MONTHLY ACCOMPLISHMENTS
February 2013

orion

ATK delivers inert launch abort motor for Exploration Flight Test-1

Alliant Techsystems, also known as ATK, successfully delivered the Exploration Flight Test-1 launch abort motor to Kennedy Space Center in Florida. The flight test abort motor is configured with inert propellant, since the EFT-1 mission will have no crew on board, but otherwise replicates the launch abort system that will ensure astronaut safety on future crewed Orion exploration missions using the new Space Launch System (SLS).

ATK's abort motor is part of Orion's Launch Abort System (LAS), which is designed to safely pull the Orion crew module away from the launch vehicle in the event of an emergency on the launch pad or during the initial ascent of NASA's SLS. Although an abort event is not necessary for the un-crewed mission, having an inert abort motor in the LAS stack for EFT-1 helps NASA achieve its goals simulating the same weight, structure and aerodynamics of the live motor configuration.

Successfully ground-tested in 2008 and flight-tested during Orion's Pad Abort test in 2010, the launch abort motor is more than 17 feet tall, measures 3 feet in diameter and includes a revolutionary turn-flow rocket manifold technology.

ATK also makes the Attitude Control Motor for the abort system at its Elkton, Md., facility. The control motor provides steering for the launch abort vehicle during an abort sequence.

Successful airdrop test

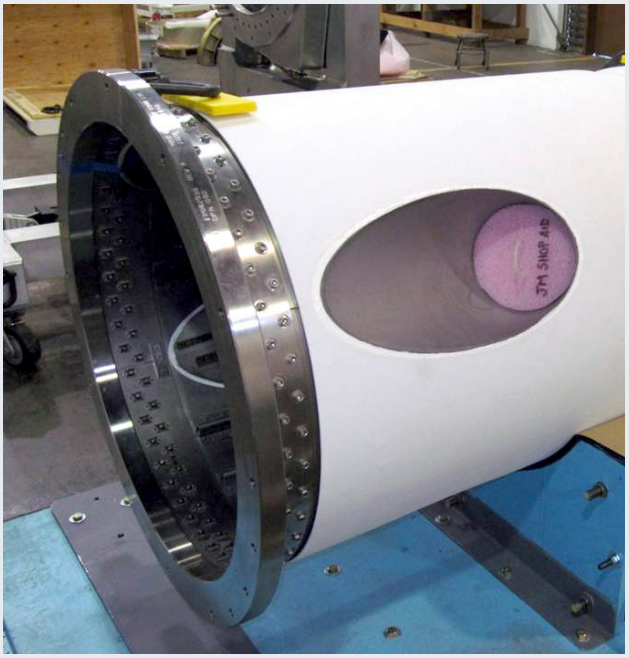
The Orion Crew Parachute Assembly System parachute team successfully conducted the fifth Parachute Compartment Drop Test Vehicle, or PCDTV-5, airdrop test in Yuma, Ariz., on Feb. 12. This was the first test that utilized the vehicle's full complement of parachutes. Engineers rigged the chutes so that only two of the three main parachutes would inflate, leaving the third to flag behind. The test demonstrated that the spacecraft could land safely if one of its three main parachutes fails to inflate during deployment. The next Parachute Test Vehicle test (PTV-4) will take place in early May.

Aerojet milestones pave way for Orion spacecraft's first Exploration Flight Test

Aerojet successfully completed fabrication of the jettison motor (pictured here) and recently shipped the first two Crew Module Reaction Control System (CM RCS) pod assemblies for NASA's Orion spacecraft's Exploration Flight Test-1 (EFT-1).

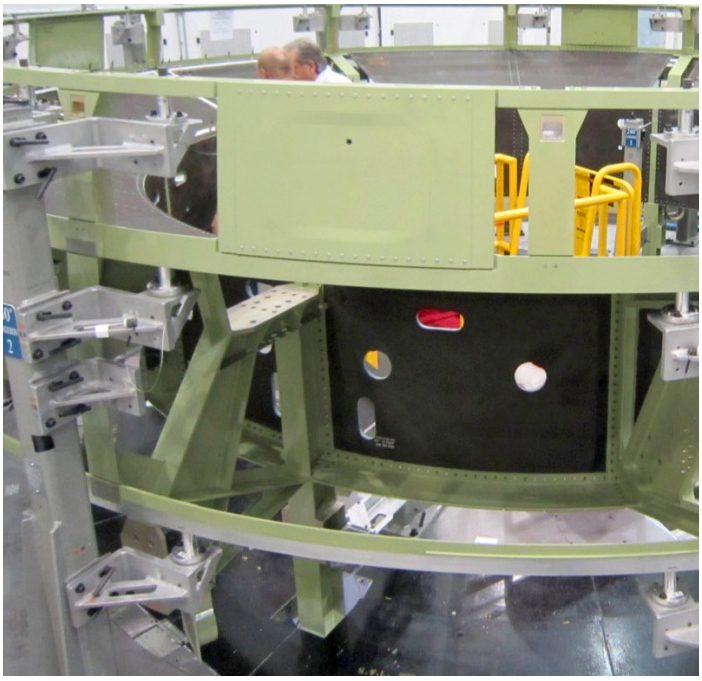
Aerojet's jettison motor will be the only active motor on the Launch Abort System (LAS) during the uncrewed EFT-1 flight, scheduled for 2014. It is required to jettison the LAS from the Orion crew capsule during the flight test's early ascent phase. EFT-1 will take Orion beyond low Earth orbit, to an altitude of about 3,600 miles above the Earth's surface, more than 15 times farther away than the International Space Station.

The EFT-1 jettison motor builds upon the successful motor static test efforts demonstrated on Development Motor-1 and Development Motor-2 at Aerojet's Sacramento, Calif., facility, as well as the successful Pad Abort 1 flight test conducted at NASA's White Sands Test Facility in May 2010.

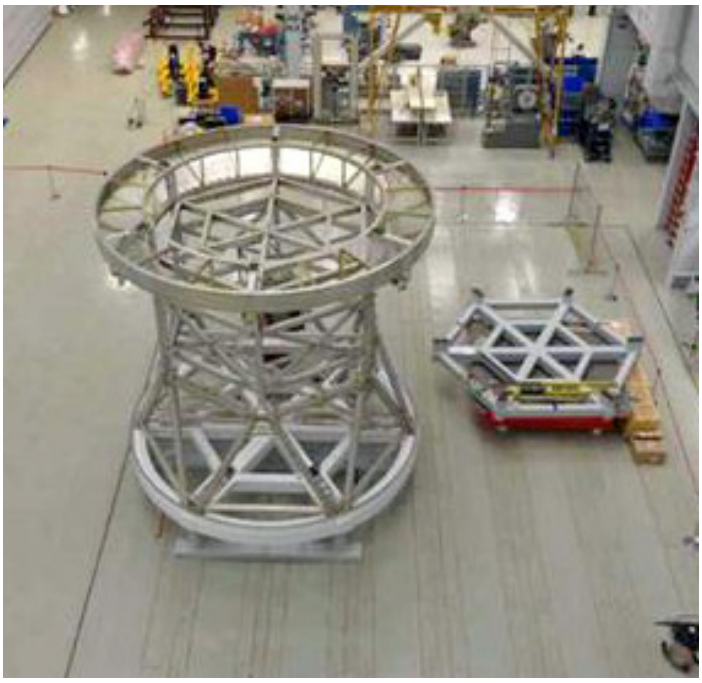


Along with progress on the LAS, Aerojet recently shipped EFT-1 crew module propulsion components to the Operations and Checkout Building at NASA's Kennedy Space Center. Aerojet's CM RCS pods provide the full complement of primary and redundant control required for critical maneuvers for a high-speed re-entry into the Earth's atmosphere.

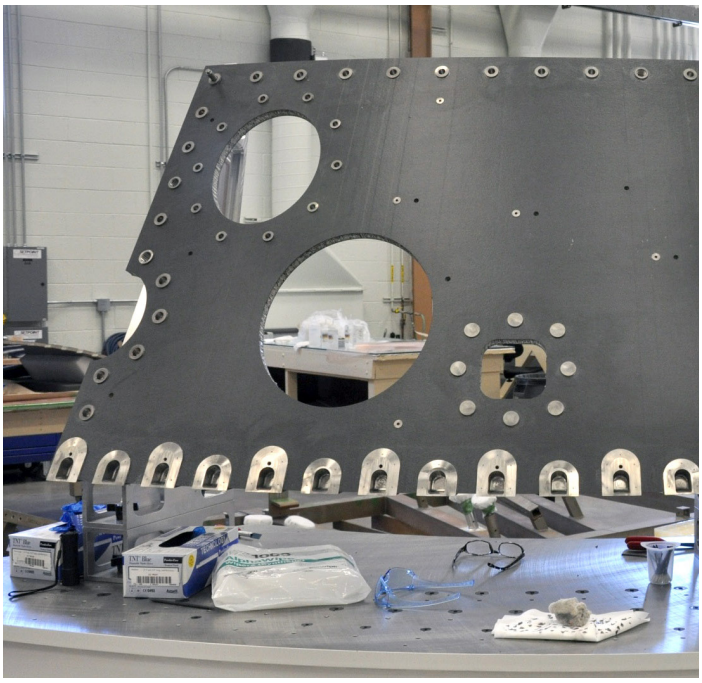
All six EFT-1 Service Module shear panels were fastened and ground test instrumentation wires and sensors were mounted on the shear web assembly tool in Kennedy Space Center's Operations & Checkout Building.



Fastening is complete on five of six EFT-1 Service Module forward wall panels. The final panel is on hold pending the installation of the avionics pallet. The pallet has arrived at Kennedy Space Center and is undergoing assembly work.



The fairing separation development test fixture was shipped to Lockheed Martin in Sunnyvale, Calif. Stiffness testing started on the structure at the end of the month and a modal test, which tests the structure in different modes of vibration, is scheduled for the end of March. The first separation test is scheduled for the first week in June.

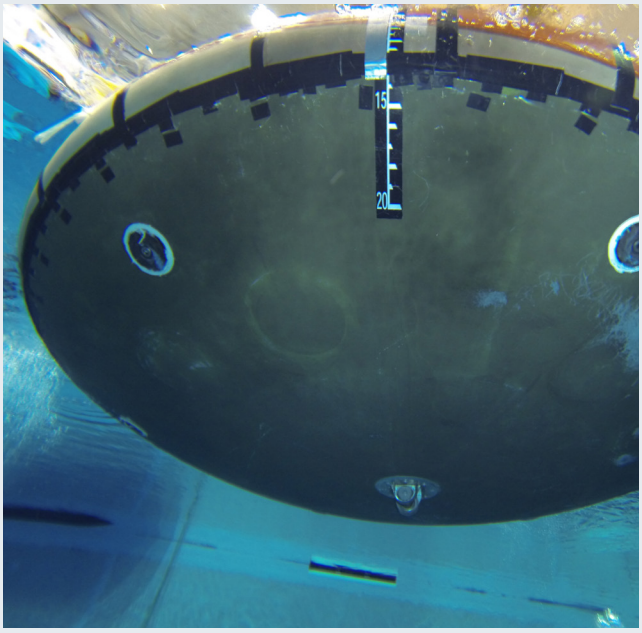


Three of the EFT-1 lower backshell panels are currently at Kennedy, and the other two will ship from Denver next week. Kennedy will conduct match drilling and fit checking prior to sending them back to Denver for static testing.

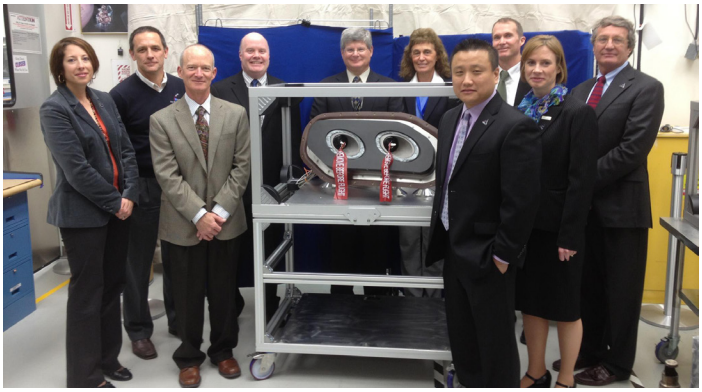
After injection of the liquid shim was completed on the EFT-1 heat shield structure in Denver, drilling began on the temporary fastener bolts. The fasteners are used to stabilize the assembly for the subsequent drilling of all skin/skeleton holes with the five-axis machine. The five-axis machining is used for complex shapes and high precision. Once complete, the structure will be transported by the Super Guppy Aircraft to Textron in Wilmington, Mass., for installation of the AvCoat ablative surface.

Orion landing and recovery training at Neutral Buoyancy Lab

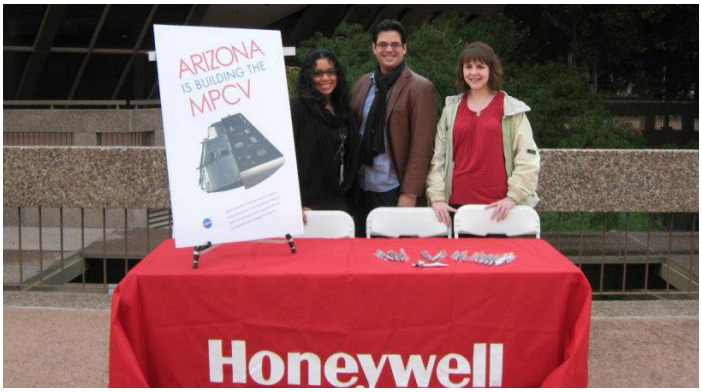
The Orion recovery team recently worked with U.S. Navy divers at Johnson Space Center's Neutral Buoyancy Lab to select imagery hardware and develop procedures for performing post landing inspections of the EFT-1 Crew Module after it lands in the Pacific Ocean. After returning to Earth at a speed over 20,000 miles per hour, Orion will be tethered and pulled into the well deck of a Navy ship for its trip back to dry land in Long Beach, Calif.



NASA astronaut Rex Walheim visited with Orion employees at Textron Defense Systems in Wilmington, Mass. Following the arrival of the heat shield at the facility in March, the team will install an Avcoat ablative material on the outer surface to protect the vehicle from the extreme temperatures during re-entry.



The Orion / Lockheed Martin team of Charlie Lundquist, Larry Price, Howard Hu, Stu McClung and Nujoud Merancy visited Orion suppliers in the Seattle, Wash., area including Aerojet (team shown standing in front of the EFT-1 crew module thrusters), General Dynamics, Janicki Industries, and Systima Technologies. The team also participated in outreach activities at the Seattle Museum of Flight, University of Washington, Bellevue College, Viewlands Elementary and an area AIAA event.



Members from Honeywell's Orion team in Arizona volunteered to help at several events supporting NASA's Destination Station exhibit during the Arizona SciTech Festival. The team participated in Geek Night Out in downtown Tempe; Destination Station at the Museum of Natural History Family Day in Mesa; Experiences in Orbit at Mesa Community College Planetarium; and Night of the Open Door at Arizona State University.

Orion Program Manager Mark Geyer discussed the status and accomplishments of the Orion program with Congressman Steve Stockman, Texas 36th district, and Congressman Randy Weber, Texas 14th district, during their visit to NASA Johnson Space Center.

Senator Ted Cruz from Texas toured the Johnson Space Center on Feb. 8 and received an update on the Orion Program from Orion Program Manager Mark Geyer.