

# Laser Tracker System Calibration Standard

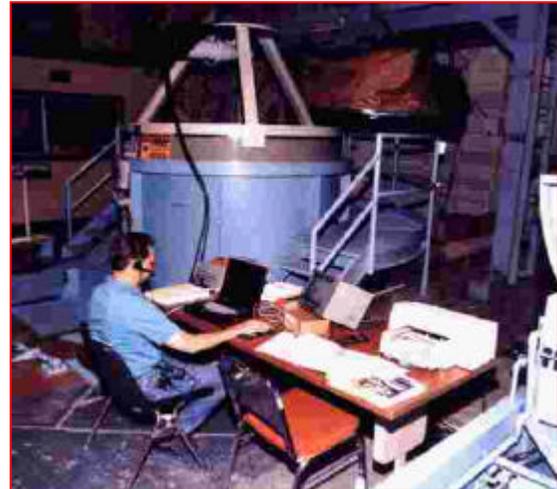
NWAS has teamed with the National Institute of Standards and Technology (NIST) on developing a new Laser Tracker System Calibration Standard (LTSCS). The NAVSEA Metrology R&D Program supports the research and development for this standard. This is a laser-based spherical coordinate measuring device for large-scale measurements used in the aircraft, shipbuilding, and manufacturing industries. However, there is no national standard to quantify system accuracy and provide a basis for comparison of the laser systems currently in use. The standard will consist of a set of physical artifacts used to conduct numerous measurements, which will be analyzed by an uncertainty verification software program. The national performance standard developed by the American Society of Mechanical Engineers will implement this calibration standard.



**Figure 1** LTSCS with beam rail artifact

NWAS was directed by Strategic Systems Program (SP22) to find an accurate method for the measurement of missile and launch tubes in support of the Trident D5 Back-fit Program. SP22 has a concern that some of the missile tubes might be deformed due to ovalization caused by the deep dives the submarines have endured. NWAS selected the Leica LTD500 laser tracker system as the most effective method to complete these measurements. In proofing the system

NWAS has already conducted measurements of Trident D5 launch tubes aboard the U.S.S. Tennessee (SSBN 734) and at the Northrop Grumman Marine System (NGMS) facility.



**Figure 2** Trident D5 Launch Tube Measurement at NGMS



**Figure 3** In a launch tube of the U.S.S. Tennessee

This new calibration standard will enable NWAS to quantify uncertainty in future measurements of missile and launch tubes by taking into account the effects of environmental factors, such as temperature, humidity, and vibration. NAVSEA will benefit from plans to expand the use of the laser tracker in future measurements of large-scale objects.