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Reliability Problem Solving, Failure Reporting and Corrective Action System (FRACAS) and Reverse Engineering

Description:

Up-front design and reverse engineering of existing products and systems are important tools in the solution of complex reliability problems. A failure reporting and corrective action system (FRACAS) is defined, and should be implemented, as a closed-loop process for identifying and tracking root failure causes, and subsequently determining, implementing and verifying an effective corrective action to eliminate their reoccurrence. The FRACAS accumulates failure, analysis and corrective action information to assess progress in eliminating hardware, software and process-related failure modes and mechanisms. It should contain information and data to the level of detail necessary to identify design or process deficiencies that should be eliminated.

How It Can Benefit You:

The concepts of a formalized FRACAS and reverse engineering have traditionally been applied to hardware products/systems, but they can be effectively applied to all types of products (including software and service) and processes (e.g., manufacturing, billing, design, administrative, etc.). The basic benefit that a comprehensive, closed-loop FRACAS provides is in the information that it contains to address the timely identification and correction of design errors, part problems, workmanship defects and/or process errors. Continuous monitoring and tracking of data via the FRACAS provides an assessment as to whether previous failure trends have been eliminated through corrective action.

A FRACAS is recognized as one of the most valuable tools for producing reliable products and systems. While it is always better to prevent problems, it is vital to identify and correct reliability problems which do occur, preferably before the product is released to the customer. Losses associated with an ineffective FRACAS can include significant direct costs in factory rework, parts/materials scrap, or warranty service, and even greater indirect costs associated with dissatisfied customers. The results of an effective FRACAS serve as a major contributor to reliability growth, efficient maintenance, and continuous process improvement.

Failure analysis techniques represent a critical step in the determination of root causes of failure. Once the root cause is identified, the resulting information can be used for the purpose of design or process improvement. Specialized techniques and/or equipment may sometimes be required to pinpoint an exact root failure cause. Once the root failure cause is found, it can be eliminated by implementing an appropriate corrective action. A thorough understanding of a design or process through reverse engineering can aid in the ability to efficiently identify and correct root failure causes, resulting in high reliability products and processes.

The extent and formality of the FRACAS should be tailored around the complexity of the product/system or process, and the criticality of its function. A second consideration should be the extent to which reliability, maintainability and quality are considered to be discriminating factors in the marketplace.

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RAC Capability:

RAC has an extensive experience base in reliability problem solving activities, having applied FRACAS and reverse engineering methodologies to the solution of technical issues experienced by both military and commercial customers. This support has included the definition and assessment of major FRACAS systems for both government and industry, including an integrated logistics depot and a major automotive manufacturer. In addition, RAC personnel established and are operating a field failure return program for the US Air Force.

Individual reliability problems involving products such as automatic parking brakes; commercial and industrial welders; and turbine tank fuel controls have been analyzed by RAC and provided payback for its customers.

A successful FRACAS requires a dependable source of data before it can be implemented. RAC, through its unbiased operation and experience in protecting proprietary data, has access to both hardware and software failure data from manufacturers.

In addition, RAC is familiar with, and frequently uses, military maintenance and reliability reporting systems such as the Air Force REMIS and Navy 3-M systems, which it has used to support FRACAS-type applications for RAC customers. Data from these systems has also been used by RAC to support technical studies involving the translation of reliability, maintainability and diagnostic-based operational readiness parameters into contractual product/system specification requirements.

RAC products include databooks that summarize, and provide details for, electronic, mechanical, and electromechanical part/assembly failure modes and mechanisms. Knowledge of failure modes allows the determination of failure effects on progressively higher levels of hardware assembly or product/system functionality. RAC has also published guides that provide insight into the definition and implementation of an effective FRACAS program.

RAC engineers have the technical failure analysis experience and expertise to assist customers in the process of isolating the root cause of failures and, most importantly, to prescribe effective corrective actions to eliminate them by recommending, and providing assistance in incorporating, design or process changes and enhancements.

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