

Identification and Assessment of Reliability Goals and Requirements

DESCRIPTION

Reliability goals and requirements are developed to: (1) establish product-level reliability specifications that, if met, will ensure that the reliability performance of the product will meet the customer's functional needs and be consistent with other product constraints and (2) allocate the product-level reliability requirements down to the level needed (i.e., subsystems, equipment or assembly level) to be meaningful to the design and manufacturing process engineers.

A reliability requirement is the minimum level of performance acceptable to, or expected by, the customer. In contrast, a reliability goal is usually some level of reliability greater than that required, which may result in one or more of the following benefits: a greater market share (reliability becomes a discriminator among products), lower life cycle costs for the customer, lower supplier costs (fewer returns and lower warranty costs), and less risk of liability and litigation (safety issues).

The customer or supplier should define the reliability goals and requirements prior to the beginning of the development cycle. Initially, requirements may be stated as "goals" until firm requirements can be defined as the design matures, but a valid starting point is essential. The goals and requirements may be based on customer expressed performance based requirements or on internally developed strategies to "position" new products in the open marketplace (i.e., competitive advantage through benchmarking competition's reliability). In the end, requirements should be realistic and achievable within budget and schedule constraints. Some of the most common tasks related to the development of reliability requirements and goals include:

- Environmental Characterization
- Dormancy Analysis
- Modeling and Simulation
- Benchmarking
- Fault Tolerance
- Durability Assessment
- Thermal Analysis
- Quality Function Deployment
- Allocations
- Life Cycle Planning
- Translations
- Market Survey

Reliability assessments are performed to: (1) determine progress in meeting the reliability performance goals and requirements, (2) evaluate the impact of design decisions on reliability, and (3) understand how a design can fail, the causes of these failures, and how to reduce their probability and consequence. Therefore, the purpose of assessing reliability goals and requirements is closely coupled with design and can be considered an extension of the tasks initially performed during the design of the product. The following tasks have proven to be effective at assessing the progress of achieving reliability goals and requirements:

- Accelerated Life Test
- Design Reviews
- Fault Tree Analysis
- Predictions
- Test Strategy
- Critical Item Control
- Failure Modes, Effects and Criticality Analysis
- Finite Element Analysis
- Reliability Growth Test
- Worst Case Circuit Analysis
- Design of Experiments
- Data Collection, Analysis, and Corrective Action System
- Parts Obsolescence
- Sneak Circuit Analysis

The Alion SRC staff has the ability to effectively identify realistic and achievable reliability goals and requirements for any commercial or defense product. Our reliability databases and reliability predictions tools are trusted sources for providing a baseline to set reliability goals and requirements. The SRC staff also has the experience and expertise to assess a customer's progress in achieving reliability goals and requirements and, if necessary, identify ways to mitigate problems when goals and/or requirements are not being achieved.