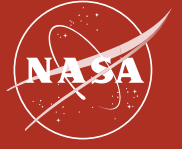


ORION



NOVEMBER 2018



Auf Wiedersehen Germany, Hello Florida!

The European Service Module that will power and propel the Orion spacecraft on its first mission around the Moon was shipped from Bremen, Germany, to Kennedy Space Center, Florida, in November.

AUF WIEDERSEHEN GERMANY



Orion program managers and Bremen Lord Mayor Carsten Sieling gather in Bremen to approve the completion and transportation of the ESM from Germany to the United States. Left to Right: Oliver Juckenhöfel (Airbus), Mark Kirasich (NASA), Mike Hawes (Lockheed Martin), Bremen Lord Mayor Carsten Sieling, David Parker (ESA), Bas Theelen (Airbus)

The European Service Module (ESM) that will power and propel the Orion spacecraft on its first mission around the Moon was shipped from Bremen, Germany, on November 5, headed to the United States. It took off in an Antonov An-124 aircraft in the early hours and arrived at NASA's Kennedy Space Center in Florida on Nov. 6.

Designed and manufactured in Italy and Germany, the powerful workhorse is Europe's contribution to humanity's return to the Moon.

For the first time, NASA will use a European-built system as a critical element to power an American spacecraft, thanks in large part to European Space Agency's (ESA) successful Automated Transfer Vehicle (ATV) program that in the past brought supplies to the International Space Station in low Earth orbit.

The knowledge gained by ESA and European industry from designing, building and operating the complex and successful ATV missions was instrumental for ESA's participation in NASA's Orion spacecraft.



Orion Team Members from ESA, Airbus, NASA and Lockheed Martin gather at the Airbus offices in Bremen, Germany, after finishing the pre-ship review that qualified the ESM for shipment.

The unit resembles ATV, from which it evolved. Three types of engines will propel Orion to its destination and can turn it in all directions to align the spacecraft as needed.

In addition to power and propulsion, the ESM contains large tanks to hold fuel as well as consumables for the astronauts. It will supply critical crew support such as air, water and temperature control during Orion's first crewed mission, Exploration Mission-2. Radiators and heat exchangers keep the astronauts and equipment at a comfortable temperature, while the module's structure is the backbone of the entire vehicle, similar to a car chassis.

The ESM was built by ESA's prime contractor Airbus with many companies all over Europe supplying components.

Watch ESM get packed for shipment:
go.nasa.gov/2B0wVwL



An-124 aircraft lifting off in Bremen, Germany, carrying the ESM.



A mass test was conducted on the European Service Module (ESM) in Bremen prior to its shipment to the United States. The ESM test was the key activity for verification of the ESM mass requirement and the total Orion mass requirements. Orion team member Aaron Cannon was onsite to witness the test, which was essential in understanding the processes and techniques used for verification closure and to avoid any discrepancies for mass tests performed at Kennedy Space Center involving the ESM module. Results of the test will be used for future Orion mass predictions.

HELLO FLORIDA!



At NASA's Kennedy Space Center in Florida on Nov. 16, a panel of leaders from NASA and ESA (European Space Agency) spoke live on NASA Television about the significance of Orion's new component that was delivered from Germany to Kennedy on Nov. 6.

NASA Administrator Jim Bridenstine delivered a remote congratulatory greeting to the audience comprised of NASA and ESA leadership, as well as executives and team members from Lockheed Martin, Airbus, suppliers and dozens of U.S. and international media representatives.

Now at Kennedy Space Center, the ESM will be connected to the Orion crew module and its adapter and then stacked

with the Launch Abort System tower in preparation for Exploration Mission -1, a test flight without astronauts that will travel farther into space than any human-rated spacecraft has ventured.

Following the event, Orion Program management took time to recognize team members at Kennedy for their efforts in bringing the ESM to the U.S. The European Service Module Physical Shipment Team is pictured below receiving their Program Manager commendation.

View the presentation: go.nasa.gov/2PqCNVD



DAY OR NIGHT, ORION RETURNS SAFELY



Orion team members supported Underwater Recovery Test 7 (URT-7) off the coast of San Diego on Oct. 31-Nov. 5. Aboard the USS John P. Murtha, the team employed the first use of the Orion recovery cradle assembly. Training and testing focused on deploy, release, and recover operations during daytime and nighttime exercises. They also tested the

open water ground support equipment (GSE) in calm waters and high sea states, which included 4- to 6-foot waves. URT-7 successfully completed verification and validation of Exploration Mission-1 Orion crew module recovery and open water GSE.

40,000 LBS OF THRUST



A motor designed by Aerojet Rocketdyne for Orion's Launch Abort System (LAS) was successfully tested by engineers at the U.S. Army Redstone Test Center on Redstone Arsenal in Huntsville, Alabama. During the Orion LAS jettison motor Qualification Motor-1 Hot-Fire Test, the motor produced more than 40,000 pounds of thrust, enough to lift 26 elephants off the ground. The 1.5-second test was the first in a round of tests aimed at qualifying the LAS jettison motor for human spaceflight in preparation for Exploration Mission-2. The LAS will safely lift the Orion crew module away from the launch vehicle in the event of an emergency

on the launch pad or during ascent, making the jettison motor a critical element for ensuring astronaut safety. The jettison motor is the only motor of the system that is activated on all Orion flights to separate the crew module from the LAS once the spacecraft is safely in orbit. The LAS is led out of NASA's Langley Research Center in Hampton, Virginia in collaboration with NASA's Marshall Space Flight Center in Huntsville, Alabama.

Watch: [go.nasa.gov/2Gcvt0u](https://www.nasa.gov/2Gcvt0u)

NATIONAL GEOGRAPHIC SHOWS OFF PROJECT MARS WINNERS

NASA Administrator Jim Bridenstine gave keynote remarks at the National Geographic Society Headquarters in Washington, D.C., during a special Aerospace Industries Association event on Nov. 5. The top two winning films in the Project Mars competition were showcased at the start of the event and the top poster winners were displayed in the lobby. See the Project Mars winning films and posters at www.projectmarscompetition.com



Event Speakers Left to Right: Stephen Petranek, American author; Gareth Edwards, film director; Jeff DeWitt, NASA Chief Operating Officer; Christyl Johnson, NASA Goddard Space Flight Center deputy director; Jim Bridenstine, NASA Administrator; Ellen Stofan, National Air and Space Museum director; Gary Knell, National Geographic CEO; Eric Fanning, AIA president & CEO; and Chris Davenport, Washington Post space reporter.

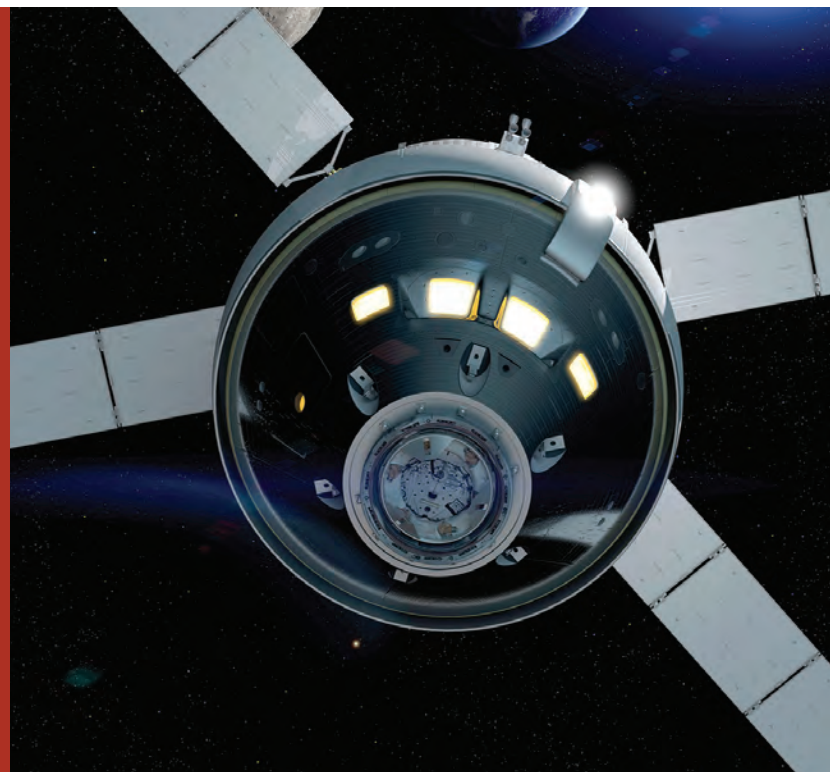
AHEAD OF SCHEDULE, AA-2 MAKES PROGRESS

NASA's Michoud Assembly Facility employees who worked on the Ascent Abort-2 (AA-2) motor adapter truss assembly (MATA) and tower structures were recognized with Ascent Abort-2 commendations for their work. NASA Orion Flight Test Management Office Manager Don Reed and Lockheed Martin Launch Abort System/AA-2 Director Roger McNamara presented the awards to the team for delivering the MATA ahead of schedule. AA-2 will be the final test of Orion's Launch Abort System, ensuring that it can propel Orion and its crew to a safe distance away from the Space Launch System rocket if an emergency arises during ascent.



NAVIGATING DEEP SPACE PODCAST

In this episode of Houston We Have a Podcast, Dr. Greg Holt, navigation lead for the Orion spacecraft, discusses how the vehicle finds its way through deep space and communicates with Earth along the way. Listen in to get an insider's view on how we'll track Orion, gather real-time diagnostics, and stay in communication with the spacecraft and its crew as they journey into deep space. Listen here: go.nasa.gov/2SvqqJz



SUPPLIER SPOTLIGHT

HOUSTON PRECISION FASTENERS



Houston Precision Fasteners (HPF), a small business headquartered in Houston, Texas, has offices around the country to support its work on Orion, Space Launch System, James Webb Space Telescope, International Space Station, and several other NASA projects. For Orion, HPF's 78 employees manufacture a wide variety of high-strength, close-tolerance structural fasteners and small machine parts that have been instrumental in facilitating engineering changes and connecting important build sections on Orion. Their team is committed to supporting Orion and SLS which has earned them nominations and awards from Lockheed Martin and NASA, including NASA's Small Business Subcontractor of the Year in 2013. Aside from their commitment to the space industry, HPF also works to make an impact in their community by supporting veterans, local sports teams, STEM programs, and national initiatives such as Toys for Tots.



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NASA'S NEW SPACECRAFT
FOR HUMAN EXPLORATION:

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DECEMBER 2018

Crew Module Uprighting System Tests
AA-2 Crew Module Departs for KSC
Space Flight Awareness Orion Honorees