

ORION



MARCH 2018

A large white Orion crew module is being lowered into a factory by a red crane. The module is suspended by a complex system of cables and hooks. In the background, a large American flag and a Texas state flag are visible. Several workers in blue shirts and white hard hats are standing around the module, observing the process. The factory floor is concrete, and there are various pieces of equipment and machinery visible.

Houston Launches Next Phase for Ascent Abort-2 Test

With the arrival of the AA-2 crew module, the NASA Johnson team builds upon critical development work from their Langley colleagues to prepare for next year's flight test.

HOUSTON LAUNCHES NEXT PHASE FOR ASCENT ABORT-2 TEST

The Ascent Abort-2 (AA-2) flight test team is implementing a new approach to do things differently by finding ways to execute spacecraft builds more efficiently and push on the norms of doing business to see if there are areas where productivity can be enhanced. AA-2 will be the last test of the launch abort system and its three motors will perform before a human mission, to ensure that astronauts are safe and secure when they fly on Orion.

Engineers and technicians at NASA's Langley Research Center in Hampton, Virginia, modified a previously built Orion test vehicle that is now at NASA's Johnson Space Center in Houston for the next phase of preparation for the 2019 AA-2 flight test. Development hardware from the Pad Abort-1 flight test is being reused and components such as radio frequency transmitters have been repurposed to support characterization and integration tests. Shuttle heritage hardware, such as pyrotechnic control cards, are being integrated into flight designs which allows the team to avoid building everything new. Additionally, flight and ground software architectures have been evolved from other development projects.

Several milestones lay ahead of the team now that the crew module has arrived at Johnson. In the spring, various subsystem elements will be incorporated into the vehicle. In June, it will be powered "on" for the first time to ensure all the proper connections are made and the vehicle can execute its flight profile. After testing and verification, the crew

module will be attached to a test rig and rotated sideways, so engineers can once again measure mass and center-of-gravity. These attributes must mirror those projected for Orion's first crewed flight to ensure the AA-2 crew module will provide representative data.

Once complete, the crew module will be sent to NASA Glenn's Plum Brook Station in Ohio, where it will undergo testing in an acoustic chamber to characterize how the structure will react to the abort environment. While the crew module is at Plum Brook, a separation ring that will connect the capsule to its booster will arrive at Johnson and be outfitted with wiring and other necessary elements. The crew module will return to Johnson in September and be mated with the separation ring before the two elements are then tested together and shipped to NASA's Kennedy Space Center in December.

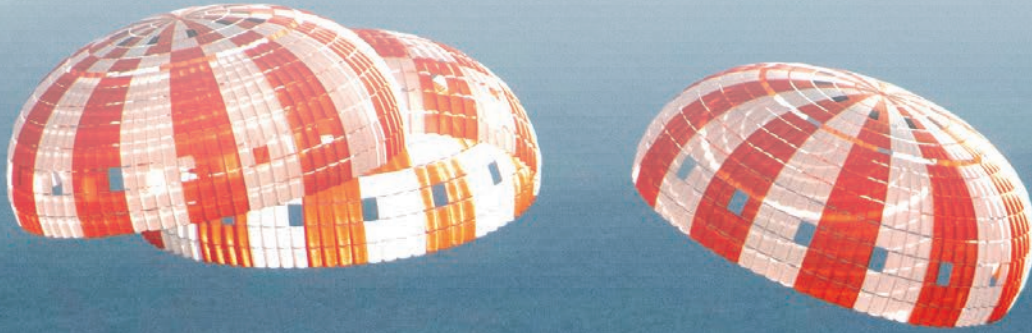
The same engineers involved in outfitting the AA-2 crew module are being trained to be the builders and operators of the Orion spacecraft. Those who have been involved in this project are extremely knowledgeable about the vehicle's systems and are simultaneously being trained as flight controllers to supervise the flight test when it launches from Cape Canaveral Air Force Station in Florida.

NASA's work to build the test article and execute the flight test is a combined effort between the Orion Program and the Advanced Exploration Systems Division at NASA Headquarters in Washington.



Employees at Johnson Space Center in Houston join the AA-2 team upon the crew module's arrival at the center.

INTENTIONAL FAILURE LEADS TO SUCCESS



NASA successfully tested a malfunction of the Orion spacecraft's parachute system on March 16 at the U.S. Army Proving Ground in Yuma, Arizona. It was the first time that engineers intentionally failed one of the system's three forward bay cover parachutes to verify that the other parachutes would deploy as needed for a safe landing. The forward bay cover protects the upper part of Orion throughout its mission and, in perfect conditions, is expelled off Orion

during reentry and descent so the rest of the parachutes can deploy properly. This test proved that even in a malfunction, the parachutes are able to deploy and bring the crew home safely. Engineers are nearing completion of the series of tests to qualify the parachute system for flights with crew. Orion's parachute systems development is being used by the Commercial Crew Program

ORION TAKES SHAPE AROUND THE WORLD



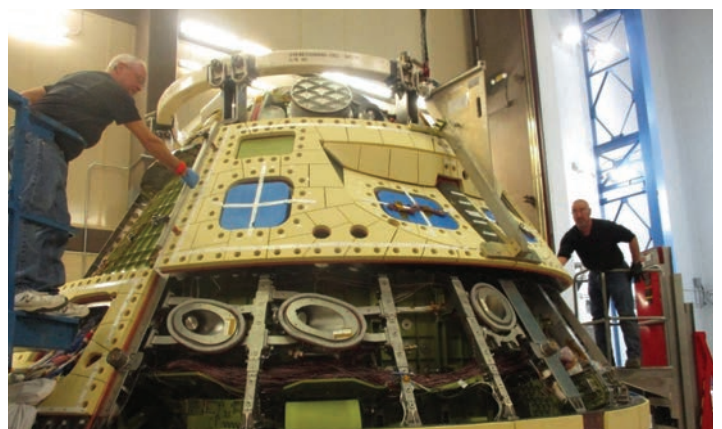
The Orion management team from NASA and Lockheed Martin traveled to Les Mureaux, France on March 2 to meet with Airbus and ESA to review the progress of the European Service Module for Exploration Mission-1. See more: bit.ly/2IFCX8A



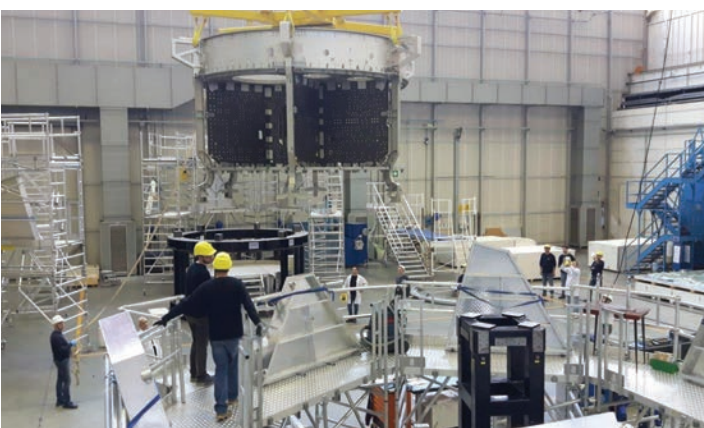
Astronaut Butch Wilmore reviews the welding progress on Orion's Exploration Mission-2 crew module pressure vessel at NASA's Michoud Assembly Facility in New Orleans, Louisiana.



Technicians at the Airbus facility in Bremen, Germany install the fuel tanks on the European Service Module for Exploration Mission-1.



Back shell panels are installed on the Orion structural test article at Lockheed Martin's Waterton facility in Littleton, Colorado.



Engineers at Thales Alenia facility in Turin, Italy, continue work on the primary structure for the European Service Module for Exploration Mission-2



Lockheed Martin CEO Marillyn Hewson gets a look inside the Orion spacecraft during instrumentation installation at NASA's Kennedy Space Center.

PROJECT MARS TAKES THE STAGE AT SXSW



Those who attended South by Southwest (SXSW) in Austin, Texas, the week of March 11 got the opportunity to experience a virtual journey to Mars and back aboard the Orion spacecraft and learn more about the Project Mars International Art and Film Contest.

Orion team members supported exhibit and panel presentations at the world renowned technology and innovation showcase. Visitors to the exhibit participated in virtual reality experiences of traveling and working in deep space and learned how to submit entries to Project

Mars, a global art and film competition open to college students and young professionals around the world. The competition invites artists to submit a poster or short film visualizing what future travel to Mars might be like. Entries will be judged by industry notables such as film director Gareth Edwards (*Rogue One: A Star Wars Story*) as well as real space explorers and creative experts.

Lockheed Martin Vice President Julie Pound moderated the Artful Eyes: A View from the Future panel presentation with Project Mars judges Joshua Grossberg, vice president

of Creative at McCann New York; Mickey Fisher, television producer and writer; and retired NASA Astronaut Nicole Stott who is also an artist. Panelists discussed personal inspirational influences and experiences that led them to creative interpretations of space exploration while NASA intern Heather Monaghan created a real-time illustration of a science fiction landscape during their discussion.

Following the panel, NASA hosted a Facebook LIVE event

at the exhibit booth with Julie Pound and Nicole Stott that reached more than 300,000 people online.

See the Facebook Live:
bit.ly/ProjMars_SXSW18

Learn more about Project Mars:
projectmarscompetition.org





SENATOR NELSON VIEWS PROGRESS FIRST HAND

On March 16, U.S. Senator Bill Nelson (D-FL) visited NASA's Michoud Assembly Facility to look at progress on Orion and the Space Launch System. While at the facility in New Orleans, Louisiana, Senator Nelson was also able to learn about Orion's upcoming Exploration Mission-1 and meet some of the people who have a daily impact on making sure America is leading the way for the future of deep space exploration.

NASA LAUNCHES NEW EXPLORATION MISSION-1 WEBSITE

HOUSTON WE HAVE A PODCAST: A RIDE IN ORION

Jeff Fox, chief engineer of the Rapid Prototype Lab at NASA's Johnson Space Center, talks about some of the testing and training to prepare Orion for future human space exploration. Fox features actual audio recorded inside the Orion crew module during its first space flight -- Exploration Flight Test-1 -- so you, the listener, can experience what it would be like to ride inside the spacecraft. Listen in to learn more about what astronauts will experience and possibly hear when traveling to the Moon and farther into deep space.

A screenshot of the NASA Exploration Mission-1 website. The page features a navigation menu on the left with options like 'Home to Mars', 'Mars Today', and 'Space Launch System (SLS)'. The main content area includes several articles and images, such as 'Super Guppy Transports SLS Flight Hardware to Kennedy Space Center' and 'Orion Crew Access Arm Installed on Mobile Launcher'. The footer contains the NASA logo and contact information.

View it here:
nasa.gov/content/exploration-mission-1

SUPPLIER SPOTLIGHT

ICF MERCANTILE, LLC



Boasting 30 years of experience in the textile industry, ICF Mercantile, LLC is an innovator of special applications for a variety of technical and specialty textile products to support the aerospace, medical, and industrial markets. ICF provides ENKA Rayon, or carbon fiber bundles, to the supply chain which then twists the fibers and weaves them into a fabric. That fabric is then carbonized and dipped into a carbon phenolic coating, a process that binds the fibers together. The result is a structurally robust and an incredibly effective thermal ablative that can be used on various spacecraft components. For the Orion spacecraft, it will surround the

thrusters and the auxiliary hatch panel on the backshell. It will also be used on the Space Launch System (SLS) boosters.

Based in Warren, New Jersey, ICF's 20 employees have long been providing services to NASA, with contributions to the Shuttle Program, and feel very proud to be a part of the SLS and Orion program efforts. ICF is also involved in the medical device and technical textile business, developing fiber and yarn for a variety of textile-based devices such as heart valves, vascular grafts, and aortic stents, as well as protective apparel for both private and government use.

FOLLOW THE PROGRESS OF
NASA'S NEW SPACECRAFT
FOR HUMAN EXPLORATION:

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APRIL 2018

Ascent Abort-2 Media Day
Orion Suppliers Visit JSC
USA Science and Engineering Festival