

STATISTICAL TOOLS FOR THE RAPID DEVELOPMENT AND EVALUATION
OF HIGH-RELIABILITY PRODUCTS

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Abstract

Today's manufacturers face increasingly intense global competition. To remain profitable, they are challenged to design, develop, test, and manufacture high reliability products in ever-shorter product-cycle times and, at the same time, remain within stringent cost constraints. Design, manufacturing, and reliability engineers have developed an impressive array of tools for producing reliable products. These tools will continue to be important. However, due to changes in way that new product-concepts are being developed and brought to market, there is need for changes in methods used for design-for-reliability and reliability testing, assessment, and improvement programs.

This paper uses a conceptual degradation-based reliability model to describe the role and need for integration of reliability data sources. These sources include accelerated degradation testing, accelerated life testing (for materials and components), accelerated multifactor robust-design experiments and over-stress prototype testing (for subsystems and systems), and the use of field data (especially early-production) to produce a robust, high-reliability product and to provide a process for continuing improvement of reliability of existing and future products. Manufacturers need develop economical and timely methods of obtaining, at each step of the product design and development process, the information needed to meet overall reliability goals. We emphasize the need for intensive and effective upstream testing of product materials, components, and design concepts.