Reliability, Maintainability, and Supportability Task Facilitation

DESCRIPTION

The level of reliability, maintainability, and supportability (RMS) designed into a product is instrumental to its success (or failure) in today's resource limited and highly competitive markets. Each company must make its own determination as to why and what level of RMS is necessary for its products. Factors to be considered include the characteristics of the marketplace (market growth, competitors' strategies, etc.); the cost (in dollars and opportunities) of implementing or not implementing a RMS program; and a complete knowledge of the customer's expectations and how the customer will use the product. Achieved RMS may be relatively simple to quantify (i.e. warranty experience vs. warranty costs, MTBF vs. MTTR, etc.), but it will also impact qualitative issues (i.e., manufacturer liability, customer perceptions, market competition, diverse market needs, and strategies for competitive advantage) which the company must adequately address in order to succeed. Achieving required or desired levels of RMS is best accomplished through completion of the analysis tasks identified within a sound RMS program. The following tables identify pertinent analysis tasks to ensure that required or desired RMS levels are achieved.

Reliability Tasks	**Description**
Reliability Modeling	Presents a clear picture of functional interdependencies and provides the framework for developing quantitative product level reliability estimates to guide the design trade-off process.
Reliability Assessment	There are two basic assessment methods: statistically-based empirical methods and deterministically-based physics-of-failure methods, which provide guidance relative to the expected reliability for a product as compared to the customer's need for the product.
Failure Modes and Effects Analysis (FMEA)	A reliability evaluation and design review technique that examines the potential failure modes within a system to determine the effects of failure on system performance. The results of an FMEA also help establish the necessary maintainability and supportability design characteristics.
Fault Tree Analysis (FTA)	A systematic, deductive methodology for defining a single specific undesirable event and determining all possible reasons (failures) that could cause that event to occur.
Thermal Analysis	An analysis technique that determines the adequacy of the thermal design for the product in its intended use environment.
Maintainability Tasks	**Description**
Maintainability Assessment	Estimates design performance from a maintainability perspective than enable comparisons of design options, assessments of the feasibility of achieving maintainability requirements, and assessment of the progress in achieving the maintainability requirements.
Reliability Centered Maintenance Analysis	Uses a logical, structured framework for determining the optimum mix of applicable and effective maintenance activities needed to sustain the desired level of operational reliability of systems while ensuring their safe and economical operation and support.
Testability Analysis	Determines the fault detection percentage and fault isolation effectiveness of a design through simulation and test.
Human Factors Analysis	Performed to identify problems related to the interactions between maintenance personnel and the design model in performing each maintenance task.
Supportability Tasks	**Description**
Spares Analysis	Identifies the number of spare parts required to effectively balance cost versus system availability by taking into account inventory considerations (supply/demand, lead time, etc.).
Life Cycle Cost Analysis	Determines the cost of system throughout its life cycle, high-cost contributors, cause-and-effect relationships, potential areas of risk, and identifies areas for improvement.
Maintenance Task Analysis	Assesses maintenance tasks in terms of task sequences, task times, and the resources required to complete task (i.e., personnel quantities and skill level, spares, test and support equipment, etc.).

The Alion SRC staff has the experience and knowledge required to complete or facilitate the completion of key RMS analysis tasks. We have worked with commercial and defense customers to ensure their design requirements or goals are achieved through effectively completing RMS analysis tasks. We have developed on-site RMS training programs that incorporate the facilitation of key RMS analysis tasks in a hands-on, team-based environment. SRC engineers have also developed many of the industry standards for completing RMS analysis tasks, including the PRISM® comprehensive system reliability prediction methodology, Failure Mode/Mechanism Distribution, which has become a vital tool for engineers completing FMEAs and FTAs, and many other publications dedicated to RMS analysis tasks.