INSTITUTE of QUALITY

Confederation of Indian Industry

ROBUST PARAMETER DESIGN

Taguchi Methods

26 - 28 February 2025
Engineering Design Centre
IIT Madras, Guindy

INTRODUCTION

From a practical stand point ' Quality 'could be defined as a measure of the extent to which Customer expectations are satisfied, at the lowest operating cost. As evident, customer expectations being always dynamic , there is an ever increasing demand for improving Product / Process quality. Quality engineering is a means to reduce the deviation of a product's functional characteristic from the target value. The cost effective way to minimize the deviations is to design the product and its manufacturing processes so that the product performance is least sensitive to the noise, internal and external, in the field conditions.

Throughout the various stages of Product development, designing high˜ quality products at low cost is an economic and technological challenge to the designers. A systematic and efficient way to meet the challenge is the Robust Parameter Design (RPD), which focuses on design optimization for performance, quality and cost. The goal of RPD, is to reduce the sensitivity of a Product's / Process's function to various sources of disturbance, such as the environmental variation, deterioration of parts and manufacturing variation. RPD, has been proved to be one of the best methods to achieve the lowest development cost, manufacturing cost and the operating cost, across the entire Product life cycle. This methodology is followed globally by almost the entire segment of product manufacturing, to release high quality products at the lowest life cycle cost.

Areas of application of Robust Parameter Design

Automotive, Chemical, Consumer products, Paints, Paper, Glass, Ceramics, Base metals, Plastics, Fertilizers, Lubricants, Pharma, Fluids, Rubber, Refineries, Food, Fibers, FMCG, Heavy / Light Engineering, etc. to name a few are successfully deploying RPD to improve on Product performance , Quality and Cost. RPD is also being implemented in super niche areas like biological sciences, enzyme production for better yield and purity

FACULTY

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FOCUS AREAS

The workshop will enable the participants to

- Understand the concept of variability and its method of reduction.
- Principles of process capability analysis
- Traditional approach to process design and its weaknesses
- Get a grasp in applying full factorial method of Product / Process design
- Understanding of ANOVA principles and concept of Error
- Understanding application of Partial factorial (Linear Graphs)
- Understanding and application of Orthogonal Arrays
- Method of conducting 2 Step design as per Taguchi methods
- Fullgrasp of Planning, Experimentation and Analysis for any RPD Study

COURSE STRUCTURE

- The pattern of the course is tailor made to suit the application of RPD in any manufacturing Productor Process design scenario.
- Since this is treated as an intensive course , the participants are expected to stay focused for protracted periods of time during the 3 days
- The course is tailor made to be synergized with TPM practicing Companies. This tool could be integrated seamlessly as a Quality Maintenance Tool in the 8 Pillar implementation.
- The computer simulation of Orthogonal Array for a particular trial combination would be demonstrated during the workshop.

WHO SHOULD ATTEND

- Product Designers (R&D, NPD, Advanced Engineering, Field testing, Prototype development)
- Process Designers (Manufacturing Systems Engineering, Process Engineering)
- Quality Managers (Quality Control, Quality Assurance, Customer Quality Assurance)
- Customer Field Engineers (Application Engineers, Project Commissioning)
- Manufacturing Engineers responsible for process specifications in current & new products.
- Production personnel (Shop Floor Production)
- Maintenance (Equipment building & Modification)

FEE

CII / TPM Member
26,000 + 18% GST

Non Member:
30,000 + 18% GST

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TOPICS COVERED

INTRODUCTION

- Need for A Statistical Approach
- The Need for Planned Experimentation
- Planning for an Experiment
- Methods for Increasing Accuracy and Precision of Comparisons
- Terminology in Design of Experiments

FACTORIAL EXPERIMENTS

- Advantages of a Factorial Design
- Designs With Factors at 2 Levels Only: (2n Series)
- Yates' Method of Computing Factorial Effects
- Factorial Design with all Factors at 3 Levels: 3n Series
- Extension of Yate's Technique to Analysis of 3n Experiments

LINEAR GRAPHS & THEIR APPLICATIONS

- Linear Graphs Of Orthogonal Array L8(27)
- Some Observations Of Linear Graphs
- Symmetrical Fractional Factorial Experiments
- Application Of L16 (215) Array
- Example Of L8 (27) Design
- Example On L16 (215) Design
- Three-Level Column In Three-Level Series Tables
- Example On L27 (313)

MULTI LEVEL ARRANGEMENTS

- Multi Level Arrangement in Two-Level Series Tables
- Combination Design & Examples

QUALITY EVALUATION THROUGH SIGNAL NOISE RATIOS

- S-TYPE, L-Type & N-Type Characteristic
- Digital type - one signal: R Type
- Taguchi's Approach To Optimisation
- Example 1: On Concurrent Measure
- Example 2: On Use Of Concurrent Measure
- Example 3: Use Of A Signal Factor