Product Quality Techniques

Course No. 311

FOR WHOM INTENDED Engineers, Design Engineers, Quality and Reliability Engineers and Technicians, Program/Project Managers.

APPLICATION   Advanced electronic assemblies for NASA, the US Department of Defense and leading industrial manufacturing companies were subjected to an extensive reliability improvement effort during the past decade. This effort included the development of innovative reliability test techniques. The overall approach resulted in dramatic improvements in reliability. This approach can be utilized during the development and acquisition of any complex equipment produced for government or commercial application.

PURPOSE To provide personnel involved in Product Design, Quality, Manufacturing and Testing with an understanding of that engineering discipline called "Reliability Engineering."

BRIEF COURSE DESCRIPTION   Although the reliability discipline has traditionally focused on a mathematical approach, our instructor has many years experience and approaches reliability from a more "hands on" common sense direction. The statistical methods are covered with reference to practical considerations. The course defines and explains the numerous terms used in reliability.

The course will provide the attendee with an understanding of the application of reliability techniques.

Lectures, illustrated with transparencies, present an overview of the reliability process.

DIPLOMA PROGRAMS This course may be used as an optional course for any TTI specialist diploma program.

PREREQUISITES There are no definite prerequisites for this course, but it is assumed that course participants are actively employed in reliability related fields.

TEXT Each student will receive 180 days access to the on-line electronic course workbook. Renewals and printed textbooks are available for an additional fee.

FURTHER INFORMATION   Class size is limited to maximize participation by all attending. Participants often audio tape the lectures. Direct questions to TTI by e-mail to Training@ttiedu.com or phoning 866-884-4338..

COURSE   HOURS, CERTIFICATE AND CEUs Class hours/ days for on-site courses can vary from 14–35 hours over 2–5 days as requested by our clients. Upon successful completion of the course, each participant receives a certificate of completion and one Continuing Education Unit (CEU) for every ten class hours.

Course Outline

Basic Concepts
    Reliability, Availability, Maintainability • Durability
    Engineering and Management Tasks • Quality
    Conceptual Models for Failure
    Applying the Concepts to Failure Classification
Reliability-Quality
    Responsibility • Incentive Rule
    Real Boundaries • Concept of Control
    Investment Payback • Management function
    Conceptual Models • Beginning Early
The Reliability Discipline
    Organizing Knowledge about User Needs
    Setting R&M Goals and Requirements
    Planning R&M Programs
    Avoiding and Eliminating Risks
Improving Reliability
    Elements of the System-Acquisition Process
    Kinds of redundancy
    Closed-loop corrective action system
Reliability Program—Management, Engineering Tasks—MIL Standard 785
Conceptual Models for Failure Analysis
    Failure budgeting • Tolerance Analysis
    Failure mode Effects and Criticality Analysis (bottom-up process)
    Fault Trees (top-down analysis)
    Manage Reliability-Critical Parts and Situations
Reliability Testing
    Accelerated Testing • Environmental Stress Screening (ESS)
    Reliability and Safety Improvement • Life (Attribute) Testing
    Introduction to MIL Standard 781
Relationships outside R&M
    Manage Vendors and Subcontractors • Assure Quality of Conformance
Probability/Statistics
    Meanings of Probability • Probability vs Statistics
    s-Event Space and Venn Diagrams
    Proving a Conceptual Model
    Probability notation and rules
    Glossary of terms used in statistical distributions
    Standard Deviation (σ) • Variance • s-confidence
Distributions
    Concepts for populations and distributions • Probability distributions (PrDs)
    Binomial distributions and graph • Poisson
    Exponential • Gaussian Distribution • Chi-Square
    Chi-Square-Nu • Student's t-distribution • Weibull
    Lognormal • Beta • Gamma
Goodness of fit, Kolmogorov-Smirnov (K-S) Limits
    Goodness of fit tests • Kolmogorov-Smirnov (K-S) Limits, Example
    Pump Data Set, s-normal distribution
Summary, Final Review
Award of Certificates for Successful Completion
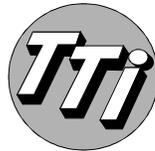
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