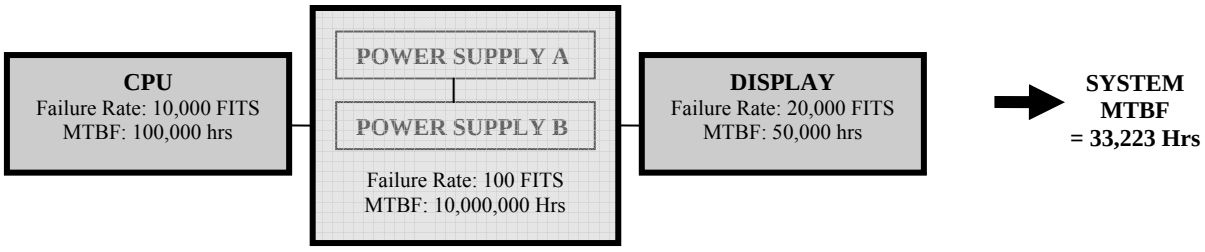
OPS ALaCARTE

Reliability Engineering Services
HALT and Classical Techniques
"Reliability Integration"

RELIABILITY PREDICTION SERVICES (MTBF)

System Level



FUNCTIONAL BLOCK ANALYSIS

Establishes a product's **reliability on a modular/block basis**. Used early in a design cycle, it allocates reliability among blocks, guiding architecture and design decisions to achieve an overall system reliability requirement. Used on established designs, it sorts every component into blocks according to their function to expose the distribution of failure rates. Typically requires a Component Level (and Service-Affecting) MTBF Analysis be performed first. Results provided in summary worksheet with Reliability Block Diagram.

- Simple Product ~$1-2,000
- Complex Product ~$3-5,000

MAINTAINABILITY ANALYSIS

Maintainability Analysis: Used early in a design cycle, it calculates Mean Time to Repair (**MTTR**), guides spares strategies, and estimates maintenance costs and time. Maintenance time is comprised of time to Detect, Isolate, Repair, Replace, Checkout, and Recalibrate. This MTTR is required for Availability Predictions.

- Simple Product ~$1-2,000
- Complex Product ~$3-5,000

Preventive Maintenance Plan: Develops PM cycles for all replaceable assemblies with wearout mechanisms.

- Typical Product ~$1-3,000

AVAILABILITY ANALYSIS

Availability estimates **Uptime** by considering failures that take down an entire system. The architecture, with redundancies, is modeled as a combination of series and parallel elements. Markov Analysis or Telcordia SR-TSY-001171 guidelines are used as appropriate. This knowledge can satisfy regulatory requirements, aid in setting spares strategy, and support marketing efforts.

Availability = MTBF / (MTBF + MTTR).

- Simple Product ~$2-3,000
- Complex Product ~$5-10,000

FIELD MEASURED RELIABILITY

Database Setup - Collects raw data from Field Return, RMA, Repair Depot, Screening, and ORT then organizes, structures, and implements an efficient failure tracking system.

- Typical Condition ~$1-2,000

Calculate MTBF - Uses Weibull Analysis on data from failure database (may require Database Setup) to establish the actual performance (MTBF and Annualized Failure Rate) and compare it with the classical 'bathtub curve' reliability life cycle model.

- Typical Product ~$2-4,000

REPORT AND PRESENTATION

Detailed Report ~$ 500

Executive Summary format explains:

- ✓ The analysis process
- ✓ Significance of the results
- ✓ Recommended product improvements

On-Site Presentation ~$ 500

One to two hour review of results/recommendations, with "What-If" Analyses of the effects of product changes.

OTHER RELATED SERVICES

- ✓ Establish risks associated with failures via Failure Modes Effects Analysis (FMECA)
- ✓ Maximize product robustness with Accelerated Stress Testing (HALT)
- ✓ Eliminate infant mortalities with production screening (HASS)
- ✓ Measure the product's reliability with Reliability Demonstration Tests (RDT)

TERMS

Expedited analyses available at nominal fee
Formal quotes: Fixed Price or Time and Materials basis
Invoicing: On progress basis
Payment due: Net 15 days after invoice