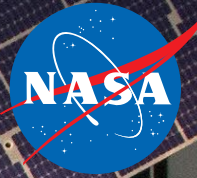


National Aeronautics and
Space Administration



ORION

ORION WORK PROGRESSES IN EUROPE

SEPTEMBER 2017



NASA Johnson Space Center Director and former astronaut Ellen Ochoa with NASA Astronaut Nicole Mann.

ESA, NASA OFFICIALS REVIEW ORION PROGRESS IN GERMANY

In Bremen, Germany, Orion management from NASA, ESA (European Space Agency), Lockheed Martin and Airbus reviewed progress on Orion and its European service module for Exploration Mission-1 (EM-1) and future human exploration missions into deep space. NASA center directors and former astronauts Ellen Ochoa of Johnson Space Center and Janet

Kavandi of Glenn Research Center, as well as current astronaut Nicole Mann, participated in an all-hands presentation with Orion Program Manager Mark Kirasich to provide local ESA and Airbus employees with information about Orion's development and manufacturing progress and future mission objectives, and how their work is directly enabling deep space exploration.

HOUSTON STRONG, ORION MOVES ON

After Hurricane Harvey hit, Houston Orion team members received support from neighbors, friends, strangers and co-workers alike. While hurricanes Harvey, Irma, and Maria have impacted Orion team members and facilities, progress has not been hampered and Orion is still on schedule as we move forward to Exploration Mission-1. Thank you to all who sent well wishes, physical and mental support to our team. Recovery is far from over but Orion moves on. Pictured here: Paul Marshall, Orion assistant manager, strategic integration at NASA's Johnson Space Center, standing with a signed banner of support for the Orion team from Ground Systems Development & Operations team members located at NASA's Kennedy Space Center.



STACKED, QUALIFIED AND READY TO GO

On Sept. 8, the primary and secondary structure of the Orion crew module structural test article passed qualification loads testing at Lockheed Martin's facility near Denver. This involved running 23 test scenarios that simulated peak loads on various components of the spacecraft. During the tests, the team reviewed over 2,200 channels of data to ensure the test article

withstood the stresses of launch and landing. These tests work to ensure Orion's crew module, launch abort system, and European service module are suitable and ready for Exploration Mission-1. The structural test article is now undergoing assembly work so it can move on to next stages.



SUPPLIERS IN DENVER BRIEFED ON ORION

Charlie Lundquist, NASA Orion deputy program manager, was one of two keynote speakers to present at Lockheed Martin's Supply Chain Conference held Sept. 14 in Denver. Lundquist presented the future of Orion to top suppliers in the aerospace industry, which included over 400 individuals from 146 companies around the world. The two-day event allowed suppliers to network with all levels of supply chain managers and allowed suppliers and customers to strengthen relationships and address questions, concerns and gain insight into challenges faced across the industry. Lundquist's presentation on NASA's future space exploration initiatives was noted as one of the most exciting and visually stimulating segments of the conference.



ORION PARACHUTES MEASURE UP IN HIGH PRESSURE TEST

Under Orion's three massive main parachutes, a representative model of the spacecraft descended through the sky above Arizona, where NASA engineers tested the parachute system on Sept. 13, at the U.S. Army Proving Ground in Yuma. NASA is qualifying Orion's parachutes for missions with astronauts.

During this test, engineers replicated a situation in which Orion must abort off the Space Launch System rocket and bypass part of its normal parachute deployment sequence that typically helps the spacecraft slow down during its descent to

Earth after deep space missions. The capsule was dropped out of a C-17 aircraft at more than 4.7 miles in altitude and allowed to free fall for 20 seconds, longer than ever before, to produce high aerodynamic pressure before only its pilot and main parachutes were deployed, testing whether they could perform as expected under extreme loads. Orion's full parachute system includes 11 total parachutes -- three forward bay cover parachutes and two drogue parachutes, along with three pilot parachutes that help pull out the spacecraft's three mains.

SUPPLIER SPOTLIGHT

SolAero Technologies Corp.



Since 1998, SolAero Technologies Corp. has been a leader in the development, manufacturing and delivery of high efficiency solar cells, solar panels and composite structural products for satellite and aerospace applications. Located in Albuquerque, New Mexico, SolAero has 250 full-time employees, of which nearly 200 have worked directly to manufacture components for Orion. SolAero supports over 40 NASA programs and is currently supplying the solar cell assemblies for the Orion EM-1 and EM-2 spacecraft.

Once completed, SolAero will send the cells to Leonardo in Milan, Italy, to be installed on the solar panels which will help power the spacecraft during each mission. As a supplier for Orion, SolAero employees are “excited to be a part of a program that is leading the future of human spaceflight into deep space.”





Imagineering employees in South Bend, Indiana pictured with Orion, SLS and GSDO team members.

FUTURE OF DEEP SPACE GOES THROUGH INDIANA AND WASHINGTON STATE

During September, team members from the Orion, Space Launch System, and Ground Systems Development Operations teams, as well as NASA Astronaut James Kelly and Orbital ATK executive and former Astronaut Brian Duffy, visited suppliers in Indiana and Washington. The team visited Manufacturing Technology, Inc., Imagineering and Major Tool & Machine in Indiana, and supported STEM initiatives and events at Purdue Polytechnic High School and the annual Indiana Manufacturing Day kickoff.

An Indianapolis Suppliers Event & STEM Fair welcomed more than 40 local suppliers and their families to learn more about how their contributions are helping build the future of deep space exploration. While in Redmond, Washington, the team from Aerojet Rocketdyne was able to learn more about Orion's future missions from Lockheed Martin Orion Deputy Program Manager Larry Price.



Students experience VR at Indianapolis supplier event.



Attending Indianapolis supplier event from left to right: Elaine Bedel from IEDC, Dan Dumbacher from Purdue University, and Congressman Andre Carson.



Former Astronaut Brian Duffy with tech team at Hilbert Circle Theater for Indianapolis supplier event.



From left to right: Mary Hanna from the NASA GSDO team, South Bend Mayor Pete Buttigieg, and Annette Hasbrook from the NASA Orion team.



Orion team explains critical parachute functions and importance to students at Purdue Polytechnic High School in Indianapolis.



Students experience VR at Major Tool & Machine Manufacturing Day kickoff event.



Aerjet Rocketdyne employees with Lockheed Martin Orion Deputy Program Manager Larry Price and NASA Astronaut James Kelly in Redmond, Washington.



Manufacturing Technology, Inc. employees in South Bend, Indiana, pictured with Orion, SLS, and GSDO team members.



Left to right: Astronaut Victor Glover, Vice Admiral Moore, and Astronaut Nicole Mann

NAVAL VICE ADMIRAL VISITS JSC

Vice Admiral Thomas J. Moore, commander of Naval Sea Systems Command, visited NASA's Johnson Space Center in Houston and was able to get a first-hand look at the Orion mockup during his tour. He also spoke with Orion team members working on egress testing at the mockup to learn more about the U.S. Navy's involvement in Orion at-sea recovery operations once it returns to Earth from deep-space missions.

EXPLORING SPACE IN THE LAND DOWN UNDER

At the 68th annual International Astronautical Congress meeting in Adelaide, Australia, Orion team leaders joined other aerospace industry experts to talk about what the future of space exploration entails. Heads of space agencies around the world outlined their future plans, astronauts joined together to tell their experiences and stories, and industry leaders interacted in panel discussions, answering questions and exploring ideas for future human and robotic space exploration endeavors. For conference highlights and information, visit www.iac2017.org.

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OCTOBER

- World Space Week
- Von Braun Symposium
- Supplier Visits in Florida, New York and Connecticut
- National Space Council Updates