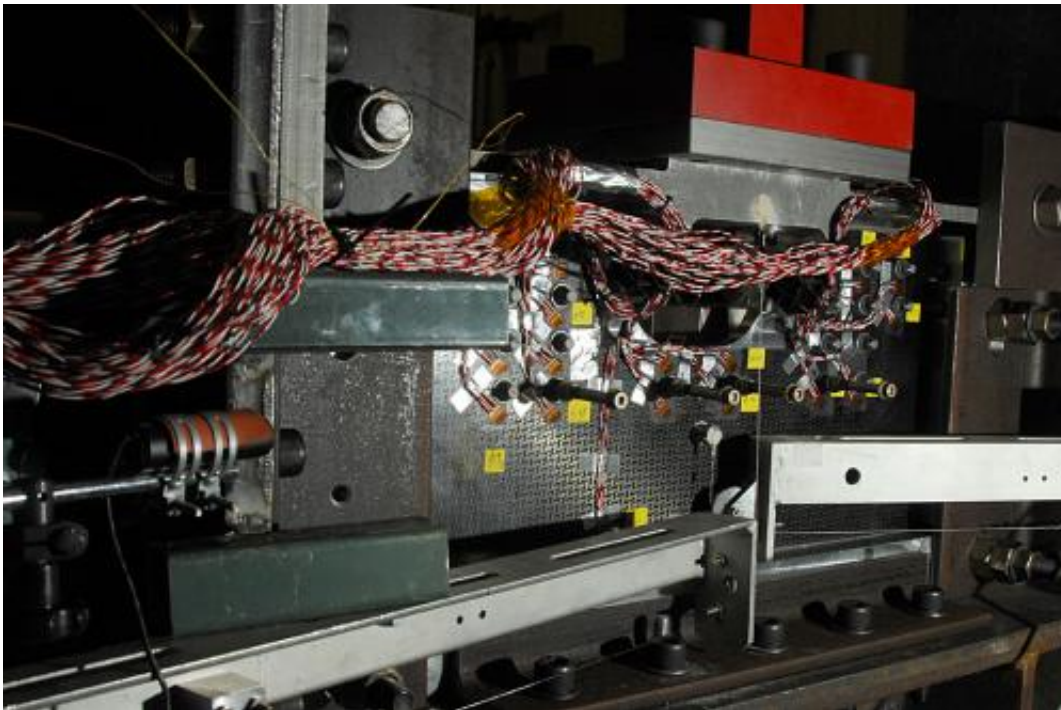


NASA conducts tests on Orion service module

May 11 2012, By Kim Newton



Load-withstanding capabilities of the Orion service module's conical adapter joint are tested at Marshall's Material Environment Test Complex facility. The test was successfully completed in March. Credit: NASA/MSFC

(Phys.org) -- Engineers at NASA's Marshall Space Flight Center are testing parts of the Orion service module to ensure the spacecraft can withstand the harsh realities of deep space missions.

To date, Marshall has completed two structural loads tests, and another is

under way. Structural loads tests prove the structural performance or material behavior of a design as weight is applied to it. Most of the time, the allowable weight is exceeded to test the material at [extreme conditions](#) to verify the tolerance of the material or design.

"Marshall was called upon to assist since we had the necessary test facilities and experienced team that could move out quickly to take on these very complex tests," said Scott Chartier, a test engineer in Marshall's Propulsion Systems Test Branch. "We were able to save time and [budget](#) since we had the facilities Orion needed and they didn't have to build a duplicate test facility."



From left, Jeremy Kelly, Wes Lawler and Dani Davis, all Lockheed Martin Corp. test personnel, perform tests on the Orion manufacturing development article shear panel. Credit: NASA/MSFC

To date, development tests have been performed on key structural pieces of the Orion [spacecraft](#) called the shear panel and the conical adapter. Both of these pieces can be thought of as the skeleton of the Orion vehicle. These tests validated the design and manufacturing processes that will be used for Orion's [service module](#) and verified the load-bearing capabilities of the components.

"The shear panel and conical adapter joint achieved all load conditions, and no permanent or visual damage was observed after the tests," said Chartier. "In addition, the conical adapter was successfully taken to the maximum capability, which concluded the test series."



The Orion Ground Test Vehicle shows the Orion "skeleton" used for pathfinding operations in preparation for the Orion spaceflight test vehicle slated for NASA's Exploration Flight Test, or EFT-1, in 2014. Credit: NASA

The next set of tests will provide data that will be used for acceptance of the design and incorporated into the Orion Exploration Flight Test 1 (EFT-1). The results from these tests will be used to assess the materials and workmanship of the Orion service module's shear panels. The acceptance test is laying the groundwork for EFT-1, planned for 2014 that will launch an uncrewed Orion spacecraft on a Delta IV Heavy to an altitude of 3,600 statute miles above Earth -- a distance that has not been achieved by a craft intended for human flight since the Apollo missions. This test will ensure that several of Orion's systems, including the heat shield, can withstand a return to Earth from a [deep space](#) mission.

"We are excited to have the opportunity to do these structural tests at Marshall to help with NASA's Orion program," Chartier said. "It will help us get Orion to that first [test](#) flight."

The Orion spacecraft, managed by [NASA](#)'s Johnson Space Center in Houston, will be launched on missions by NASA's Space Launch System -- a heavy-lift launch vehicle that will provide an entirely new capability for human exploration beyond low-Earth orbit. Designed to be flexible for launching spacecraft for crew and cargo missions, SLS will expand human presence beyond low-Earth orbit and enable new missions of exploration across the solar system. SLS is managed by the Marshall Center.

Provided by JPL/NASA

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