

i am an INNOVATOR



National Aeronautics and
Space Administration



When WSTF borescope inspections of flight composite overwrapped pressure vessels (COPVs) indicated ripples in the liner, it became a “flight constraint” to STS-117. It had to be proven that no liner buckles existed that would fatigue and cause an orbiter COPV to fail during the mission. Regor Saulsberry, NDE (nondestructive evaluation) Projects Manager at White Sands Test Facility, worked with the Laser Techniques Company and in just 9 days designed and built a laser interior profilometer that was used to precisely map the vessel interior including ripple magnitude and period. Using this data, the constraint was cleared without flight impact. In an effort to reduce COPV variability, Saulsberry coordinated with the NASA NDE Working Group and developed a laboratory profilometer to inspect COPVs to help determine mechanical response. This highly successful effort has provided data never before obtained on liner changes that occur with wrapping and autofrettage. Based on the success of the laboratory system, external profilometer capability was added as well as external eddy current (EC) scanning, which inspects liners for cracks. These capabilities have produced outstanding NDE tools that support the manufacturing process from the bare liner to the accepted COPV. An additional laser profilometer has been developed that uses an articulated laser head, which allows it to inspect COPVs with ellipsoid heads. Many applications of the new systems are planned. The new articulated sensor system will be applied to the 55-in. long Orion fuel/oxidizer gaseous helium bottles and possibly other vessels, such as the International Space Station Nitrogen and Oxygen Recharge System. A project is also just starting using the EC sensor for development of sensitive new scanning processes for inspection of COPV liners used in critical NASA and industry applications.