



**DESIGN OF EXPERIMENTS -  
THE SHAININ TECHNIQUES**

[www.slkcee.com/doe/](http://www.slkcee.com/doe/)

**21-23rd  
September 2017**



A Three Day  
Residential Program by  
**Mr. Rajan Shringarpure**



# THE PROGRAM



S.L. KIRLOSKAR CENTER  
FOR EXECUTIVE EDUCATION

## WHY THIS COURSE

Industry often face Issues of Product Quality. These could either result from design or from the manufacturing process or from the Service. Faulty Product Quality; service; results in repair & re-work, re-calls & replacements, along with erosion of profit. All this causes significant damage to credibility and reputation of the organisation. In the long run this will result in loss of competitive edge and loss of business in Global economy.

Design of Experiments (DOE) is one of the most successful structured approach in understanding the real life issues in identifying the critical factors and interactions that undermine quality through design, manufacturing or service. It is a methodology that can be effective for problem-solving, as well as for improving or optimizing product design and manufacturing processes.

## OFFERING SCIENTIFIC & VALIDATED SOLUTIONS

- Design of Experiments (DOE) is a scientific method of planning and conducting an experiment. Its practice will yield the true cause-and-effect relationship between the 'X' variables and the 'Y' variables of interest. This allows the experimenter to study the effect of many input variables that may influence the product or process simultaneously, as well as possible interaction effects.
- Specific applications of DOE include identifying proper design dimensions and tolerances, achieving robust designs, generating predictive models that describe physical system behavior, and determining ideal manufacturing settings.
- DOE saves considerable time & efforts in trouble shooting, identifying quality inputs and in rectifying the total system.  
The Shainin Approach of DOE is a set of simpler techniques for problem solving in various situations. It is mathematically less intricate and relatively innovative approach. It also involves small sample sizes.

An understanding of DOE requires only basic knowledge of statistics and experimentation concepts. Although a DOE can be analyzed in many software programs, it is important for practitioners to understand basic DOE concepts for proper application.

The goal of DOE is to find a design that will produce the information required at a minimum cost. This workshop utilizes hands-on activities to help you learn the DOE.



## COURSE OBJECTIVES:

The three day interactive workshop will allow the participants:

- to understand how to apply techniques of “DOE (Shainin)” in a generic problem solving framework
- how these fit in a roadmap of variation reduction robust product / process design, quality improvement and cost reduction
- learn the role played by Process Certification, Operator Certification, Positrol, Poka – Yoke and PreControl in holding the gains after problem solving.

## METHODOLOGY:

Classroom sessions with many examples of industrial life. There will be Tests, Exercises, Discussions and hand holding between modules, experience sharing & case studies followed by Quiz Test at the end to reinforce understanding.

Prerequisite : Scientific Calculator and open mind to absorb principles.

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## WHO SHOULD ATTEND:

The workshop would be relevant and useful for Practicing Supervisors, Executives, Officers, Engineers and Managers from Marketing, Sales. Manufacturing, Design, Planning, Production, Process Engineering, Maintenance, Logistics, Materials, Supply Chain, Service and Quality assurance.

# COURSE CONTENT

This highly interactive program demands academic rigour and challenges participants with various assignments. The Program content includes late evening assignments to deliver a high value and efficient delivery of the program.

## 1.0 Module 1 :

- 1.1 What is Design of Experiments ( DOE)
- 1.2 Objectives of the Training Programs
- 1.3 Introduction to Problem Solving Tools
- 1.4 Quality Gap - Why?

## 2.0 Module 2 :

- 2.1 Sources of variation
- 2.2 Causes of variation
- 2.3 Methods of variation detection and reduction - DOE Classical, Taguchi, Shainin
- 2.4 Measure of variability
- 2.5 Variation measurement techniques
- 2.6 Accuracy, Precision, Bias, Cp, Cpk calculation, interpretation and their significance
- 2.7 Relationship between Specification Limits and Control Limits

## 3.0 Module 3 :

- 3.1 Variation Reduction Roadmap
- 3.2 Shainin DOE Tools in brief introduction
- 3.3 Need for DOE
- 3.4 Benefits of DOE

## 4.0 Module 4 :

- 4.1 Clue Generation Techniques :
  - 4.1.1 Concentration Chart
  - 4.1.2 Multivari Chart
  - 4.1.3 Component Search
  - 4.1.4 Paired Comparison
  - 4.1.5 Product / Process Search

## 5.0 Module 5 :

- 5.1 Formal DOE techniques :
  - 5.1.1 Variable Search
  - 5.1.2 Full Factorial
  - 5.1.3 B v/s C Test
  - 5.1.4 Scatter Plot
  - 5.1.5 RSM ( Response Surface Methodology

## 6.0 Module 6 :

- 6.1 Transition to SPC :
  - 6.1.1 Positrol
  - 6.1.2 Process Certification
  - 6.1.3 Operator Certification
  - 6.1.4 Precontrol - Maintenance Tool

## 7.0 Module 7 :

- 7.1 Dart Chart - Tracking Improvement
- 7.2 Six Sigma concept and understanding
- 7.3 Case Study - Application of all Techniques

# PROGRAM FACULTY

- *Mechanical Engineer, having 40 years of industrial experience in MNC in the manufacturing industry, having worked in various positions from Maintenance Engineer to Managing Director and Director Operations.*
- *Trained by DOE Practitioner and DOE GURU Mr. Keki Bhote. Hands-on experience of achieving many breakthrough improvement using DOE Techniques and holding on gains through SPC & Control Charts.*
- *Conducted various training programmes in India & abroad on DOE, SPC & Control Charts and many more for cost reduction, quality improvement, productivity improvement, change management, TQM, innovation etc.*
- *Coached, Guided, Mentored many senior level executives, Directors and Senior Directors across Pan Asia.*
- *Qualified "Talent Assessor"*
- *Guided many projects and transfer of plants and many more quality improvement projects*
- *Associated with many industrial bodies at zonal, state, regional and national level*
- *Associated with many Engineering Collages and Management Institutions*
- *Recipient of "Best CEO Award" at international level*
- *Currently active in the domain of 'Industry 4.0' applicability for Indian Industries*



Mr. Rajan Shringarpure

# FEE & REGISTRATION

**Program Fee : Rs. 45,000 +** Govt Taxes per participant.  
The above fee includes Boarding as well as tuition fee charges.

For registration, please write to us on **corporate.relations@slkcee.com**, please note that registration is on the first come first serve basis, and there are limited seats for the program.

To know more about the program or if you require any assistance you can give a missed call on our toll free number, **8268- 001 - 171**, and our team will get in touch with you.

## Program Coordinator

Mr Sumit Thakur

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Venue:  
S.L.Kirloskar Center for Executive Education  
KIAMS Campus, Village Dhamane, Taluk  
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