

Course ID
PLAST-FA
Course Duration
3 days

Course Title
Plastic Parts Failure Analysis

Related Courses

- Plastic Materials Selection (PLAST-MS, 4 days)
- Plastics: Design for Producibility, Molds, and Molding (PLST-DES, 3 days)
- Materials and Methods: Designing for Plastics vs. Other Materials (PLST-OTHER, 2 days)
- Poka-Yoke: A Comprehensive Workshop for Improving Product and Process Quality By Preventing Defects (POKAYOKE, 2 days)
- Geometric Dimensioning and Tolerancing (GDT, 2 days)
- Statistical Tolerance Analysis: A Comprehensive Workshop (S-TOL-ANAL, 2 days)
- Statistical Process Control (SPCON, 3 days)
- Root Cause Failure Analysis and Experiment Design Techniques (RCFA3D, 3 days)
- Cost Reduction: Opportunities and Strategies (COSTRED, 2 days)
- Quality Management (QUALMGT, 3 days)

Aimed At

Those whose work requires an understanding of plastic part design, mold design, material selection, processing, and failure analysis process/tools.

Prerequisites

There are no formal prerequisites for this course.

Group Size

5-25

Course in a Nutshell

With the plastic parts content of products growing across a variety of industries, there is need for a course focusing on the range of topics discussed in this course, which include: Elements of a successful plastic product, principles of plastic part design, mold design considerations, materials selection, processing, failure analysis tools, and failure analysis process. The course includes case studies that will help you apply the concepts and techniques taught in this course to on-the-job requirements

Customize It!

We can customize this course to your team's technical needs, usually at little to no additional cost. A less in-depth, two-day version of the course is available. Schedule post-class follow-up consultation for continuing in-house implementation of the principles and techniques discussed in this course.

Course Outline

- Elements of a Successful Plastic Product
 - Part Design
 - Mold Design
 - Material Selection
 - Processing
- Principles of Plastic Part Design
 - Nominal Walls
 - Ribs and Other Projections
 - Holes and Other Depressions
 - Designing for Manufacturing and Assembly (DFMA)
 - Design Properties versus Inherent Properties of Materials
- Mold Design Considerations
 - Mold Steel Selection
 - Managing Polymer Flow in the Mold – Runners and Gates
 - Cavitation and the Effect on Balanced Flow
 - The Economics of Cavitation
 - Hot Runners versus Conventional Cold Runners
 - Mold Temperature Control
 - Draft Angles and Ejection
- Material Selection
 - Defining the Application Environment: Time, Temperature, Stresses, Etc.
 - Amorphous and Semi-Crystalline Polymers
 - The Importance of Molecular Weight
 - Structural Choices within a Polymer Family
 - Property Modifiers and Additives
 - Regulatory Considerations: UL, NSF, FDA
 - Performance and Processability
 - Establishing the Cost/Performance Balance
- Processing
 - The Fundamentals of Polymer Flow
 - The Effect of Material Structure on Sound Processing Decisions
 - Machine Selection
 - Process Control Strategies
 - The Quest for Six Sigma
- Failure Analysis Tools
 - Material Testing: Composition and Degradation
 - Molecular Weight Evaluations
 - Thermal Analysis: DSC, TGA, DMA, TMA
 - Spectroscopy: FTIR, EDS, XPS, SIMS
 - Microscopy: Cross Sections and Scanning Electron Microscopy
 - Physical Property Evaluation – Your Part Is Not a Tensile Bar
 - FEA and Its Relation to the Application Environment
 - Advanced Characterization of Mechanical Properties

- The Failure Analysis Process
 - Gathering Background Information
 - Focusing on the Four Fundamentals of a Successful Product
 - Conducting the Appropriate Evaluations
 - Establishing Root Cause
 - Fixing What Is Broken
 - Understanding the Interactions of Multiple Causes
 - The Role of Designs of Experiment
 - The Cost/Benefit Analysis of Problem Solving
 - Following Up
- Case Studies
- Course Wrap-up: Recap, Q/A, and Evaluations

How You Will Learn

- A highly experienced plastics engineer with a life-time of hands-on design, consulting, and training experience will present this course in an interactive lecture format.
- Along with the lecture, we use interesting group activities and case studies to engage the participants and help them apply the course content to on-the-job applications.
- You will receive a Participant Handbook that includes all materials presented in class, which will serve as a valuable reference back on your job.
- You will learn key plastics engineering concepts and techniques from a theoretical and practical perspective

Rev. 2Ktd-ms