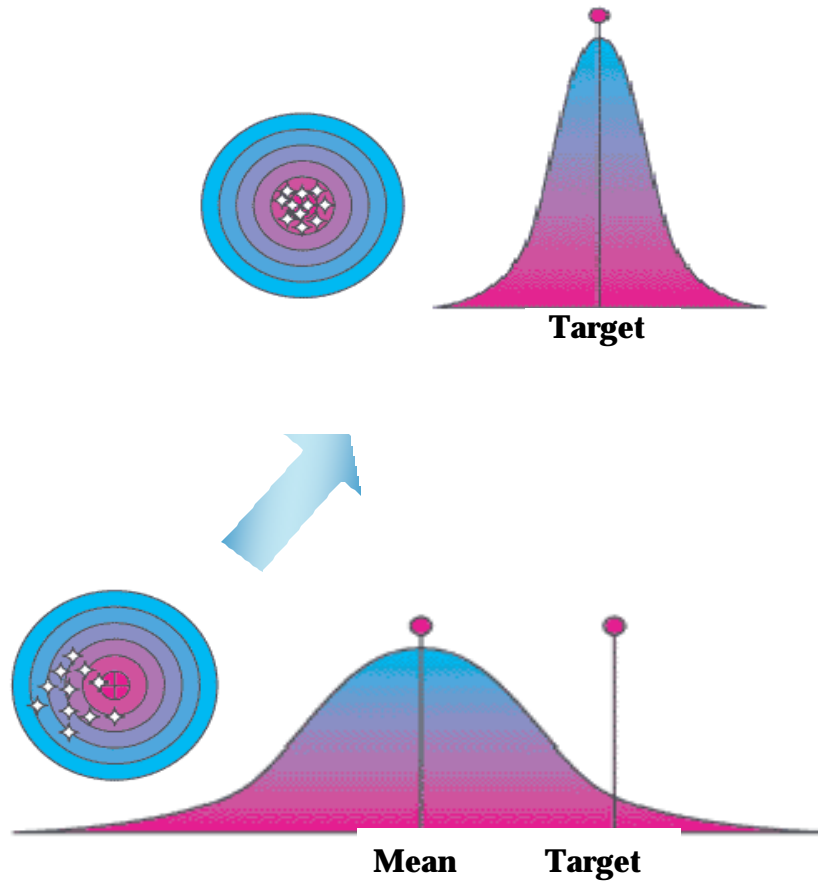


DOE-II. Advanced Experiment Designs for Robust Products and Processes



Nutek, Inc.

Quality Engineering Seminar and Software
Bloomfield Hills, MI, USA. www.Nutek-us.com



DOE-II. Advanced Experiment Designs for Robust Products and Processes

Presented
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Course Overview

Manufacturers with established market recognition should strive to build robustness in their products and processes to stay ahead of the competition. To achieve this goal, experienced quality and scientific professionals will need to learn and apply the advanced concepts in design of experiments and robust design strategies. This seminar with hands-on application workshop prepares attendees for immediate applications of the Taguchi experimental design technique for robust product and process designs.

Participants to this session are required to have completed DOE-I or equivalent course content. The topics of discussion in this session will be: *Noise factors, Outer array, Signal-to-Noise, ANOVA statistics, Dynamic characteristics, Loss Function*, etc. The aim of this session is to build a strong foundation among participating application specialists who are looking toward applying the technique to build robustness in new product design and R&D efforts. The last day of the session will be dedicated to hands-on application workshop which utilizes Qualitek-4 software for experiment design and analysis tasks.

Outline

Robust Designs

- Robust design strategy
- Outer array designs & Analysis using Signal-to-Noise ratios

Analysis of Variance (ANOVA)

- Purpose of ANOVA & Sample calculations of ANOVA statistics
- Test of significance & Pooling Technique
- Confidence Intervals & Discussion on Some Key Issues

Loss Function

- Rationale for computation of loss & Sample calculations
- Interrelationships with MSD, S/N, Cpk and Loss
- Improvement in terms of Variation diagram

Dynamic Characteristics

- Process representation of the system
- Ideal function & Objective characteristics (Beta, Sigma, and S/N)
- Experimental setup
- Analysis of results

Application Workshop using Software

- Experiment Planning, Designs & Analysis tasks
- Group project presentations.

Principal Instructor's Background

Ranjit K. Roy, Ph.D., P.E. PMP (Mechanical Engineering, president of **NUTEK, INC.**), is an internationally known consultant and trainer specializing in the Taguchi approach of quality improvement. Dr. Roy has achieved recognition for his down-to-earth style of teaching of the Taguchi experimental design technique to industrial practitioners. Based on his experience with a large number of application case studies, Dr. Roy teaches several application-oriented training seminars on quality engineering topics.



Dr. Roy began his career with The Burroughs Corporation following the completion of graduate studies in engineering at the University of Missouri-Rolla in 1972. He then worked for General Motors Corp. (1976-1987) assuming various engineering responsibilities, his last position being that of reliability manager. While at GM, he consulted on a large number of documented Taguchi case studies of significant cost savings.

Dr. Roy established his own consulting company, Nutek, Inc. in 1987 and currently offers consulting, training, and application workshops in the use of design of experiments using the Taguchi approach. He is the author of **A PRIMER ON THE TAGUCHI METHOD** - published by the Society of Manufacturing Engineers in Dearborn, Michigan and of **Design of Experiments Using the Taguchi Approach: 16 Steps to Product and Process Improvement** published (January 2001) by John Wiley & Sons, New York. He is a fellow of the American Society for Quality and an adjunct professor at Oakland University, Rochester, Michigan.



SEMINAR SCHEDULE

Design of Experiments Using Taguchi Approach

DOE- I

- **Introduction**
 - The Taguchi Approach to Quality Engineering
 - Concept of Loss Function
 - Basic Experimental Designs
- **Designs with Interactions**
 - Application Examples
 - Basic Analysis
- **Designs with Mixed Levels and Interactions**
 - Column Upgrading
 - Column Degrading
 - Combination Design

DOE-II

- **Robust Design Principles**
 - Noise Factors and Outer Array Designs
 - S/N Ratio Analysis
- **Learning ANOVA through Solved Problems**
 - Computation of Cost Benefits Using LOSS FUNCTION
 - Manufacturer and Supplier Tolerances
 - Brainstorming for Taguchi Case Studies
- Design and Analysis Using Computer Software
- Group Reviews
- Computer Software
(Qualitek-4) Capabilities
- **Dynamic Systems**
- **Class Project Applications**
- Project Presentations



General Reference

Taguchi, Genichi: *System of Experimental Design*, UNIPUB Kraus Intl. Publications, White Plains, New York, 1987

Roy, Ranjit: *Design of Experiments Using the Taguchi Approach: 16 Steps to Product and Process Improvement*, John Wiley & Sons; ISBN: 0471361011

INTERNET: For general subject references (Taguchi + Seminar + Software + Consulting + Case Studies + Application Tips), try search engines like **Yahoo, Lycos, Webcrawler**, etc. For Nutek products, services, and application examples, visit:

<http://www.nutek-us.com>

<http://www.rkry.com/wp-inb.html>

<http://www.nutek-us.com/wp-ind.html>

<http://www.nutek-us.com/wp-inc.html>

<http://www.nutek-us.com/wp-ine.html>



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