



## **Robust Optimization and Tolerance Design**

(16 hours)

### **Course Description:**

ROTD is specifically designed to meet the analytical needs of those individuals working within a variety of industries. Robust Optimization and Tolerance Design presents the methods and practices associated with designing and optimizing products and processes and to discuss tolerance design methods to protect product quality and clinical benefits.

### **Audience:**

This Course is required for all scientists, engineers and quality professionals who actively work on any aspect of discovery, product and process development where the goal is to characterize, optimize and improve product and process performance.

### **Course Objectives:**

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

- Learn and apply the principles of robust product design
- Design experiments appropriate for the information of interest
- Use and apply the structures of orthogonal arrays for product and process development and problem solving
- Ensure the experimental design is efficient
- Use regression techniques in order to analyze the results and make process and product improvements
- Optimize the response at this most robust condition
- Tolerance the factors and responses
- Use JMP software to design and analyze experiments

**Software:** JMP, Excel

**Prerequisites:** Engineering Statistics and Data Analysis and Design of Experiments are recommended prerequisites for this course.

### **Detailed Course Outline:**

#### **Distribution and tolerance design foundations**

System, parameter and tolerance design

Tolerance design methods

#### **DOE Review and Robust Design Principles**

Eight robust design principles

#### **DOE using Custom Designs**

Custom Designs

Strategies to minimize experimental size

Adding covariate and uncontrolled factors

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Special topics for custom designs (optional)

Blocking designs

Setting constraints in the design

**Robust Optimization Methods**

Tighten the tolerance of X

Design to the flats

Use interactions to tune out sensitivities

Use parameter combinations

**Tolerance Design and Margin Analysis**

Tolerance Design procedure

Tolerance stack up analysis