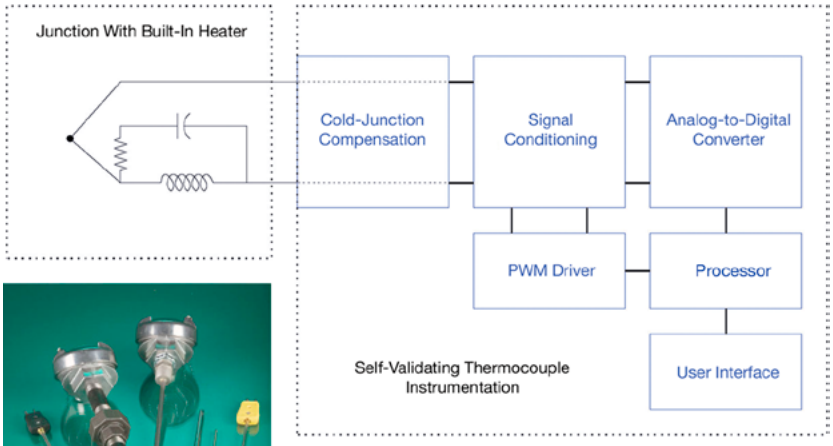
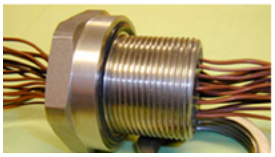
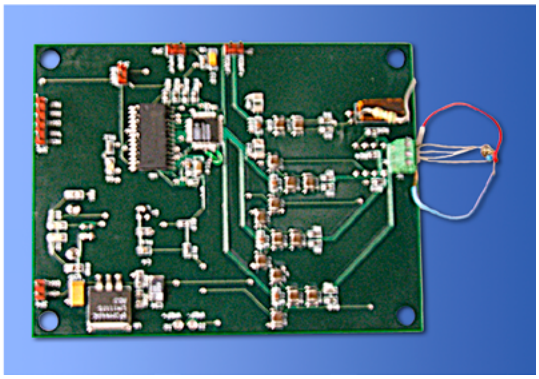
John F. Kennedy Space Center's Self-Validating Thermocouple







The National Aeronautics and Space Administration (NASA) seeks to license a Self-Validating Thermocouple (SVT). The concept of self-validating sensors, specifically those of thermocouples, has been investigated for many years. The advantage of this technology is that it can continuously monitor and validate sensor measurements to determine their health. Developed at Kennedy Space Center (KSC), the SVT is capable of detecting thermocouple probes open circuits, short circuits, and unnoticeable faults such as probe de-bonding and probe degradation. The SVT differentiates between bonded and de-bonded conditions and provides cold-junction compensation so that the most common types of thermocouples, such as T, K, J and E, can be used.

BENEFITS

- Eliminates redundant thermocouple measurements
- Saves on operations and maintenance costs
- Maximizes failure-detection capabilities
- Provides valid and reliable data automatically or by request
- Can be used with common thermocouple types

opportunity

APPLICATIONS

- Food, beverage, and drug
- Semiconductor manufacturing
- Military/aerospace
- Power utilities
- Glass manufacturing
- Plastic injection molding
- Residential appliance operation

TECHNOLOGY STATUS

- ☑ Patent pending
- ☑ U.S. patent No. 7,841,771
- ☐ Copyrighted
- ☑ Available to license
- ☐ Available for no-cost transfer
- ☐ Seeking industry partner for further codevelopment

Technology Details

The most common causes for thermocouple measurements failure are related to the physical bonding between the sensor element and the surface it is attached to. The SVT detects open or short faults and identifies the degradation of the thermocouple as well as its bonded or de-bonded state. The design uses an integrated approach by combing real-time measurement/analysis, statistical tools, and advanced circuit design to effectively determine the sensor measurements and health to correct the state of the system. The SVT instrument is composed of a cold-junction compensator, signal conditioner circuitry, thermocouple excitation, PWM, A/D converter, a processor, power, and a USB interface.

Partnership Opportunities

NASA has been issued a U.S. patent on the Self-Validating Thermocouple technology and is seeking licensees of the patent. NASA has the authority to grant licenses on its domestic and foreign patents and patent applications pursuant to 35 U.S.C. 207-209. NASA has implemented this authority by means of the NASA Patent Licensing Regulations, 37 CFR § 404. 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 Self-Validating Thermocouple technology, or if you desire additional information, please reference Case Number KSC-12875 and contact:

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