



Reliability - Concepts Workshop

Course #2017

Course Details

Length: 3 days

Prerequisites: Meridium – User and Reliability Analytics - User

Benefits: This course is designed to teach you about data and tools you can use to improve the outcomes of your Reliability initiative.

Audience: Implementers, Administrators, Reliability Engineers, Reliability Managers, Maintenance Engineers, or Maintenance Managers.

Overview

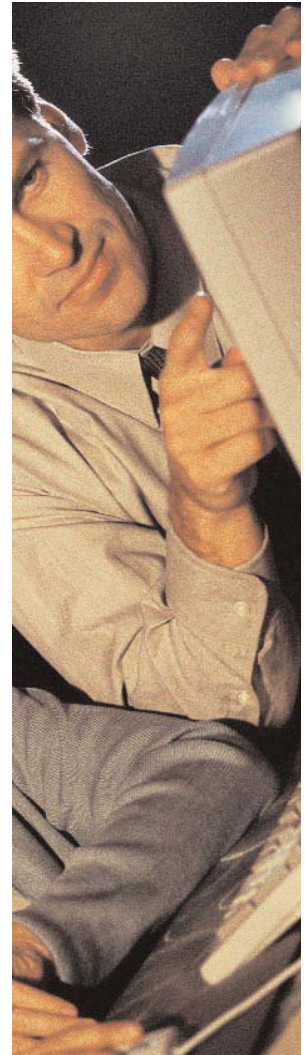
Evaluating your Current Initiatives

You will learn the concepts underlying Reliability Analysis of assets and how you can apply the available tools to answer questions such as:

- Is reliability improving, staying the same, or getting worse?
- What maintenance intervention might help reduce failures?
- What is the impact of changes made to our reliability strategy and execution?
- Is our chosen analysis method the best to use with the available data?
- Is it possible mixed failure modes are involved?
- How much opportunity is there for increased production?

Equations, Proofs, and Theorems

Class exercises and examples will be used to demonstrate concepts, and the results will be plotted on diagrams or graphs. Rigorous mathematical equations, proofs, and theorems will not be necessary.





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Day One Training Agenda

Defining Failures

- Function defines Failure
- Identifying and analyzing Failure Modes
- Failure Effects

Defining Reliability

- MTTF & Failure without Replacement
- MTBF & Failure with Replacement
- Reliability vs. Availability
- Reliability vs. MTBF
- Constant Rate Failure

Data Collection

- Key Time Stamps
- Data required for tracking Asset Reliability

Reliability Data Analysis

- Six patterns of Failure
- Why use Distribution Analysis?
- Why use Crow-AMSAA?
- Distribution vs. Growth Analysis

Distribution Characteristics and Functions

- Normal, Exponential, Lognormal, Weibull
- Three classes of Failure
- Exercise: Weibull by Hand

Day Two Training Agenda

Goodness of Fit Tests

- Goodness of Fit Test examples & testing methodologies
- Exercise: Choosing the Best Distribution

Preventive Maintenance Strategies

- Failure Replacement Cost
- Failure Trends & Cost of Reliability
- Exercise: Using PM Optimization

Weibulls: The Good, the Bad, and the Ugly

- Causes of "Dirty" Weibull Plots
- Exercise: Downward Curving Plots
- Exercise: Non-zero Time Origins

Data Censoring and Suspensions

- Data censoring & Weibull Plots
- Failure data in TTF Rank Order
- Exercise: Censoring and Suspending Data in Growth and Distribution Analyses

Day Three Training Agenda

Group Activity

- Fatigue Failure and Accelerated Testing

Weibull Production Analysis

- Daily Production Weibull
- "Six Sigma" Chemical Process

Crow-AMSAA Growth Modeling

- Reliability Growth Modeling
- Crow-AMSAA Model Parameters
- Cumulative Data Log-Log Plots
- Crow-AMSAA Beta Rules
- Tracking Reliability Improvements
- Crow-AMSAA vs. Weibull

Monte Carlo Simulation

- Applications and Examples
- Exercise: Building a System Model and performing Monte Carlo Simulation