Design of Experiments Workshops Using ECHIP Software

These workshops have been refined over the last 25 years to include the latest methods and tools. Thousands of professionals have attended these workshops worldwide. This Design of Experiments methodology using the ECHIP software has helped create and optimize billions of dollars of leading products representing virtually all markets including:

- pharmaceuticals
- food
- beverages
- electronic equipment
- plastics
- mechanical design
- semiconductor materials
- integrated circuit processing
- metallurgy
- batteries
- composite materials
- adhesives
- automotive
- aerospace
- medical devices (stents)
- candy
- personal care products
- ceramics

The Basic workshop gives the attendee the ability to independently apply the method to their research. The integration of the methodology and the software provides the non-statistician long term ease of use of DOE. Studies have shown that over 85% of those having taken this workshop were still using DOE 1-year later.

3-Day Basic Design of Experiments Workshop

Goal: Give experimenters the ability to predict how their control variables affect their processes in the fewest experimental trials.

This 3-Day Basic workshop teaches a highly effective robust strategy to give non-statisticians the tools to independently develop, analyze and apply the results from complex Experimental Designs. The first two days focus on a "core strategy" for obtaining interactive "pictures" of your process. The last day concentrates on dealing with real-world problems with experimentation.

The workshop runs from 8:00 am to 5:00 pm except for the third day which ends at 4:00pm.

Day 1:

1. "Bag Sealing" Problem - Try it Your Way First
2. Overview of DOE Experimental Cycle - The Strategy for Success
3. "Bag Sealing" Problem Using DOE - Follow the Experimental Cycle

4. First Time Around the Experimental Cycle Topics
    - Objectives
    - Variables & Models
    - Resolving Power
    - Design
    - Data Collection Analysis
    - Contour Plots & Tables
    - Check Points
    - Report

5. Putting the Experimental Cycle to Work - Working in teams you conduct a real experiment to optimize a 3-variable process, make predictions, and run check points.

Day 2:

6. Second Time Around the Experimental Cycle
7. Review and Elaborate on Topics: Objectives through Design
8. Second Time Around the Experimental Cycle Continues
9. Review and Elaborate on Topics: Data Collection through Reports
10. Exam Problem: 10 Control Variables & 2 Responses. Teams solve a complex experimental problem where the data is created dynamically using a real world simulator running a non-linear model with noisy outputs. Even though the initial screening design produces no acceptable operating conditions, the DOE process finds viable operating conditions for the 10 control variables. The students meet goals of both marketing and manufacturing. All teams reach a consensus solution.

Day 3:

11. Discussion of Exam Problem
12. Data Transformations - Eliminate Lack-of-Fit; Predictions Make Sense
13. Simultaneous Optimization of Multiple Responses
14. Non-Algorithmic Design Special Cases
15. Algorithmic Design to Solve Real-World Problems:
16. Special Models
17. Broken Design Repair (Part I)
18. Constrained Regions
19. Intro to Mixture (Formulation) Variables
20. Categorical Variables
21. Blocking Variables
22. Intro to Robust Product Design

2-Day Advanced Design of Experiments Workshop

Goal: Give experimenters with basic DOE skills the ability to use the more sophisticated DOE techniques.

The Advanced Workshop teaches use of the more sophisticated concepts which are available using the ECHIP DOE software. This workshop is available only to those who have already attended the ECHIP Basic Training Workshop.

The workshop is modular. The order and emphasis of the topics will vary according to the interests of the participants.

The workshop runs from at 8:00 am to 5:00 pm on the first day and from 8:00 am to 4:00 pm on the second day.

1. Algorithmic Design

Special Models
Candidate Sets
Uniform Blocking

2. Augmentation

Broken Design Repair - Using Constraints and Blocking
Augmenting to Increase Complexity of Model
Deleting Variables

3. Advanced Mixture Concepts

Very Narrow Mixture Ranges
Order of Addition of Components
Mixture Candidate Sets Especially with 3 Variables or Less
Complex Algebraic Constraints
Mixtures Summing to Less than 100%

4. Categorical Variables

Strategies for Using Categorical Variables
Understanding the Model
Understanding Table Results and Contrasts
Continuous - Categorical Interactions
Constraints - Using Special Candidate Point Sets
Continuous, Mixture, Categorical and Blocking Variables in
Same design

5. Transformations

Bounded One Side: Box-Cox
Bounded Two Sides|: Aranda-Ordaz
Poisson
Arcsin
Binomial Data

6. Optimization

Targeting
Acceptable Range
Computer Model

7. Robust Product Design Approaches

More Robust Tolerances
Minimizing Variance while Targeting Mean

8. Getting Out the Coefficients

ECHIP's Default Coefficients
"Raw" Coefficients
For Transformed Responses
For Mixture Variables
For Categorical Variables