

ponent interface and functional verification. ODySSy further provides the capability for on-orbit support in the form of autonomous mission planning and fault protection.

Modular C&DH FSW based on the architecture described in this tech brief

was successfully demonstrated on-orbit as part of the United States Air Force Academy's FalconSat-5 technology demonstrator spacecraft, which launched in November of 2011. This flight program clearly demonstrated the benefits of the modular FSW approach, including built-

in test via ODySSy, throughout the lifecycle of the FalconSat-5 spacecraft.

This work was led by John Cuseo of Advanced Solutions, Inc. for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16054-1

In-Situ Wire Damage Detection System

John F. Kennedy Space Center, Florida

An In-Situ Wire Damage Detection System (ISWDDS) has been developed that is capable of detecting damage to a wire insulation, or a wire conductor, or to both. The system will allow for real-time, continuous monitoring of wiring health/integrity and reduce the number of false negatives and false positives while being smaller, lighter in weight, and more robust than current systems. The technology allows for improved safety and significant reduction in maintenance hours for aircraft, space vehicles, satellites, and other critical high-performance wiring systems for industries such as energy production and mining.

The integrated ISWDDS is comprised of two main components: (1) a wire with

an innermost core conductor, an inner insulation film, a conductive layer or inherently conductive polymer (ICP) covering the inner insulation film, an outermost insulation jacket; and (2) smart connectors and electronics capable of producing and detecting electronic signals, and a central processing unit (CPU) for data collection and analysis. The wire is constructed by applying the inner insulation films to the conductor, followed by the outer insulation jacket. The conductive layer or ICP is on the outer surface of the inner insulation film. One or more wires are connected to the CPU using the smart connectors, and up to 64 wires can be monitored in real-time.

The ISWDDS uses time domain reflectometry for damage detection. A

fast-risetime pulse is injected into either the core conductor or conductive layer and referenced against the other conductor, producing transmission line behavior. If either conductor is damaged, then the signal is reflected. By knowing the speed of propagation of the pulse, and the time it takes to reflect, one can calculate the distance to and location of the damage.

This work was done by Martha Williams, Luke Roberson, Lanetra Tate, and Trent Smith of Kennedy Space Center; and Tracy Gibson, Pedro Medelius, and Scott Jolley of ASRC Aerospace Corporation. For more information, contact the Kennedy Space Center Innovative Partnerships Office at 321-867-5033. KSC-12866