

Ridgetop Group Inc

Prognostics Overview

Electronic Prognostics

Ridgetop Prognostic Technologies and Design Services

At Ridgetop Group, we specialize in developing electronic prognostic solutions for critical systems. These include sensor array detectors, harnesses for “prognostics-enabling” critical systems, and analysis software to comprise a complete solution.

A Prognostics Development Walkthrough

- Key failures are detected and ranked.
- Precursor signatures or multivariate inputs are extracted using Prognostic Health Management (PHM) software such as Sentinel PHMPro™.
- Historic and trending data used to fine-tune the analysis.
- Prognostic metrics are generated, such as current state of health (SoH) and remaining useful life (RUL).

Prognostic Solutions

Electronic prognostics, also known as predictive diagnostics, uses measurement observations to develop predictions of impending failures in an observed system.

Precursor signatures and multivariate inputs are measured and defined to determine a precursor event, along with the fault-to-failure progression model.

State-of-the-art algorithms are used to create the metrics that accurately assess the current health and predict the lifetime of a target device or system.

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Ridgetop's specialty? Determining the extent of aging and degradation, and rooting out troublesome intermittencies.

As the world leader in electronic prognostics, Ridgetop Group provides a range of effective solutions for critical systems. These include award-winning, non-intrusive methods of determining state of health (SoH) and remaining useful life (RUL) for five levels of electronic system designs.

Our insertion tools and related libraries support implementations from the die level through package, board, module and system-level solutions.

Step 1: Characterize Device or System Failures



Key Failure

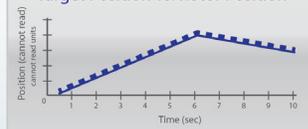


Parento Ranking of Key Failures

Step 2: Extract Precursor Signatures to Failure

Example Precursor Signatures

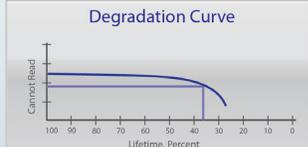
Target Position vs. Rotor Position



Following Error

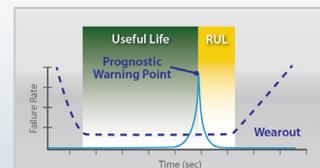


Degradation Curve



Step 3: Calculate Remaining Useful Lifetime (RUL)

Device or System Lifetime



Designing a Prognostic Solution



Needs

Power Prognostics

Power supplies play a critical role in any electronic system, yet are subject to untimely failures. Ridgetop has designed non-intrusive sensing and monitoring systems to detect impending failures before they occur.

Prognostics for Digital Electronic Equipment

Digital processor boards and single board computers have become increasingly crucial in mission-critical equipment used in aerospace, defense, military, medical, and other sectors.

To ensure high levels of reliability and performance, prognostics technology developers provide prognostic data for intermittent fault detection, root cause analysis, and health management.

Integration Prognostics and Semiconductor Fabrication

The transition to nanoscale processes has also seen yield-limiting defects move from random to systematic effects. To meet yield and performance expectations, the next generations of fabrication processes must integrate prognostics to reduce the yield learning curve.

Continuing IC reliability issues include hot carrier, latchup, TDD, NBTI, and other defects detectable through Ridgetop's electrically-based nanoDFM tool suite.

Solutions

Prognostic solutions for power drivers:

- Allows replacement to ensure system uptime and lifetime objectives.
- Reduces maintenance costs by upgrading to a predictive model, replacing the outdated preventive scheme.

Prognostic solutions for digital equipment:

- Prognostic systems and tools dedicated to detecting intermittent faults, performing root-cause analysis, and implementing intelligent health management activities.
- Sensor-rich platforms designed to use existing operands and measurands for correlation with access to PCI / VME buses.

- Autonomic (adaptive and dynamic) cross-calibration of in-situ sensors.
- Cross-correlation of prognostic sensor outputs for enhanced prognostic capabilities.
- Adaptive burn-in to optimize remaining useful life at outset (and for urgent "fab to field" speed-up).
- Electronic autopsies, forensics, and post-service test-to-failure.

Ridgetop Design Services

Ridgetop Group's engineers have extensive experience designing custom, high-performance solutions to customer requirements. Our design services include:

- Incorporation of prognostics into large IVHM systems for aerospace automotive and industrial system applications
- Specialized system engineering trade studies
- Teaming with prime contractors for proposal development
- Experienced hardware and software engineers for complex system integration tasks
- Diagnostic and prognostic engineering
- Design engineering for signal conditioning and interfacing

