Aerospace

FARO Laser Tracker used in NASA's Ares I Project

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Space exploration has fascinated humans for centuries. In 1969, the world watched in amazement as man first landed on the moon. Since 1981, NASA has been traveling into space using the Space Shuttle (officially called the Space Transportation System, or STS). Each shuttle was originally designed for a lifespan of 100 launches or 10 years of operational life. In 2010, the Space Shuttle is planned to be retired from service and will later be replaced by the Orion crew exploration vehicle. Making its first flights to the International Space Station by the middle of the next decade, Orion is part of the Constellation Program which will send human explorers back to the moon, and then onward to Mars and other destinations in the solar system.

Future astronauts will ride into orbit on Ares I, which uses a single five-segment solid rocket booster, a derivative of the Space Shuttle's solid rocket booster. In 2009, NASA's first test flight is planned to launch. This test flight, called Ares I-X, will provide NASA with an early opportunity to test and prove the hardware, facilities and ground operations associated with the Ares I crew launch vehicle. Data collected will begin to confirm the vehicle as a whole is safe and stable in flight before astronauts begin traveling into orbit.

NASA Langley Research Center, located in Hampton, Virginia, is facilitating the build-up of the Ares I Crew Module, the Launch Abort System and the Separation Ring Assembly. With the high accuracy requirements when building these items, the Research Center has turned to laser tracker technology. Laser trackers are recognized in the aerospace industry for their portability, ease-of-use and their ability to achieve extremely high accuracy levels. The demand for this technology is continuing to increase as people realize how integrating laser trackers into their processes increases accuracy, facilitates build routines and provides real-time data acquisition. For Ares I-X, the FARO Laser Tracker is an integrated part of the fabrication process to assure the accuracy of the final product.

The Research Center chose the FARO Laser Tracker due to its cost, portability and accuracy. "We already had certain expectations for what laser trackers should be able to do," said Pete Veneris, Quality Assurance Specialist at NASA Langley Research Center. "We are pleased with the FARO Laser Tracker's compact and lightweight tracking head that is quick to set up and to relocate. Also, the unit's ability to immediately connect to the beam after it has been broken is a real time saver."

From beginning to end the Laser Tracker has facilitated the establishment of the most accurate Flight Test Article (FTA) possible. In the beginning, precision layouts on large surface tables were essential to aligning the large build components of the Launch Abort System (LAS). During the installation of permanent fasteners, the Laser Tracker was used to monitor any movement in the parts and help technicians maintain critical tolerances that were on the engineering drawings. On the Crew Module (CM) upper bulkhead assembly, the Laser Tracker was used for critical template alignments. These templates assured the holes were accurately aligned so that the CM and LAS would fit together correctly when the time came to mate the two pieces of hardware together.

Another key use of the Laser Tracker is in establishing a model coordinate system that is an exact replica of the engineering CAD model. This makes the use of build points possible where large parts of the structure can be tweaked into the correct alignment system with other existing FTA components. Spatial Analyzer Software worked flawlessly for the FARO Laser Tracker in helping to effectively manage the entire buildup of the Ares I-X CM LAS.

"Traditional methods of checking and aligning parts on large structures such as Ares I-X are still used, but the Laser Tracker technology has established itself as the main quality tool for the job," said Veneris. "Everything else is secondary. In the end, the official build procedures were verified with the Laser Tracker."