

# Production Problem Solving Using Designed Experiments (The Taguchi Approach)



Presented  
By

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## Production Problem Solving Using Designed Experiments (Taguchi Approach)

Design of Experiments (DOE) is a powerful statistical technique for the study of multiple variables simultaneously. Designed for production and quality specialists, this session offers opportunities to learn and apply the Taguchi experimental design techniques for economically solving engineering and production problems.

When is a problem a PROBLEM? A vast majority of the “Problems” in the manufacturing floors are of two kinds. The first situation is where nobody seems to have an answer. And the other kind is where everyone claims to have an idea, but none seem to work as a permanent solution. So, how do you attack such problems? Solutions based on *opinion* or *past experience* may not cure the problem and you don't seem to have time to take a close look at the problem. What you need is a structured and objective approach. Use of Design of Experiments can help you create such a structured and economical strategy. Attendees of this session learn how to handle production and manufacturing problems permanently with minimum time in experimenting.

### Areas of Discussion

- Overview- concepts of quality engineering
- Measuring cost of quality by Loss Function
- Review basic concepts in experimental design
- Project objective Evaluation Criteria
- Experiments designed using orthogonal arrays
- Experiments to study interaction
- Basic analysis and strategy for experimentation
- Strategy for Robust Designs
  - New attitude toward uncontrollable factors
  - Outer array for robust design
  
- Class project & presentation by the groups

This seminar is intended for product/process design engineer, R&D scientists, production, and QA personnel, manager, director or senior engineer and technicians who wish to lead teams for investigation of engineering and production problems, would benefit from this course.



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### **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.



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**SEMINAR SCHEDULE**  
**Production Problem Solving Using Designed Experiments**

(1-day and 2-day seminars)

(All classes run from 8:30 a.m. - 5:00 p.m. unless otherwise specified. Lunch is from 12:00 p.m. to 1:00 p.m.)

### Topics

#### Day 1

- Introduction
  - Definition of Production Problems
  - Assumption and Expected Solution
  - Strategy and Approach
  
- Experiments Using Standard Orthogonal Arrays
  - Design of Experiment Basics
  - Experiments with 2-level Factors
  - Full Factorial Design with Seven 2-level Factors
  - Tools for Experiment Designs
  - Three Major Steps in Applications
  - Procedure for Experiment Planning (Brainstorming)
  - Results with Multiple Criteria of Evaluations
  - Analysis of Results
  - Experiment Designs with Larger Number of Factors
  - Basic Experiment Design and Analysis Strategy

#### Day 2

- Designs with Interactions
  - Understanding Interactions
  - Scopes of Interaction Studies
  - Experiment Design for Interaction Studies
  - Application Examples
  - Testing for Presence of Interaction
  - Correction of Performance Prediction Based on Interaction

#### Topics for Future Studies (Not covered in 2-day session)

- Designs with Mixed Levels and Interactions
- Analysis of Variance (ANOVA)
- Robust Design Principles
- Quantification of Benefits from Performance Improvement
- Qualitek-4 software (when purchased by the sponsor)

