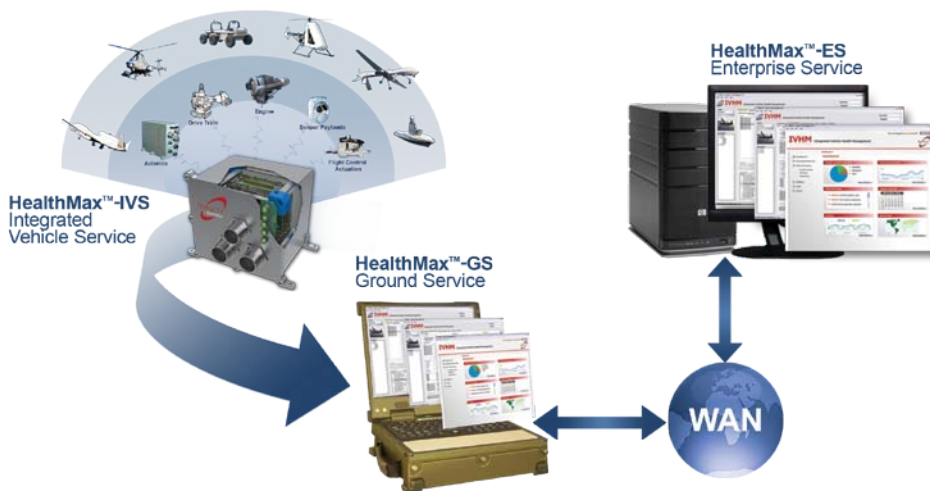


HealthMax™ - Integrated System Health Management for Unmanned Vehicles



Provides real-time health assessments of critical subsystems on unmanned air, sea, and surface vehicles

Impact Technologies, LLC has developed HealthMax™, an Integrated System Health Management (ISHM) solution capable of providing real-time health assessments of critical subsystems on unmanned air, sea, and surface vehicles. The three-part system has been developed to acquire component and vehicle level analog and digital data during system operation, and process this data into knowledge of the health and capability of mission, flight, and safety critical systems and subsystems. These health assessments are then supplied to personnel via local and enterprise level ground based elements to support optimal management of the vehicles' operations, maintenance, and logistics activities by providing advanced warning of developing failures and specific corrective action recommendations.



Benefits:

Military/Civilian Customer

- Improved Mission Reliability
- Increased Time on Station
- Increased Readiness
- Total Asset health Visibility
- Lower Total Ownership Cost

OEM Customer

- Supports Performance-based Logistics
- Provides Valuable Lead-time
- Supports Increased Vehicle Reliability
- Supports Vehicle Improvement
- Provides Your Customer with Greater Value

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Headquarters New York Office

200 Canal View Boulevard
Rochester, NY 14623
Phone: 585.424.1990
Fax: 585.424.1177

Pennsylvania Office

270 Walker Drive, Suite 200W
State College, PA 16801
Phone: 814.867.5122
Fax: 814.867.7550

Georgia Office

75 Fifth Street NW, Suite 312
Atlanta, GA 30308
Phone: 404.526.6188
Fax: 404.526.6189

Low Cost, Highly Capable, Embeddable Data Acquisition and Processing

HealthMax™-IVS Integrated Vehicle Service

Inputs

Digital Data

- BIT, Telemetry
- Ethernet, RS232 / 422 / 485, 1553

Analog Data

- High bandwidth IEPE
- Voltage, Current
- Tachometer, Torque
- Strain



Outputs

Health Features

- Max/Min
- Bias
- RMS
- Kurtosis
- etc...

Failure Modes

- Bearing Fatigue
- Gear Tooth Crack
- SFC High
- etc...

Subsystem Health Coverage

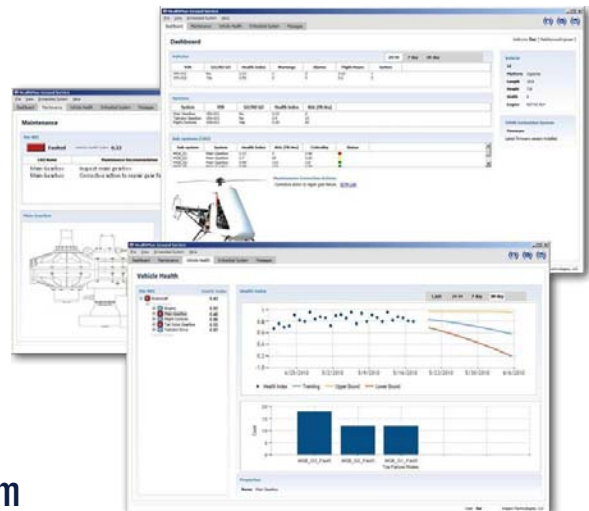
- Sensor Validation
- Engine
- Oil & Debris Contamination
- Flight Control Surfaces
- Drive Train Components
- Avionics
- Weight on Wheels

Integrated Vehicle Service (IVS)

- Lightweight and ruggedized on-board in-situ acquisition and processing
- Analog and digital data acquisition
- High bandwidth alias-free acquisition
- Supports IEPE, current, and voltage type transducers
- Multiple health module configurations available
 - *Base Level*
 - Generic data driven modules, plug-n-go
 - *Gold Level*
 - Physics of failure domain specific modules
 - *Custom*
 - Allows tailoring of the solution software package

Ground Services (GS)

- Health assessments support the local user
- Immediate access to information needed to maintain availability and expedite turn-around
- Local software application operating on ruggedized laptop computer
- Client installation supported by ClickOnce for centralized installation and updates
- Remaining useful life assessments provided for degrading components
- Supports enhanced health data viewing and analysis capabilities
- Pushes firmware and OS updates to the IVS for easy system upgrades
- Pushes vehicle health data to the ES

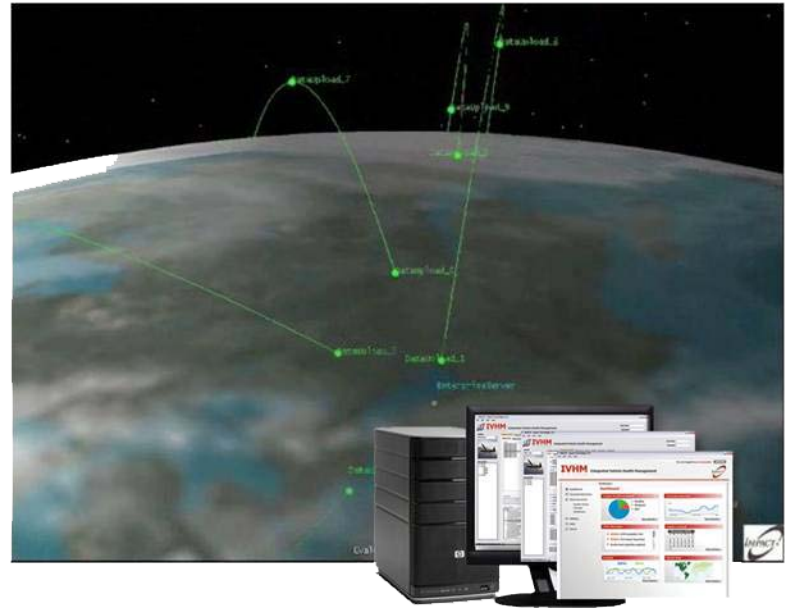


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Enterprise Service (ES)

- Web service
- Receives data from geographically dispersed systems of UVs
- Fleet-wide perspective to analyses and reports
- Fleet-wide data repository for unmanned systems monitored by HealthMax™
- Database designed using open standard architecture [i.e. OSA-CBM]
- Synchronizes data transfer between client installation and enterprise systems
- Automatic IVS and GS software update management for single source system maintenance
- Interface with external enterprise resources



Fleet-Wide Health Availability Summaries

Module	Application	Configuration		
		Base	Gold	Custom
FirstCheck™	Sensor data validation	✓	✓	Select any Suitable Combination (Some modules have dependencies)
SignalPro™	Sensor data validation, engine performance, actuation, APU, pumps, alternators & generators, system-wide, vehicle-wide	✓	✓	
ReasonPro™	Model-based health and maintenance reasoning	✓	✓	
ImpactEnergy™	Bearings in engines, gearboxes, transmissions, carrier bearings, pumps, alternators & generators, APU		✓	
GearMod™	Gears in engines, gearboxes, transmissions, driveline		✓	
GearMod™ Shaft	Shafts in gearboxes, transmissions, driveline		✓	
Drive-IR	Inference reasoner for driveline components		✓	
ClutchGuard™	Clutch elements in driveline, accessories, etc.		✓	
CAHM™	Electromechanical control actuator health management		✓	
CAA	DC electric motor current asymmetry analysis		✓	
PS-PHM	Power supply PHM		✓	
C-PASS™	Continuous power assurance		✓	
SmoothRide	Rotor Track and Balance		✓	