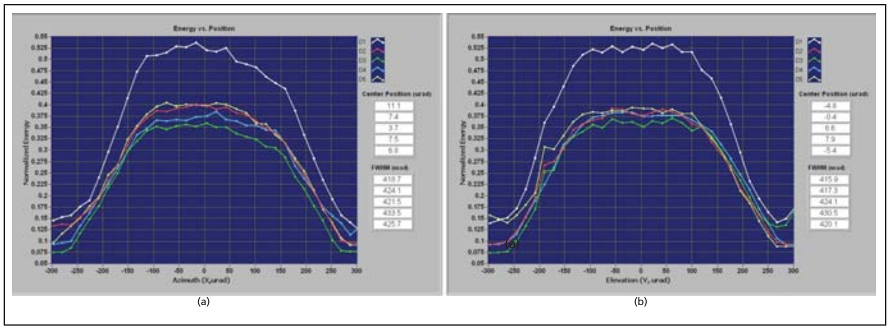

Fig. 2. **LOLA Laser 1 S/C Level Boresite Alignment Test Results**: (a) X-Axis, (b) Y-Axis.

flector (LTR) to flip the transmitter laser beam by exactly 180° into the receiver telescope, a set of motorized and computer-controlled Risley prisms to scan the transmitter laser beam across the receiver FOV in a controlled and measurable fashion, and a set of parallel plate neutral density (ND) filters to attenuate the output laser beam by several orders of magnitude to a receiver-safe level.

The target assembly is compact, modular, accurate, and easy to use. The target assembly itself is alignment insensitive, so no special care needs to be taken in placing the target assembly in front of the instrument under test other than making sure that the transmitter laser beam is not vignetted at the target assembly entrance aperture. In addition, sealing the transmitter path to the target assembly input aperture is usually required to prevent stray light from saturating or damaging the sensitive receiver detector(s) of the instrument under test. The target assembly components can be easily changed to customize the target assembly for any required active sensor co-alignment measurement task.

This work was performed by Luis Ramos-Izquierdo, V. Stanley Scott, Haris Riris, and John Cavanaugh of Goddard Space Flight Center, and Peter Liiva and Michael Rodriguez of Sigma Space Corporation. Further information is contained in a TSP (see page 1). GSC-15789-1

Virtual Sensor Test Instrumentation

This technology has application in wireless RFID systems.

Stennis Space Center, Mississippi

Virtual Sensor Test Instrumentation is based on the concept of smart sensor technology for testing with intelligence needed to perform sell-diagnosis of health, and to participate in a hierarchy of health determination at sensor, process, and system levels. A virtual sensor test instrumentation consists of five elements: (1) a common sensor interface, (2) microprocessor, (3) wireless interface, (4) signal conditioning and ADC/DAC (analog-to-digital conversion/digital-to-analog conversion), and (5) onboard EEPROM (electrically erasable programmable read-only memory) for metadata storage and executable software to create powerful, scalable, reconfigurable, and reliable embedded and distributed test instruments. In order to maximize the efficient data conversion through the smart sensor node, plug-and-play functionality is required to interface with traditional sensors to enhance their identity and capabilities for data processing and communications.

Virtual sensor test instrumentation can be accessible wirelessly via a Network Capable Application Processor (NCAP) or a Smart Transducer Interlace Module (STIM) that may be managed under real-time rule engines for mission-critical applications.

The transducer senses the physical quantity being measured and converts it into an electrical signal. The signal is fed to an A/D converter, and is ready for use by the processor to execute functional transformation based on the sensor characteristics stored in a Transducer Electronic Data Sheet (TEDS). Virtual sensor test instrumentation is built upon an open-system architecture with standardized protocol modules/stacks to interface with industry standards and commonly used software. One major benefit for deploying the virtual sensor test instrumentation is the ability, through a plug-and-play common interface, to convert raw sensor data in either analog or digital form, to an IEEE 1451 standard-based smart sensor, which has instructions to program sensors for a wide variety of functions. The sensor data is processed in a distributed fashion across the network, providing a large pool of resources in real time to meet stringent latency requirements. Advantages of deploying the virtual sensor test instrumentation include:

- Simplification of troubleshooting through HTML/XML-based Health Monitoring that allows the user to verify all sensors via a graphic user interface.
- Cost reduction for set-up and tear-down through sensor auto detection.
- Elimination of recalibration when replacing sensors. The data acquisition system can recalibrate itself through TEDS.
- Elimination of large lengths of analog wiring through a radio frequency module.
- Reduction of installation, maintenance, and upgrade costs of measurement and control systems through Web-based TEDS server.
- Increased opportunity to add intelligence to sensors through embedded EEPROM.

This work was done by Ray Wang for Stennis Space Center.

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