BOOST
THE LEADING TRAINING PROVIDER

Maintenance & Reliability Management

# Data Analysis Techniques for Engineers & Technologists

## Course Introduction

Corporate ethos which sees change as a survival necessity, coupled with continual demands to achieve greater production efficiencies and reduced operating / maintenance costs, means that Engineers and Technologists are faced with ever-increasing plant and process performance targets. As a consequence, more and more reliance is being placed upon the accurate and reliable analysis, representation and interpretation of data.

**practical capabilities**

This course aims to provide engineers and technologists with the understanding and practical capabilities needed to convert data into information, and then to represent this information in ways that it can be readily exploited. A Working vocabulary of analytical terms which will enable you to converse with people who are experts in the areas of data analysis, statistics and probability, and to be able to read and comprehend common textbooks and journal articles in this field.

An understanding and practical experience of a range of the more common analytical techniques and data representation methods, which have direct relevance to a wide range of engineering problems. The ability to recognize which types of analysis are best suited to particular types of problems. A sufficient background and theoretical knowledge to be able to judge when an applied technique will likely lead to incorrect conclusions.

## Target Audience

- Facilities Engineer
- Facilities Engineering Manager
- Facilities Manager
- Facilities Specialist / Coordinator
- Health and Safety Engineer
- Maintenance Group Leader
- Maintenance Helper / Assistant
- Maintenance Manager
- Maintenance Superintendent

- Maintenance Supervisor
- Mechanical Reliability Engineer
- Network Reliability Engineer
- Operations and Maintenance Specialist
- Reliability Engineer

## Learning Objectives

- Provide delegates with a working vocabulary of analytical terms to enable them to converse with people who are experts in the area of data analysis, statistics and probability and to be able to read and comprehend common textbooks in this field.
- Provide delegates with both an understanding and practical experience of a range of the more common analytical techniques and data representation methods, which have direct relevance to a wide range of analytical problems.
- Give delegates the ability to recognize which types of analysis are best suited to particular of problems
- Give delegates the ability to recognize which types of analysis are best suited to particular types of problems.
- Provide delegates with an overview of the main data analysis applications within Engineering Systems
- Give Delegates sufficient background and theoretical knowledge to be able to judge when an applied Techniques will likely lead to incorrect conclusions.

## Course Outline

- **01 DAY ONE**

  **Module (01) Basics and Fundamentals**

  - 1.1 Sources of Data
  - 1.2 Data Sampling
  - 1.3 Data Accuracy
  - 1.4 Simple Representations

- 1.5 Dealing with Practical Issues

**Module (02) Fundamental Statistics**

- 2.1 Mean, Average, Median, Mode & Rank
- 2.2 Lies and Statistics
- 2.3 Compensations for small sample Sizes
- 2.4 Descriptive Statistics
- 2.5 Workshop using Production Data from a batch Fermentation process

• **02 DAY TWO**

**Module (03) Data Mining and Representation**

- 3.1 Single and Multi-dimensional Data Visualization
- 3.2 Trend Analysis
- 3.3 Box and Whisker Charts
- 3.4 Common Pitfalls and Problems
- 3.5 Workshop using Plant Data

**Module (04) Probability and Confidence**

- 4.1 Probability Theory
- 4.2 Properties of Distributions
- 4.3 Expected Values
- 4.4 Weibull Distribution
- 4.5 Binomial Distribution
- 4.6 Workshop using Statistical Processes

• **03 DAY THREE**

**Module (05) Histograms & Frequency of Occurrence**

- 5.1 Histograms
- 5.2 Pareto Analysis
- 5.3 Cumulative percentage Analysis
- 5.4 Percentile Analysis
- 5.5 Workshop using Historical Failure Data

**Module (06) Frequency Analysis**

- 6.1 The Fourier Transform
- 6.2 Periodic and a-periodic Data
- 6.3 Inverse Transformation
- 6.4 Practical Implications of Sample Rate
- 6.5 Dynamic Range

- 6.6 Workshop using Vibration Data from Machine

- **04 DAY FOUR**

**Module (07) Regression Analysis and Curve Fitting**

- 7.1 Linear and Non-Linear Regression
- 7.2 Min Variance, Max Likelihood
- 7.3 Least Squares Fits
- 7.4 Curve Fitting Theory
- 7.5 Linear, Exponential and Polynomial Curve Fits
- 7.6 Predictive Methods
- 7.7 Workshop using Data from Large Equipment

**Module (08) Data Comparison**

- 8.1 Correlation Analysis
- 8.2 The Autocorrelation Function
- 8.3 Practical Considerations of Data Set Dimensionality
- 8.4 Workshop using Diesel Engine Performance and Pollutant Emission Data.

**Module (09) The power of Excel and MATLAB**

- 9.1 Pivot Tables
- 9.2 The Analytical Toolbox
- 9.3 Internet-based Analysis Tools
- 9.4 Dynamic Spreadsheets
- 9.5 Sensitivity Analysis
- 9.6 Visualization
- 9.7 Workshop involving step-by step Examples

- **05 DAY FIVE**

**Module (10) Quality Control Applications**

- 10.1 Terminology
- 10.2 Control Charts
- 10.3 Statistical Control
- 10.4 Estimating the Process Mean and Variation
- 10.5 Capability Indexes
- 10.6 Workshop on Constructing the X bar and R Charts

**Module (11) Reliability Evaluation Applications**

- 11.1 Terminology
- 11.2 Reliability Definition and Concepts

- 11.3 Reliability Functions
- 11.4 Reliability Process
- 11.5 Workshop on Evaluating the hazard Rate, Survivor Function, Failure Density and Cumulative Distribution Function.

## Confirmed Sessions

| FROM | TO | DURATION | FEES | LOCATION |
|---|---|---|---|---|
| May 4, 2025 | May 8, 2025 | 5 days | 4250.00 $ | KSA - Jeddah |
| July 13, 2025 | July 17, 2025 | 5 days | 2150.00 $ | Virtual - Online |
| Sept. 22, 2025 | Sept. 26, 2025 | 5 days | 4250.00 $ | UAE - Dubai |
| Dec. 15, 2025 | Dec. 19, 2025 | 5 days | 4950.00 $ | Thailand - Bangkok |