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STRUCTURED PROBLEM SOLVING METHODOLOGIES WITH STATISTICS/DOE

BY ELITE INDIGO

Walk away with practical 'quick wins' to effectively improve your problem solving skills and enhance productivity immediately.

REGISTERED HRD CORP TRAINING PROVIDER

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• Program Overview

The quality of your results is based on the quality of your decisions. In a failure analysis, we are very much concerned about the reliability of various functioning components in the systems, the system safety associated with production and ability of the system to function as planned.

Your best decisions are built on a sharp and focused ability to analyse situations, people and probabilities.

Trouble-shooters are highly skilled workers but are becoming an increasingly rare breed in the workforce. Attending training courses are to possess valuable knowledge set, while the real troubleshooting skills are learned on the job over a long period of time from experienced maintenance personnel.

• Learning Objectives

By the end of the course, participants will be able to learn about:
- Understand concept of problems solving and decision making.
- Understand how to define, and analyse problem.
- Describe what makes an effective troubleshooting.
- Collect evidence to review the fault symptoms.
- Develop their ability to think “outside the box”.
- Isolate the faulty component/system.
- Understand how to make decision rationally.
- Close out the problem effectively.
- Review your performance go for continuous improvement.

• Duration Two(2) Full-Day Workshop;

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• Course Schedule (Day 1)

DAY/TIME	Topic
1 Hour 30 Minutes	**Module 1: Introduction to Problem Solving** 1. What is a Problem? 2. Be creative about your problem definition. 3. Turn problems into opportunities. 4. Steps in defining Problem Solving. 5. Are all "Decisions" really a "decision?" 6. Do we "need" to solve problem? 7. What is Decision Making. 8. How problem differs from decision. 9. Team Exercise: Problem Solving in Action.
1 Hour 30 Minutes	**Module 2:Failure Classification** 1. Identification of failures. 2. Sporadic failures. 3. Chronic failures. 4. Understanding the critical 6 Losses. 5. P-F Curves. 6. Team Exercise: Prioritizing Failures using P-F Curves.
1 Hour	**Lunch**
4 Hours	**Module 3: Perform Root Cause Analysis** **Step 1: Observe or collect the relevant data.** Data gathering. Fact-finding. **Step 2: Analyze the data and look for relationships.** Data analysis. Historical analysis. Think outside the box. **Step 3: Identify Possible Causal Factors.** 5 Whys - Ask "Why?" **Step 4: Identify the Root Cause.** **Step 5: Recommend and Implement Solution.**

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• Course Schedule (Day 2)

DAY/TIME	Topic
3 Hours	**Module 4 – Key Statistical Tools Supporting Design of Experiments (DOE)** Moderate Statistical Tools (Inferential & Association) for DOE Analysis **1. Hypothesis Testing in DOE** Hypothesis testing forms the statistical foundation of DOE by validating whether changes observed in experimental responses are statistically significant. **1.1 t-Tests (DOE Confirmation & Comparison)** • Applied in DOE to compare experimental responses between two factor levels (e.g., low vs high setting). • Used to validate before-and-after DOE improvements against baseline performance. • Confirms that DOE-driven changes are statistically significant. **1.2 ANOVA – Analysis of Variance (Core DOE Analysis Tool)** • Primary statistical method used to analyze DOE results. • Determines significant main factors and interaction effects. • Quantifies the contribution of each factor within factorial and fractional DOE designs. • Forms the basis for optimization and process window definition. **1.3 Chi-Square Test (DOE with Categorical Responses)** • Applied in DOE when response variables or factors are categorical (e.g., Pass/Fail, Defect Type). • Evaluates whether changes in factor levels significantly affect categorical outcomes. • Commonly used in defect classification and quality-related DOE studies.

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• Course Schedule (Day 2) Cont.

DAY/TIME	Topic
1 Hour	**Lunch**
2 Hours	**2. Correlation & Regression Analysis in DOE** **2.1 Correlation Analysis (Pre-DOE Screening & Insight)** • Used prior to DOE to identify relationships between potential experimental factors. • Helps reduce redundant or highly correlated variables before DOE design. • Supports efficient DOE planning by minimizing unnecessary experimental runs. **2.2 Regression Analysis (DOE Modeling & Prediction)** • Converts DOE results into mathematical models relating response variables to experimental factors. • Enables prediction of outcomes for untested factor combinations. • Supports Response Surface Methodology (RSM) and optimization following DOE.
2 Hours	**3. Probability Distributions in DOE** **3.1 Normal Distribution (DOE Assumptions & Process Variation)** • Used to verify DOE assumptions related to residuals and response distributions. • Supports interpretation of DOE results under normal process variation. • Links DOE outcomes to process capability and statistical process control (SPC). **3.2 Poisson Distribution (DOE for Defect & Event Data)** • Applied in DOE when response variables represent counts of defects or failures. • Models rare or discrete events in manufacturing and reliability DOE studies. • Ensures correct statistical treatment of non-continuous DOE responses.

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ABOUT ELITE INDIGO

We are dedicated to empowering businesses to achieve their full potential. With a team of seasoned professionals and a wealth of industry experience, we offer tailored consulting services to help organizations overcome challenges and seize opportunities.

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