

Health and Usage Management Systems (HUMS)



Bell 525

Photo courtesy Bell



CH-47D



CH-53E



AH-1Z



S-76D



HH-60



MH-60R/S



- **Early detection of incipient flaws**

The system provides insight into small problems that developed on the last flight or immediately after maintenance. Early detection of imbalances, faulty installation, gear and bearing deterioration or other conditions allows operators to quickly address easily fixed problems before they grow or cause collateral damage to the aircraft.

- **Reduction of test flights**

By automating inspections and data collection on every flight, pinpointing the root cause of problems and identifying issues immediately after maintenance, the system greatly reduces the number of ground turns or other maintenance-related test flights, rendering significant savings through lower use of fuel, engine and aircraft cycles as well as man hours.

- **Reduction of inspections and increased part life cycles on aircraft**

By monitoring hundreds of signals, the system performs automatic electronic examinations to eliminate the need for many maintenance inspections.

- **Faster troubleshooting**

Interactive, intuitive interfaces give the ability to conduct real-time on-aircraft troubleshooting or drill down into data sets at the ground station. Strip-chart parameter tools isolate the root cause of problems, minimizing troubleshooting time and greatly reducing no-fault-found component removals.

Lower Fleet Operating Costs

Unlike preventative maintenance which relies on time-based upkeep, HUMS enables condition-based maintenance practices by giving flight crews and ground personnel advance notice before components break to avoid vehicle downtime and greatly reduce maintenance costs.

Superior System Functionality for Improved Flight Performance

HUMS on-board system constantly monitors component health from tip to tail by tapping into hundreds of aircraft flight-control signals and specialized accelerometers distributed throughout the aircraft. By synthesizing performance information including speed, torque, temperature and pressure data as well as comprehensive vibration and rotor track and balance data, the system executes real-time diagnostics without pilot involvement. The system provides “go” or “no-go” status on the flight deck display or more detailed health assessments and recommended maintenance actions on the ground station.

Better Data for Enhanced Mission Readiness

With HUMS on board, confidence in vehicle health and usage management data equates to mission readiness:

- Unique UTC Aerospace Systems technology synthesizes data from many sensors to detect incipient flaws, even those that develop months ahead of a potential failure
- Comprehensive signal integrity and built-in test checks ensure the highest standard of diagnostics in the industry

Integrated Solutions Backed by UTC Aerospace Systems Support

Our solutions are backed by our outstanding Global Maintenance, Repair and Overhaul (MRO) support and UTC Aerospace Systems 24-7 Aircraft on Ground (AOG) service provided by our worldwide Field Technical Support Team.

In addition, service operations for HUMS customers include:

- Comprehensive engineering services, including system installation and integration with other aircraft systems
- Ongoing support services include training, product performance tracking, periodic best practices training, ground station upgrades, user conferences and telephone support with expert users



Cracked Spline Adapter



Debonded Tail Rotor Boot Cuff



Sand build up in Oil Cooler

Comprehensive Ground Station Functionality for Improved Lifecycle Management

All flight data and calculations performed by the HUMS on-board system are transferred to the Windows®-based ground station via various means depending upon the aircraft. The solution integrates current and historical flight data into a comprehensive database with full reporting capabilities for use by maintenance crews as well as logistics, operations and engineering personnel.

The ground station facilitates day-to-day maintenance, logistics and planning with an array of functions including:

- Strip-chart analysis
- Component usage tracking as determined by cycles, flight time or other parameters
- Diagnose gear, bearing and shaft assembly and wear features requiring maintenance
- Generate motor smoothing instructions for maintenance
- Vibration acquisition review
- Data files that can be read by Flight Operation Quality Assurance (FOQA) and Military Flight Operations Quality Assurance (MFOQA) aftermarket flight operations software

In addition, HUMS is offered with a database interface to your preferred Maintenance Management Information System (MMIS) which automatically provides flight information, operational usage metrics and maintenance suggestions to the MMIS during the data download.

Legacy HUMS Solutions

Our Integrated Mechanical Diagnostics – Health and Usage Management System (IMD-HUMS) provides full-system functionality for heavy-lift aircraft including the H-53E, AH-1Z and UH-1Y platforms. The Vibrational Structural Life and Engine Diagnostics solution is a hardware box developed for the V-22 aircraft.

Integrated Vehicle Health Management Systems (IVHMS)

HUMS provides all the capabilities of the IMD-HUMS but with added functionality including integrated crash-survivable cockpit voice and flight-data recording with a location beacon that is fully compliant with ED-112 standards.

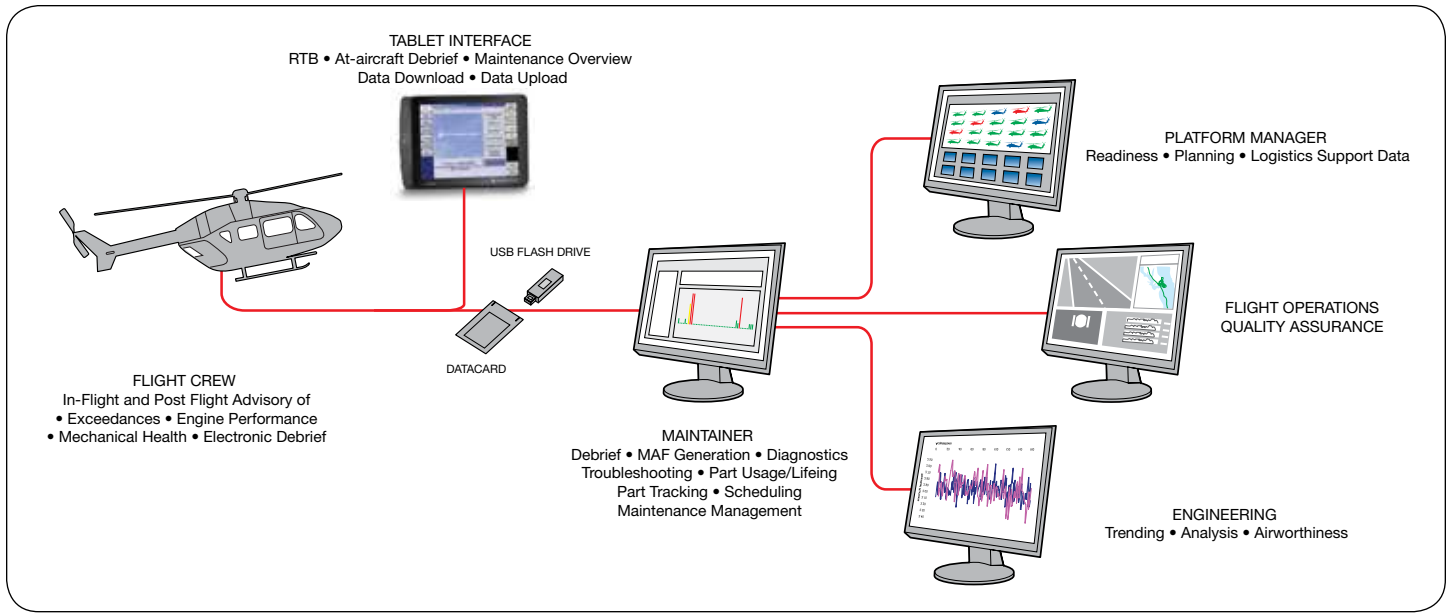
HUMS is currently flying on the UH-60, MH-60, S-70, CH-47 platforms and is being adapted to the new CH-53K aircraft.



“I never have to schedule a backup aircraft for our planned S-92 flights.”

— Commercial Operations Manager

Health and Usage Management Systems (HUMS)



Vigor® Systems

The Vigor® System is the latest HUMS solution developed exclusively for small and mid-size helicopters. Solutions provide full-system functionality for digital aircraft in an efficient size and weight.

With the flexibility to adapt to a number of different aircraft, Vigor Systems are currently being certified on commercial helicopters, including the S-76D.

Latest Products

Our next generation of embedded **Pulse®** software incorporates our extensive experience deploying vehicle health systems and reduces time to market as well as certification and modification costs. A new open data format is in development to provide customers full access to the on board data collected by Pulse systems.

The following developments are optimized for the new environment:

- **Remote Serial Interface Model (RSIM)**—reduces HUMS wire weight by processing sensor data near the source and enables easier integration with existing aircraft systems.w
- **Aircraft Interface Units (AIU)**—a family of smaller, lighter HUMS on board processing units to meet the vehicle health needs of medium to small helicopters. The AIU 120 can handle up to 10 HUMS sensors and the AIU 220 can handle 20. Each is equipped to interface with the digital data sources found in most modern aircraft and when combined with RSIMs can handle any reasonable number of sensors.

UTC Aerospace Systems is also developing an innovative **Fleet Management** application that enables improved forecasting of maintenance based on **Remaining Useful Life** estimates for HUMS monitored components to help customers improve asset management.

The new **Pulse® Ground Station** software is compatible with current Microsoft® Windows® operating systems and offers the ability to deploy the Pulse Ground Station in true client server fashion. It also incorporates an improved rotor tuning algorithm with more user control and improved visuals. A companion tablet application is also being developed for at-aircraft HUMS functionality.

For additional information:

100 Panton Road, Vergennes, VT 05491 U.S.A.
Tel: +1 802 877 4000
Fax: +1 802 877 4111

This document does not contain any export controlled technical data.

utcaerospacesystems.com

4223E LIT 2/2016 © Simmonds Precision Products, Inc., 2016