



John F. Kennedy Space Center's Solenoid-Controlled Valve Health Monitor



BENEFITS

- Self-contained
- Noninvasive
- Identifies specific solenoid valve problems
- Automatically corrects output errors caused by changes in environmental temperature
- Notifies users when out-of-specification conditions are detected

opportunity

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.

APPLICATIONS

- Emergency power equipment in nuclear power plants, airport control towers, hospitals, and large data centers that require smart monitoring
- Aircraft and aerospace systems that provide emergency power switching to detect near-failure critical solenoids
- Quality control of flight-critical aerospace components manufactured for end users

TECHNOLOGY STATUS

- Patent pending
- U.S. patent No. 6,917,203
- Copyrighted
- Available to license
- Available for no-cost transfer
- Seeking industry partner for further codevelopment

Technology Details

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.

Partnership Opportunities

NASA has been issued a U.S. patent for the Solenoid-Controlled Valve Health Monitor and is seeking licensees for the patent. All NASA licenses are individually negotiated with the prospective licensee, and each license contains terms concerning commercialization (practical application), license duration, royalties, and periodic reporting. NASA patent licenses may be exclusive, partially exclusive, or nonexclusive. If your company is interested in the new Solenoid-Controlled Valve Health Monitor, or if you desire additional information, please refer to Case Number KSC-12220 and contact:

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