

Course ID
RCFA2D
Course Duration
2 days

Course Title
Root Cause Analysis of Systems Failure: A Tutorial

Related Courses

- Root Cause Analysis of Systems Failure: A Comprehensive Five Day Workshop (RCFA, 5 days)
- Root Cause Analysis of Systems Failure: A Comprehensive Course (RCFA4D, 4 days)
- Root Cause Analysis of Component Failure: Understanding Human and Engineering Factors for Improved Product Performance (RCFA-ME, 2-4 days)
- Systems Engineering: An Intermediate Tutorial and Workshop (SYSENG, 2 days)
- Succeeding at Technical Management: Do's and Don'ts for the Technical Manager (DOS&DONTs, 1 day)

Aimed At

This course is aimed at engineers, project engineers, design engineers, process engineers, program managers and others responsible for preventing or determining the causes of systems failures.

Group Size

5-25

Prerequisites

While there are no formal prerequisites, the course does assume a process, industrial, manufacturing, or engineering background.

Course in a Nutshell

This short tutorial brings together essential concepts from engineering, quality assurance, problem solving, procurement, and other disciplines to identify and eliminate the root causes of failures occurring in complex systems, subsystems, and components. The course emphasizes the development and implementation of a failure analysis methodology for use throughout the organization.

We will show you how to utilize brainstorming, Ishikawa diagrams, mind-mapping, and fault tree analysis for identifying potential failure causes. We will also arm you with procedures and technologies for working through various types of systems failures. We will learn how hardware analysis, statistical analysis, design of experiments, technical data package evaluation, and other pertinent tools and techniques can be brought together to define potential root failure causes, and to develop a plan for evaluating these causes. The course presents corrective action alternatives and a framework for selecting optimal intermediate and longer-term corrective actions. The course utilizes real-life case studies to help you apply this toolkit effectively to your job. At the end of the course, you will have learned how to identify dominant failure modes through quantity and cost-based Pareto analyses, identify the root causes of systems failures, select and implement effective corrective actions, and work as an inter-organizational, multi-disciplinary

failure analysis team.

Customize It!

Whatever the nature of your system and objective, whether failure prevention or cause determination, we will customize the course to meet your specific needs and concerns. Here are some of the ways in which we can tailor the course to help you get more out of it:

- Add a “workshop day” to the course to allow the participants to work together to analyze a failure specific to your organization. The workshop day can be scheduled a few weeks after the course to allow time for applying the technologies presented in class under an experienced failure analysis practitioner’s guidance.
- Add a design-of-experiments and Taguchi training module.
- Schedule post-class follow-up consultation for continuing in-house product and process failure analyses.

Learn How To

- Work together in an effective multi-disciplinary team environment to resolve complex system failures.
- Objectively identify all potential failure causes using fault tree analysis and other technologies.
- Objectively evaluate the likelihood of each potential failure cause.
- Identify the most likely failure causes.
- Proactively eliminate additional potential failure causes before they occur.

Course Outline

- Day 1: Introduction to Systems Failure Analysis
 - The need for efficient systems failure analysis
 - Systems failure analysis philosophy
 - The four-step problem solving approach
 - Systems and component failure analyses
 - The inherent value of failed hardware
 - Continuous improvement concepts and systems failure analysis
 - Quality measurement and reporting concepts
 - Using failure analysis as a preventive measure
 - The value of a priori failure cause identification
 - Brainstorming, mind-mapping, and Ishikawa diagrams
 - Fault tree analysis history, applications, and capabilities
 - Fault tree analysis construction
 - Fault tree gate usage and interpretation
 - Quantifying top undesired events
 - Using fault trees to identify redundancy-defeating failure modes
 - Case study
- Day 2: Isolating Failure Causes and Corrective Action
 - Evaluating potential failure modes

- Using Failure Mode Assessment and Assignment (FMA&A) matrices
- "What's Different" analysis
- Test and inspection data, material certifications, and SPC data
- Using flow charts for product performance and process evaluations
- Interviewing techniques for use with assembly, test, and inspection personnel.
- Failed hardware analysis
- Evaluating failed hardware conformance
- Component failure analysis technologies, including optical microscopy, SEM, FTIR, EDAX, X-ray, N-ray, SIMS, and Auger analysis
- Basic metallurgical and electronic component evaluations
- Evaluating leaks
- Designing tests to confirm failure causes
- Corrective action alternatives, including design modifications, process modifications, requirements relaxation, screening, and other corrective actions.
- Using the FMA&A matrix for corrective action identification and tracking
- A suggested failure analysis procedure
- Creating a product-oriented Lessons Learned document
- Recap, Q/A, and evaluations

How You Will Learn

- A seasoned consulting engineer-instructor will present this course in interactive lecture/workshop format.
- Along with the lecture, we will use exercises, puzzles, case studies, and interesting group activities to enrich the instruction and drive home the key points.
- You will learn the key concepts of root cause failure analysis from a theoretical, practical, and organizational perspective.
- You will receive a printed Participant Handbook that includes all materials presented in class. It will help you remember and retain what you learned and apply it on your job.

Revised 09 Sept 29f