

National Aeronautics and
Space Administration



ORION

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ORION EXTENDS ITS REACH



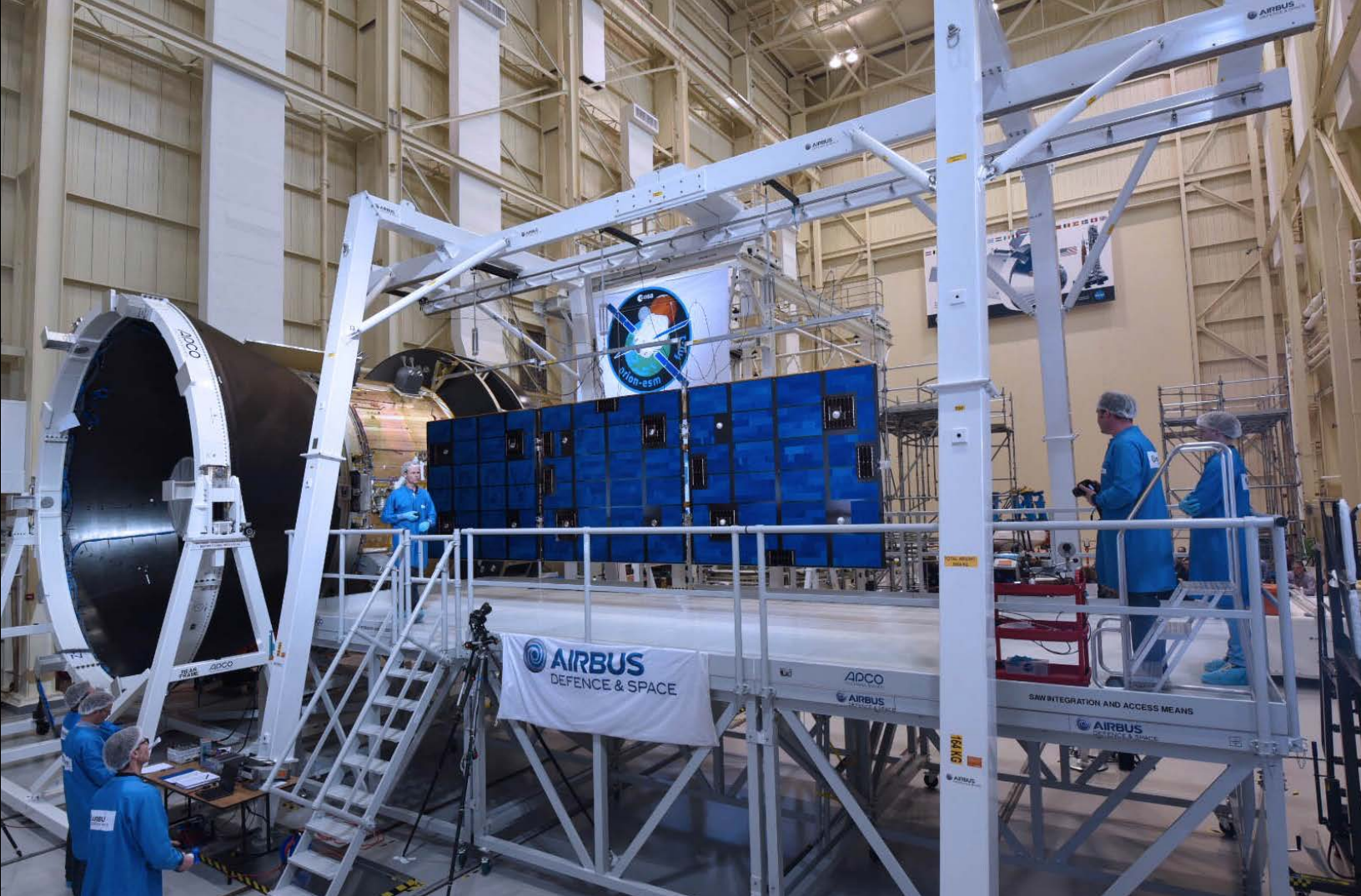
Engineers examine one of Orion's solar array wings after a test at NASA Glenn's Plum Brook Station.



ORION SOLAR ARRAY SUCCESSFULLY DEPLOYED



A representative structure of Orion's service module, which is being tested at Plum Brook Station in Sandusky, Ohio, was tilted to a 90-degree angle in preparation for the solar array deployment test.



An international team of engineers successfully deployed an Orion solar array wing inside the Space Power Facility (SPF) at NASA Glenn Research Center's Plum Brook Station in Sandusky, Ohio, on Feb. 29.

The deployment of the 24-foot wing qualification model was an important first step to verify Orion's power system for the spacecraft's first flight atop the agency's Space Launch System (SLS) rocket.

When deployed on orbit, Orion's four solar array wings will span across 63 feet and resemble the ESA (European Space Agency) Automated Transfer Vehicle's X-shaped array. The four panels combined will generate 11 thousand watts, enough power to light up an entire street of homes on Earth. The array is a component of Orion's service module, which is being provided by ESA and built by Airbus Defence and Space to supply Orion's power, propulsion, air and water.

The successful deployment was the first in a series of crucial tests being performed at SPF to verify the Orion service module can withstand the harsh conditions of launch and ascent into deep space. SPF is the only place in the world that can

subject the full-scale, flight-like test article to the conditions of launch and ascent. It is home to the world's largest mechanical vibration table and most powerful acoustic chamber.

Throughout spring and fall, engineers will use those facilities to mimic the shaking and noise the service module will experience during its ascent into space. They also will use pyrotechnics to simulate the shock the service module will experience during separation from the SLS rocket. In early fall, the team will conclude the campaign with another solar array wing deployment test.

With the first solar array wing test complete, engineers will waste no time preparing for the next test. They will soon begin stacking the Orion crew module and launch abort system mass simulator on top of the test article and attaching the outer fairings in preparation for acoustic tests to begin this spring.

► [Read the full story](#)

SIMULATIONS ARE THE REAL DEAL FOR ORION MISSION OPERATIONS TEAM

In early February, flight controllers and astronauts took part in a joint simulation to evaluate the prototype Orion crew display and control system, advanced caution and warning system for flight controllers, and communication protocols. The test was conducted in the Rapid Prototyping Lab (RPL) at NASA's Johnson Space Center in Houston where engineers are creating and evaluating the display and control systems that Orion's crew will use to navigate and operate the spacecraft.

The simulation involved two astronauts and several flight controllers, including a flight director, capsule communicator (CAPCOM) to communicate with the crew, and controllers who manage electrical power subsystems and environmental control and life support elements. Together they worked through a failure scenario in which part of Orion's power system failed. This scenario required troubleshooting to get pumps and other systems back up and running to support the systems the crew needs to survive. Evaluating extreme failure scenarios is a routine part of training for missions in space.

As the RPL continues to build and evaluate the displays for crew, it also is providing hands-on engineering experience for students in Texas. Mechanical engineering students at the University of Texas at Tyler (shown at right), have designed and built a mount to attach the cursor control device that serves as one way to operate Orion's displays. The students delivered their hardware to NASA in February.

As engineers continue to develop Orion's display, controls and software for crewed flights, teams will conduct additional simulations. The RPL will also continue to look for potential ways to include student ingenuity in the lab.

► [Read the full story](#)





NASA ROLLS OUT STATE OF THE AGENCY

On Feb. 9, as part of the rollout of President Barack Obama's Fiscal Year 2017 budget proposal for NASA, Administrator Charles Bolden delivered a "State of NASA" speech at the agency's Langley Research Center in Hampton, Virginia, in front of the Orion Ground Test Article. During the speech, Bolden highlighted key work and advancements by the agency during the last few years and discussed some of the future goals the agency continues to work toward, including exploration of Mars and elsewhere in our solar system and beyond, aeronautics research, development of technology to enable humans to explore deep space and research aboard the International Space Station for the benefit of life on Earth and for astronauts on long-duration space missions.

► [Watch the 'State of NASA'](#)



BLACKWELL-THOMPSON TO LAUNCH NASA'S NEXT STEP IN SPACE EXPLORATION

The first flight of a Space Launch System, or SLS, rocket carrying the Orion spacecraft on an uncrewed mission to lunar orbit and back now has its launch director. Veteran spaceflight engineer Charlie Blackwell-Thompson will helm the launch team at NASA's Kennedy Space Center in Florida for Exploration Mission-1 (EM-1). Her selection as launch director means she will be the first woman to oversee a NASA liftoff and launch team.

As work for the mission progresses on Orion, SLS and the ground systems and mission support needed to launch them, NASA will identify additional key personnel who will lead and oversee the launch and execution of the mission from different NASA centers. Blackwell-Thompson will be responsible for launching the EM-1 mission from Firing Room 1 at Kennedy's Launch Control Center, while a team of flight directors at NASA's Johnson Space Center in Houston will manage Orion's mission as it ventures beyond the far side of the moon and returns to Earth.

► [Read more about Charlie Blackwell-Thompson](#)

BREVARD SCHOOLS RECEIVE FLOWN FLAG FROM ORION'S FIRST SPACE FLIGHT

Lockheed Martin presented a U.S. flag flown on Exploration Flight Test (EFT)-1 to Brevard Schools in Florida this month. Included in the presentation frame were flown mission pins and patches. EFT-1 was launched from Cape Canaveral Air Force Station on Dec. 5, 2014.

The presentation was held at Apollo Elementary School in Titusville where fifth grade students participated in the county's first space school. Students were provided with science, technology, engineering and math (STEM) hands on learning with astronauts and space professionals.



Joe Mayer, Lockheed Martin Director of Government Relations (second from right) presents EFT-1 flown items to Dr. Desmond Blackburn, Superintendent of Brevard Schools (holding presentation). Also shown are Lorna Kesner, assistant principal (far left) and Frank Miller O'Leary, principal (far left).



ORION TANKS ARRIVE IN SWEDEN

Orion's propulsion qualification module, which will ensure the spacecraft's thrusters and fuel system work and is used to orient the spacecraft and send it back to Earth, arrived in Stockholm, Sweden. OHB Sweden and Airbus Defence & Space will do the final integration of this part of the spacecraft test module before shipping it to NASA's White Sands Test Facility in New Mexico in July for hot fire testing to occur in September.

Left: The fuel tanks that will hold mixed oxides of nitrogen and monomethyl hydrazine were built in Bremen, Germany, and delivered to Sweden to be placed in the propulsion qualification module.

MEDIA GET THE SCOOP ON ORION PROGRESS AT KSC

The Orion crew module pressure vessel arrived at NASA's Kennedy Space Center in Florida on Feb. 1 via the Super Guppy cargo aircraft and was moved into the birdcage tool at the Neil Armstrong Operations and Checkout (O&C) Building. A media event was held at the O&C on Feb. 3 for the crew module arrival with NASA Johnson Space Center Deputy Director Mark Geyer, Astronaut Stan Love, NASA Orion Production Operations Manager Scott Wilson, and Lockheed Martin Orion Program Manager Mike Hawes.



ORION TEAM PAVES THE WAY FOR FUTURE ENGINEERS



Debbie Korth and Susan Baggerman of the Orion Program spoke with potential future engineers during Project Lead the Way at Clear Lake High School in Houston on Feb. 4. During the event, engineers from different industries met with students in Grades 6 through 12 to let them know more about jobs in engineering.



Lockheed Martin Orion engineer Dustin Neill puts things (or planets) into perspective for students when answering a question during a Feb. 23 NASA Exploration Systems Web Chat with Imagination Station in Toledo, Ohio. Neill grew up in the Toledo area and enjoyed talking with fifth graders from his hometown during this national Engineer's Week STEM outreach event.



ASRC Federal hosted several STEM-related events in February and during Engineers Week. As part of the company's ongoing Apprenticeship Program partnership with Eastern State College, ASRC sponsored the college's annual Aerospace Maintenance Competition. In addition, ASRC sponsored several FIRST Robotics Competitions including the Rocket City Regional in Alabama; the 2016 FIRST Chesapeake District Championship in College Park, Maryland; and the Orlando FIRST Robotics Regional at University of Central Florida. Pictured above: ASRC's Joe Velez and Scott Altman host students from Eastern State College to attend the National Space Club luncheon in Florida.



K-12 educators attending the Space Exploration Educators Conference (SEEC) in Houston, Texas, experienced several days of complete immersion in an out-of-this-world adventure of space exploration on Feb. 4 & 5. Orion team members briefed educators touring the JSC Space Vehicle Mockup Facility and staffed an Exploration Systems Development display booth at the Space Center Houston exhibition.

INDUSTRY SUPPLIERS CONVENE IN THE SPIRIT OF SPACE EXPLORATION

More than 200 Orion, SLS and GSDO suppliers from 30 states gathered in Washington to get the latest updates from program managers and hear briefings from NASA leadership including NASA Administrator Charles Bolden. In addition, the suppliers conducted more than 175 meetings with their respective Congressional and Senatorial representatives to provide them updates on program progress toward Exploration Mission-1.



Moving from left to right: Rick Brown (General Plastics), Jonathan Beaudoin (Systima), Robert Emmett (Orbital ATK), Lauren Anderson (Kimble's Fuel Logistics), JC Hall (Esterline), Jerry Berg (Systima)



Patty Stratton of Abacus Technology and NASA Fellow Denton Gibson visit with Mary Lynne Dittmar, NASA's Tom Whitmeyer, and Orbital ATK's Sandy Coleman.



Tom Culligan, (left) conference coordinator, visits with SLS Program's Kimberly Robinson and Charlie Precourt of Orbital ATK.



Orion Program Managers Mark Kirasich (left, NASA) and Mike Hawes (right, Lockheed Martin) are pictured with astronaut Cady Coleman. The human spaceflight veterans spoke to the suppliers about the importance of flawless performance and crew safety for deep space exploration.



NASA Administrator Charles Bolden addressed industry suppliers to provide them an overview of NASA's Journey to Mars exploration plans and thank them for all their hard work in building the spacecraft and systems needed for America's space program.



EM-1 Mission Manager Mike Sarafin provided the supplier team with a detailed overview of Orion's next spaceflight that will launch atop the new Space Launch System and travel 40,000 miles beyond the moon during a three-week mission in 2018.

LAST MAN ON THE MOON TALKS ABOUT AMERICA'S NEXT GIANT LEAP

The Orion and SLS industry team sponsored the U.S. release of Gene Cernan's film *The Last Man on the Moon*, an inspiring documentary about America's Apollo Program and its legacy that continues with today's space exploration endeavors. In a brief interview following the film, Captain Cernan talks about the future of human space exploration with Orion and SLS.

► **Watch Cernan video**

The film was released in theaters nationwide and through On Demand platforms on Feb. 26.

► **For more information**



Former astronauts reunited at the Washington premiere for *The Last Man on the Moon*. Pictured from left to right are astronauts Tony Antonelli, Bill Readdy, Cady Coleman with film producer Mark Stewart, film director Mark Craig, astronauts Gene Cernan, Jan Davis, Michael Lopez-Alegria and Charlie Precourt.



TTTECH HOSTS VIP TOUR FOR NASA EXECUTIVE VISIT

NASA's Associate Administrator for Human Exploration and Operations Bill Gerstenmaier (center) visited Orion supplier TTTech at its headquarters in Vienna, Austria, on Feb. 23. TTTech, a sub-contractor to Honeywell Aerospace, supplies the ethernet for the Orion avionics architecture. TTTech has been working with NASA since 2000 on various projects.

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