Response Surface Methodology experiment to build a statistical model
- Understand the concepts of Robust Design using Taguchi Methods™

Day 1

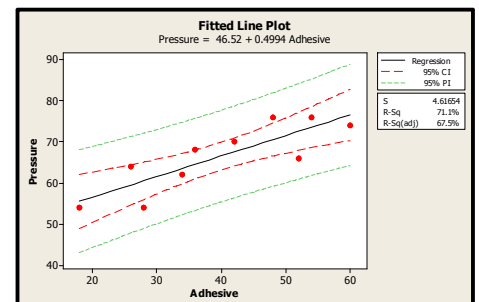
Introduction to Design of Experiments

- Workshop – “Cooking” I
- Choices in experimental design
 - OFAT
 - Full factorial
 - “Panic mode”
 - Fractional factorial
- Workshop – “Cooking” II

Run Number	A	B	C	Factors D	E	F	G	Test Result
1	1	1	1	1	1	1	1	Result 1
2	2	1	1	1	1	1	1	Result 2
3	2	2	1	1	1	1	1	Result 3
4	2	2	2	1	1	1	1	Result 4
5	2	2	2	2	1	1	1	Result 5
6	2	2	2	2	2	1	1	Result 6
7	2	2	2	2	2	2	1	Result 7
8	2	2	2	2	2	2	2	Result 8

Correlation & Regression analysis

- Linear regression
 - Testing for statistically significant correlations
 - Analysis of Variance, ANOVA
 - Building the $y=f(x)$ model and testing for significance
 - Predictions using the regression model
- Polynomial Regression
- Workshop – regression analysis



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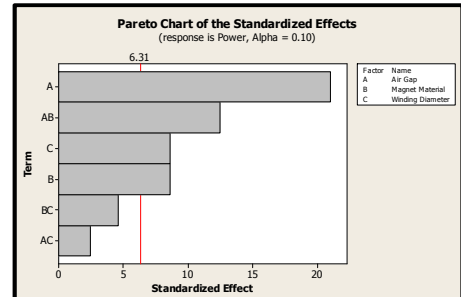


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Day 2

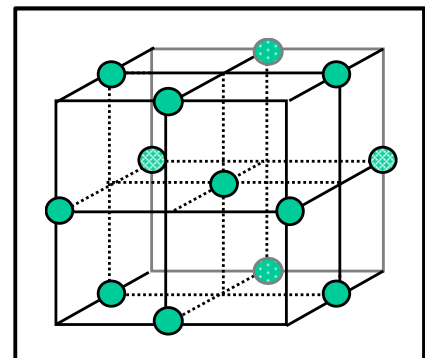
Full factorial experiments

- Designing a full factorial experiment
- Analysis of full factorial experiments
 - Main effects & interactions
 - Pareto chart of effects
 - Testing for statistical significance
 - Factorial plots
- Workshop- Full factorial example



Fractional factorial experiments

- Confounding (aliasing)
 - Resolution III & IV designs
- Screening experiments
- Selecting the design
 - Adding centre points
- Workshop – Screening experiment example



Day 3

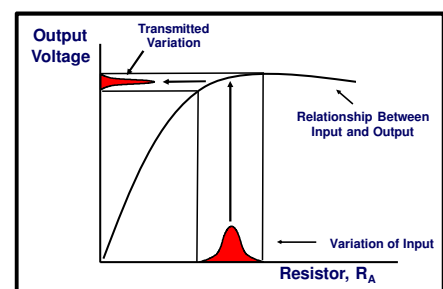
Response surface methodology

- RSM experiment designs
 - Box Behnken designs
 - Central Composite designs
 - Reducing the $y=f(x)$ model (stepwise elimination)
 - Response optimiser (Minitab)
- Workshop – Response surface methodology example

Robust Design using Taguchi Methods™

- Introduction to Robust Design
 - Taguchi's definition of robustness
 - Control & noise factors
 - Signal-to-noise ratio
 - Orthogonal Arrays
 - Case studies
- Workshop – Robust Design example

- Closing discussions



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Optional 1-day Basic statistics and Minitab primer

Learning objectives:

At the end of this session, delegates will be able to:

- Recognise the difference between variable, categorical and discrete data
- Understand measures of location (mean, median mode) and dispersion (range, standard deviation and variance)
- Utilise simple graphical methods to display data (histogram, box plots, etc)
- Navigate the basic layout and menu structure of Minitab
- Understand the descriptive statistics menu in Minitab
 - Descriptive statistics
 - Inferential statistics (including confidence intervals)
- Recognise the Normal distribution and test a data set for normality
- Know six reasons for failing the normality test
- Recognise the basic format of a Hypothesis test

Some comments from previous DOE practitioner courses:

"Excellent course, useful & interesting"

"Very informative course – most applicable"

"Instructor was highly knowledgeable, very helpful"

"Interesting and engaging"

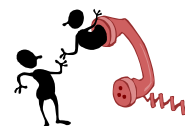
"Well paced course – good mix of practical workshops"

"Good interaction, kept interest throughout course"

"Excellent presentation & knowledge"

"Excellent course, look forward to working with you in the future"

This course is supported by our free telephone/email helpline.



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