



Mechanical and Fluid Systems

# Solenoid Valve Health Monitoring System (SVHMS)

Remotely Monitor the Health of Solenoid Valves

The National Aeronautics and Space Administration (NASA) seeks to license its Solenoid-Controlled Valve Health Monitor system. Developed at the John F. Kennedy Space Center (KSC) to remotely monitor the health of solenoid valves, this sensor can help lower operational costs and increase reliability by predicting valve failures before they occur. The system monitors solenoid performance by comparing the electrical current profile of each solenoid actuation to a typical current profile. The complete system contains the health-monitoring software, smart current signature sensors, and modules for signal acquisition, signal conditioning, power supply, and calibration.

## Status

- ➔ Free Technology

## BENEFITS

- ➔ Tracks the electrical and mechanical health of solenoid valves
- ➔ Proprietary algorithms evaluate recorded current signatures
- ➔ Trends valve performance
- ➔ Predicts valve failures prior to occurrence
- ➔ Allows for informed preventative maintenance

technology solution



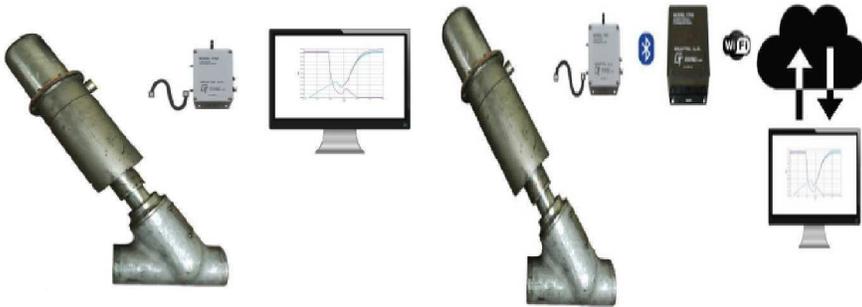
## THE TECHNOLOGY

The Solenoid-Controlled Valve Health Monitor was designed to reduce the cost of maintenance for solenoids, which are widely used at KSC. The system measures and analyzes steady state and transient components of the magnetic field and, indirectly, the electric current in a solenoid valve during normal operation. It enables continuous monitoring of the integrity and operational status of solenoid valves without the need for interrupting their operation to conduct frequent inspections. The system can warn of imminent solenoid valve failures so that preventive repairs can be performed.

The sensor exploits the fact that unique characteristics (signatures) of the solenoid current, especially current transitions when the solenoid is turned on or off are affected by electrical and mechanical deterioration of the solenoid and its valve parts. Current signatures include characteristic peaks and valleys that repeat at well-defined times during every operating cycle and have well-defined magnitudes and shapes. As electrical or mechanical deterioration occurs, the peaks and valleys change both in time and magnitude; these changes can indicate potential trouble.

The Solenoid-Controlled Valve Health Monitor learns what a good signature looks like from good solenoid valves in specific applications. When future signatures are collected, they are compared against the archived good signatures and the current valve's condition can be determined and reported based upon its learned behavior and proprietary algorithms.

This technology has been exclusively licensed and is available @ <https://www.gtwlabs.com>



Local Recording

Remote Recording

## APPLICATIONS

The technology has several potential applications:

- Technology may be utilized in any application that employs solenoid valves
- Handheld Recording; Transducer is non-intrusively attached to the solenoid valve
- Local Recording; Transducer and Field Recorder are permanently attached to the solenoid valve
- Remote Recording

## PUBLICATIONS

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National Aeronautics and Space Administration

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