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SHUTTLE SUPER LIGHTWEIGHT FUEL TANK COMPLETES TEST SERIES

A new super lightweight external tank for the Space Shuttle achieved a major milestone this week with the completion of a certification test series at NASA's Marshall Space Flight Center, Huntsville, AL.

The Aluminum Lithium Test Article, a full-scale but shortened version of the external tank's new aluminum lithium hydrogen tank, underwent structural verification tests that simulated the launch environment. This testing verified the integrity of the redesigned hydrogen tank by exposing the test article to loads and pressures the external tank experiences at liftoff, as well as while it is unpressurized on the launch pad, and when the solid rocket boosters separate from the Shuttle.

"This is a significant accomplishment for the Super Lightweight Tank Program," said External Tank Project Manager Parker Counts. "The success of this test series can be directly attributed to the hard work of many dedicated individuals, both at Marshall and at Lockheed Martin at the Michoud Assembly Facility in Louisiana. They can be very proud of this accomplishment."

"With the completion of this test series we have verified the structural integrity of the new orthogrid design changes and the new aluminum lithium material implemented on the hydrogen tank. We also have cleared all constraints for proceeding with the first flight super lightweight tank acceptance test," Counts said.

The super lightweight tank is constructed of aluminum lithium which is a lighter, stronger material than the metal alloy currently used in the production of the Space Shuttle's external tank. The new tank's structural design also will be changed. Taking advantage of the high strength, lower density properties of aluminum lithium, the walls of the hydrogen tank will be manufactured in an orthogonal waffle-like pattern. The new external tank will be the same size as the current one, but will be 7,500 pounds lighter.

While the test article is only 40 feet long, compared to the 154-foot length of an external tank, its diameter of 27 feet is the same. The two major changes that were implemented into this test article were the orthogrid barrel panels and the aluminum lithium material. The single section

test article replicates design enhancements that are built into all four of the sections that make up the new liquid hydrogen tank.

"Each pound we can take from the external tank is one more pound we can take to orbit. This becomes especially important when launching the international Space Station into its proper orbit in 1997," Counts said.

With the certification portion of the test series completed, the test article now will undergo a series of capability tests. This includes testing the article to the point of failure, which provides engineers data about the ultimate capability of the tank. While these final capability tests are not required to certify the tank for flight, they will provide engineers with a wealth of data about the tank's structural capability beyond what is required for flight.

The Shuttle's current external tank as well as the new Super Lightweight Tank are manufactured by Lockheed Martin Corp. The tank contains the liquid hydrogen and liquid oxygen propellants consumed by the Shuttle's three main engines during launch. The External Tank Project is managed for the Space Shuttle program at Marshall.

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