Valve Health Monitoring System Utilizing Smart Instrumentation for Real Time and Historical Data Tracking

A valve health monitoring system that includes sensors and data-acquisition, wireless data-communication, and data-processing subsystems has been developed as a means of tracking both real-time and historical information indicative of deterioration in the mechanical integrity and performance of a high-geared ball valve or a linearly actuated valve that operates between cryogenic and ambient temperatures. This system can stand alone or can be incorporated into a network that is part of a higher-level "health-management system.

Benefits

Compact Size: Each sensor unit is encapsulated in a small package that can be mounted within confined locations.

***Data Logging*:** Data events are logged and time stamped for data synchronization within one millisecond. This enables alignment with events on other systems such as high speed data acquisition and high speed cameras.

System Design: The system is designed for a Class 1 Division II explosive environment. The units are monitored to safeguard against outside temperature limits, and are potted in a fire retardant substance devoid of cavities that could potentially confine hydrogen gas.

Smart Communication: The system implements one-way communication which increases power conservation within the sensor unit while still maintaining accurate and reliable data transfer. This enables the sensor unit to establish connectivity only when necessary, eliminating continually powering a receiver.

***Monitoring*:** The monitoring system targets identified data events associated with degraded valve performance and failure. This reduces the massive amounts of data accumulation, and alleviates issues with data storing, transmitting and interpretation.

The Technology

This valve monitoring system is a new integrated electronic technology, in the form of a smart sensor, organized into a data tracking system which provides a method of implementing a valve health monitoring system that can be used for managing valve maintenance and failures. The system also provides insight into valve duration and failure prediction; the unit does this by performing data tracking, and then identifying and archiving degraded performance. The data collection types include: cryogenic valve cycles, total valve cycles, inlet temperature, outlet temperature, valve body temperature, torsional strain, linear bonnet strain, valve preload position, total valve travel, and total directional changes. Events associated with these data collection types are recorded. Each event is time stamped, and then organized into a text file and stored in a compact flash memory card for database upload capability. It also includes an interface port for onboard programming and serial communication. The units are optimized for low power consumption, and for extended operational durations without maintenance. The utilization of this system is intended to aid in the prediction of valve failures associated with high geared ball valves and linear actuated valves; however, the utility is not limited to those valve types.

Commercial Opportunity

The system can be utilized in commercial applications that require long term monitoring for events associated with different types of strain, cryogenic temperatures, ambient temperatures, limit switches, 4-20 milliamps signals, 0-10 volt signal and magnetic fields.. For more information go to: https://quicklaunch.ndc.nasa.gov/

Commercial Applications

Automotive Industry Cryogenics
Petroleum Industry Chemical Industry

For More Information

If you are interested in pursuing commercialization of this technology or require more information, please contact the:

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