# Industrial Applied Reliability Engineering

## Introduction:

This course is for operations and maintenance managers, engineers, and supervisors who want practical solutions and techniques to lift the efficiency, productivity and output of their production and operating assets. The candidates will learn useful, effective methods and tools to boost equipment reliability, lift plant availability, and get higher production output. The reliability concepts and math involved are covered in a simple, clear way that allows you to appreciate the basic ideas and apply the techniques without getting bogged down in theory. The focus will be on using practical reliability engineering methods to employ every day that improves your operating and production performance through lower maintenance costs, less downtime, fewer plant and equipment failures and higher throughput.

If you want a highly effective maintenance program you use reliability engineering to understand the cause and effect relationships of equipment and operational problems. Where the consequence of failure is important you need to put into place the right actions to prevent the failure. These include introducing defect eliminating practices, timely overhauls of parts suffering usage-based failures, replacement of equipment when key parts approach end-of-life, and equipment redesign to remove failure modes. This reliability training helps you make effective and good decisions for each of those choices. With it you'll optimize your maintenance interventions and apply sound maintenance strategy

Learn how to deliver equipment reliability improvement using every-day reliability engineering to enrich your operating and maintenance processes. This applied reliability engineering course provides you with valuable and insightful knowledge, along with practical case studies and hands-on data analysis activities you learn from. After a basic introduction to reliability engineering and equipment operational risk you see how reliability engineering is practically applied and used to achieve equipment reliability growth and optimize your maintenance management strategy.

## Who Should Attend?

Maintenance managers, reliability and maintenance engineers, top level maintenance technicians, production managers, plant engineers, design engineers, reliability engineers/technicians, operators, safety engineers, risk engineers, safety engineers and anyone who is involved in Reliability Engineering strategies or methodologies to include design engineers for capital projects engineers

## Course Objectives:

**By the end of this course delegates will be able to:**

- Improve operating & maintenance methods &practices to get least life cycle cost (LCC) from your assets

- Optimize and develop reliable, low LCC plant and equipment designs to give you higher plant and equipment availability

- Identify how your equipment parts and systems fail so you can select the ideal maintenance strategies for your operation.

- Build and apply Reliability, Availability and Maintainability (RAM) processes for production improvement

- Improve reliability of equipment designs with data analysis of the historic failures affecting your equipment

- Understanding the practical methods and useful features of Reliability Engineering and how they can help you

- Know when to use reliability engineering to get the most benefit for your operation

- Learning which reliability engineering techniques to use to improve your operating equipment performance and profits

- Recognize how to use reliability professionals to deliver better operating outcomes and plant availability

WWW.BTSCONSULTANT.COM

- Realize where reliability engineering can deliver simple and low-cost reliability improvements to your operation

# Course Outline:

## Reliability Engineering Basics

- Physics of Equipment Failure

- Risk Analysis and Risk Management

- Frequency and Consequence

- Event Trees and Fault Trees

- Risk Matrix and Risk Triangle

- Equipment Criticality

- Equipment Criticality Example

- Basic Reliability Math explained

- Series/Parallel systems

- Probability and Distributions

- MTBF/MTTF/MTTR/Availability

- Equipment Reliability Performance Indicators

- Reliability and Hazard Functions

- Failures and Survivors data analysis

- Failure mode distributions

- Stability of historic data

- Failure data goodness-of-fit

- Introduction to Weibull Analysis

- Introduction to Reliability Block Diagram basics

- Building Basic Reliability Models

## Reliability Improvement

- Reliability Loss and its Causes

- Reliability Growth and its Causes

- Human Factors and Human Error
- Component and equipment stress reduction
- FRACAS process
- RCFA/5 Whys dos and don'ts
- Pareto Charts focus effort
- See your chance of success
- Timelines and failure modes
- Separating failure modes
- Weibull graphs and parameters
- Failure Data Plotting example
- FMECA/FMEA
- Reliability, Availability and Maintainability (RAM)
- Crow-AMSAA plots for measuring reliability growth

**Reliability, Maintenance, Asset Management**

- Introduction to Life Cycle Modelling
- Component Failure Data Modelling
- Failure Distribution Curves
- Cost Benefit Analysis
- Optimising Preventive Maintenance