

Course Description

Design for Reliability

In today's highly competitive global economy, customers demand and expect cost effective products that are safe and reliable. Reliability is defined as a product performing its intended function for a stated period of time. Simply put, reliability is quality over time. Customers are expecting longer service times for products they buy and they expect superior product performance under demanding conditions. Producing a single unreliable product can negatively impact your company's reputation, result in excessive warranty costs, and generate unhappy customers, who may then search for a more reliable supplier. Your product's reliability may be the main source of competitive advantage versus your competitor's products. Therefore, you must be able to accurately predict the reliability of your products or it may cost you customers and/or warranty payments.

Who Should Attend

Engineers and product designers who are responsible for product design and reliability will benefit from this course. The student will learn how to calculate, interpret, and use reliability information to minimize total lifecycle costs. The student will also be introduced to several different data distributions for modeling reliability and predicting lifecycle costs. This course also introduces the student to the Design for Reliability methodology (called IDOV) for designing products with predictable reliability. The student will be introduced to many of the features of Reliasoft's Weibull++ software, which will be used to accomplish the majority of the calculations required for the course.

What to Expect

This 5-day course takes a very hands-on approach to learning. Participants will learn how to apply the methods via a combination of lecture, working examples, and in-class exercises using Reliasoft's Weibull++ software. College prep high school algebra and math will be used in this course which includes the use of exponential and logarithmic functions. For those who have forgotten much of their high school math, appropriate topics will be reviewed as needed for the class. At the end of the course, the student should be able to apply these tools to enhance their product design experience using the IDOV methodology or their own company's product development process.

Course Overview:

1. Introduction to Design for Reliability (DFR)
 - Total Life Cycle cost minimization
 - The connection between DFR and Design for Six Sigma
2. Reliability Basics
 - Definition of Reliability and its application to Design Engineering

Design for Reliability

The Reliability Function

Basics of Reliability Functions, including

Cumulative Distribution Functions, Probability Distribution Functions

Hazard Function, the Bathtub Curve, and Concept of Stress-Strength Interference

Reliability Demonstration Strategies and the concept of Statistical Confidence

3. Identifying the Boundary and Scope of System Requirements

Scope Trees and Boundary Diagrams

The language of Reliability Requirements

4. Designing with Reliability in Mind

FAST diagrams

Allocating Reliability to Design Features

Stress-Strength Interference Calculations

5. Optimizing for the Time Domain

The use of MSA and DOE for Reliability improvement

Test Progression Strategy (Levels 1, 2, and 3)

Application of ALTA, LDA, and RGM

6. Validation of Product Reliability using Test Progression Strategy (Level 3)

Measuring Field Reliability

Predicting Product Failure and Identifying Foolish Failure Limits

Confirmation of Failure Slopes

7. Reliability in Manufacturing

Relation to DMAIC Control Phase

Control Plan Information

Application of Statistical Process Control

8. Warranty Analysis

Different formats for warranty analysis data

Management of reliability prediction through the use of warranty data

Prerequisites for course attendance: The student is expected to have already attended the DFSS Foundations course as well as the Breakthrough Performance Using Design for Six Sigma prior to attending this Design for Reliability course.

Course Materials

Participants receive the following materials, which are integrated and used throughout the class:

Participant Guide

Textbook:

- Practical Reliability Engineering by Patrick D. T. O'Connor

Required Software (not provided): Reliasoft's Weibull++ (current version)