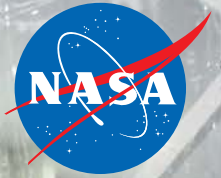


National Aeronautics and
Space Administration



ORION

MAY 2017

**WELDED, WRAPPED
AND READY TO GO**

ORION'S MONTHLY HIGHLIGHTS



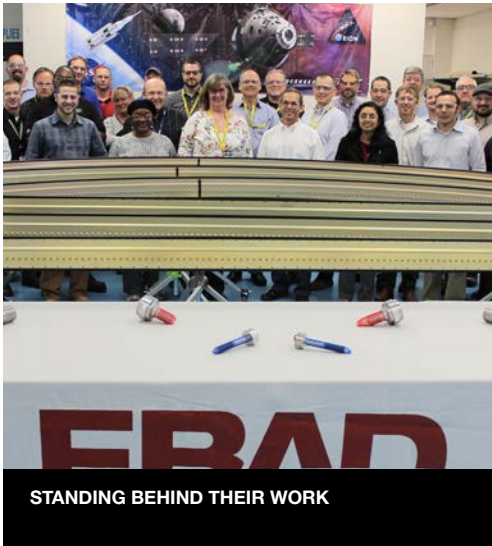
ORION TEAM WRAPS UP CLEAN ROOM WORK ON EM-1 SPACECRAFT



ON TRACK FOR EM-1 UNCREWED MISSION



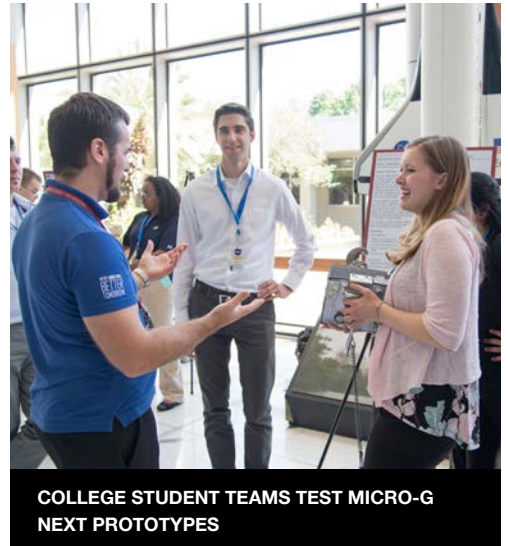
ILLINOIS SUPPLIERS RECOGNIZED FOR EM-2 PROGRESS



STANDING BEHIND THEIR WORK



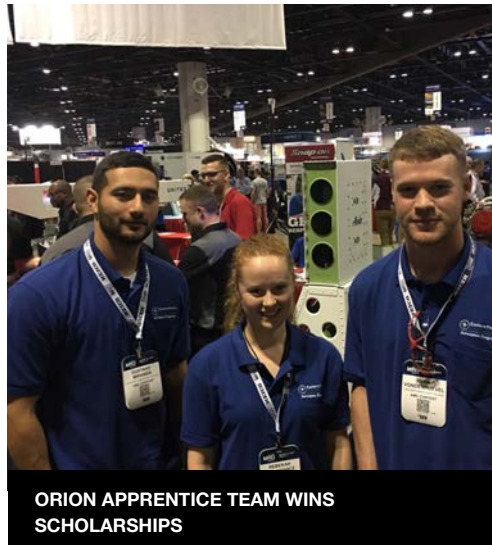
LAUNCH ABORT SYSTEM FACILITY TEAM FIRES UP NEW SYSTEM



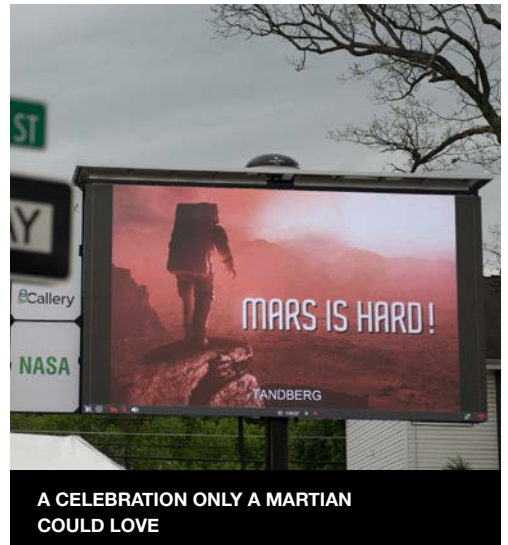
COLLEGE STUDENT TEAMS TEST MICRO-G NEXT PROTOTYPES



ORION TEAM MEMBER SHOWS AND TELLS ALL AT MINI MAKER FAIRE



ORION APPRENTICE TEAM WINS SCHOLARSHIPS



A CELEBRATION ONLY A MARTIAN COULD LOVE



ORION TEAM WRAPS UP CLEAN ROOM WORK ON EM-1 SPACECRAFT

Work continues to prepare NASA's Orion crew module for its first integrated flight atop the Space Launch System (SLS) rocket – Exploration Mission-1 (EM-1). The crew module was moved from a clean room to a work station inside the Neil Armstrong Operations and Checkout Building high bay at the agency's Kennedy Space Center in Florida to prepare for the next additions to the spacecraft.

In the clean room, engineers and technicians completed the welding of the tanks to the propulsion and environmental control and life support systems (ECLSS) tubing. They also completed welding to install the propellant, pressurant and post-landing coolant tanks. The pressurant is used to maintain the flow of propellant and coolant in the propulsion and ECLSS systems, respectively.

Now secured in a work station, Orion will undergo additional processing to prepare it for launch in 2019. The crew module uprighting system, comprised of five uprighting bag assemblies,

each with an inflation gas assembly, will be installed in the crew module's forward bay. The uprighting bags are inflated after the crew module splashes down in the ocean and will turn the spacecraft upright if external forces cause it to roll over. The three main parachute assemblies also will be installed in the forward bay.

Orion's crew module will be populated with avionics components, including control systems and communication and data units. Flight wire harnesses, which distribute power and data among the spacecraft's systems, will be routed throughout the crew module's forward bay, crew cabin and aft and mid bays.

The first flight of SLS and Orion will send the spacecraft beyond the moon before Orion returns to Earth and splashes down in the Pacific Ocean. The mission will demonstrate the integrated performance of the SLS rocket, Orion and ground support teams before a flight with crew in the early 2020s.



ON TRACK FOR EM-1 UNCREWED MISSION

In February, NASA began an effort looking at the feasibility of putting crew aboard the first integrated flight of the Space Launch System rocket and Orion spacecraft – Exploration Mission-1. After weighing the data and assessing all implications, the agency will continue pursuing the original plan for the first launch, as a rigorous flight test of the integrated systems without crew. However, engineers will apply insights gained from the effort to EM-1 and the integrated systems to strengthen the long-term push to extend human presence deeper into the solar system.

NASA determined it is technically capable of launching crew on EM-1, but after evaluating cost, risk and technical factors in a project of this magnitude, it would be difficult to accommodate changes needed to add crew at this point in mission planning. The effort confirmed that the baseline plan to fly EM-1 without crew is still the best approach to enable humans to move sustainably beyond low Earth orbit.

EM-1 is the first in a broad series of exploration missions that will eventually take humans to deep space, and on to Mars. It is designed to be a flight test of our entire system -- one that is challenging in itself and will offer the opportunity to better

understand our capabilities and limitations and ultimately build confidence in our ability to safely send crew into deep space. As part of the assessment, NASA reviewed the schedule for EM-1 and will adjust the target launch date for the mission to 2019, and will execute its normal process in the coming weeks to determine an official revised launch date.

NASA continues to keep each part of the enterprise – Orion, SLS, and ground systems – moving at their best possible pace toward the first integrated test mission. While components for EM-1 are being delivered, contractors can turn to the next phase of their work for the second flight, Exploration Mission-2, which will carry crew beyond the moon.

NASA continues to lead the way in sending humans into deep space beyond the moon through building a flexible, reusable and sustainable capability and infrastructure that will last multiple decades and support missions of increasing complexity. This infrastructure will be available for use by partners, both domestic and international, as they want to join in the effort to advance human presence into the solar system. These systems create an incredible capability from which future generations will continue to benefit.

Read more: <https://bit.ly/EM1Affirmed>

ORION SUPPLIERS: BUILDING THE FOUNDATION FOR FUTURE EXPLORATION



ILLINOIS SUPPLIERS RECOGNIZED FOR EM-2 PROGRESS

NASA executives joined program leadership and industry team managers from the Orion and Space Launch System programs at Ingersoll Machine Tools and UTC Aerospace Systems in Rockford, Illinois, to see the first hardware nearing completion for Exploration Mission-2, which will be the first crewed flight of Orion and the Space Launch System rocket. The Ingersoll team has been machining parts of the Orion spacecraft, and the UTC

Aerospace team has been involved in the design and management of parts for the Orion spacecraft and SLS. NASA Deputy Associate Administrator for Exploration Systems Development William Hill, Orion Program Manager Mark Kirasich, and Astronaut Rex Walheim were among the leadership team that toured the facilities and commended employees for their stellar work on the programs.

Read more: <https://bit.ly/OrionIL>





STANDING BEHIND THEIR WORK

The team at Ensign-Bickford Aerospace & Defense in Simsbury, Connecticut, stand behind their frangible joint and separation bolts following completion of the pre-ship review. The hardware was shipped on May 15 to NASA's Michoud Assembly Facility in New Orleans, Louisiana, where it will be installed on the fairing panels for the structural test article.



Orion spacecraft and launch abort system in LASF prior to Exploration Flight Test-1.

LAUNCH ABORT SYSTEM FACILITY TEAM FIRES UP NEW SYSTEM

MJW Consolidated has successfully completed a fire protection project at the Launch Abort System Facility (LASF) at NASA's Kennedy Space Center in Florida. The facility is used for the assembly and integration of the Orion spacecraft with the launch abort system (LAS). The abort system is designed to protect astronauts in the unlikely event of an emergency during launch or ascent that would require propelling the spacecraft away from the rocket or launch pad.

MJW was contracted in a full design-build capacity, providing professional engineering, detailed design, procurement, construction and commissioning of the new systems protecting the LASF. The project included modification and extension of site firewater systems, fabrication and installation of a custom enclosed fire pump skid, fabrication and installation of a building wet-pipe sprinkler system and high-bay water spray system. The project culminated in a successful full-flow test of the high-bay water spray system, demonstrating its ability to protect the LAS vehicle.

REACHING OUT TO FUTURE EXPLORERS



Orion team member Dustin Neill speaks to Micro-g NExT student teams testing their prototypes in May.

COLLEGE STUDENT TEAMS TEST MICRO-G NEXT PROTOTYPES

Thirty-one student teams from across the country tested their designs in simulated microgravity this year as part of NASA's Micro-g Neutral Buoyancy Experiment Design Teams (Micro-g NExT) activity. Test sessions started in May and more will occur in June. Micro-g NExT challenges undergraduate research students to design, build and test a tool that addresses an authentic, current space exploration challenge. Students spent

months designing and building their unique spacewalk tool prototypes, which will be put to the test in NASA Johnson Space Center's Neutral Buoyancy Laboratory, a 6.2-million-gallon indoor pool used to simulate microgravity for NASA astronaut spacewalk training.

Dive deep into the Micro-g NExT program at – <https://bit.ly/NASAMicroG>



ORION TEAM MEMBER SHOWS AND TELLS ALL AT MINI MAKER FAIRE

At the 5th annual Tyler County Mini Maker Faire, Orion team member Stuart McClung shared a presentation with hundreds of participants about the future of deep space exploration aboard the Orion spacecraft. The Maker Faire in Tyler, Texas, is a family-friendly festival that brings artists, inventors, tinkerers, and scientists together to share what they do and how they do it.



ORION APPRENTICE TEAM WINS SCHOLARSHIPS

The current Orion Apprentice team from Eastern Florida State College recently won the Composite Competition at the Aerospace Maintenance Competition (AMC) in Florida. Each year, selected students are brought onsite to NASA's Kennedy Space Center in Florida and receive experience and mentorship with Orion team members. This year, the Orion Apprentice team participated in the AMC at the Orlando Orange County Convention Center in conjunction with MRO Americas, and received a paid scholarship to attend a prestigious composite advanced training program.

SEEING RED: EVENTS FOCUSED ON MARS EXPLORATION



A CELEBRATION ONLY A MARTIAN COULD LOVE

NASA representatives joined thousands of residents and visitors in Mars, Pennsylvania, to celebrate the Martian New Year on May 5-6. Every 687 days, Mars completes its orbit around the Sun, and an event is held to celebrate the new year for the distant planet. Those who attended learned more about the planet and

NASA's programs involving it, including the Journey to Mars. NASA scientists and engineers also explained to visitors why time keeping on Mars is so important, as it will influence the timing of future exploration mission astronauts will take to Mars.



STUDENTS EXPERIENCE THE MAKING OF A MARS MISSION

During a recent Space Center University program at Space Center Houston, Orion team member Paul Boehm talked to students about NASA's Journey to Mars. During the five-day engineering design challenge, students from all over the world experienced a simulated mission to Mars as they tested heat shields with blow torches, made Mars habitats and built robotic rovers. Students also went on tours of various NASA Johnson Space Center areas as well as a scuba diving activity before graduating from the Space Center University program.



HOUSTON MCNAIR GROUP TOURS NASA JOHNSON SPACE CENTER

The McNair Group, the collection of companies owned and controlled by Robert C. McNair who is most notably the Founder, Chairman and Chief Executive Officer of the Houston Texans, toured NASA's Johnson Space Center this May. McNair has been a leading businessman, sportsman and philanthropist in the city of Houston for more than 55 years. The McNair Group leadership was given a tour showcasing NASA's current programs and achievements, including the Orion spacecraft mockup which was shared with the group by NASA Orion Assistant Manager for Program Integration Annette Hasbrook.

 **NASA's Johnson Space Center** was live.
May 23 at 1:50pm · 🌐

LIVE: Tour around the International Space Station, NASA Commercial Crew Program, NASA's Orion Spacecraft, and NASA JSC Education opportunities like NASA Internships.

This is the fifth stop of today's virtual tour of the State of NASA as we take a look at the cutting-edge work here and on humanity's destiny in deep space. To learn more about the events across the Agency, visit: <https://www.facebook.com/events/304402813315262/>



LIVE FROM NASA – IT'S ORION AND ISS!
Following the Fiscal Year 2018 budget overview presentation given by NASA Acting Administrator Robert Lightfoot, NASA hosted Facebook Live events at each center around the country. One of the stops was NASA's Johnson Space Center, where NASA Orion Crew and Service Module Manager Lara Kearney and Astronaut Michael Hopkins took viewers on a tour of the Orion and International Space Station mockups.
Watch the video: <https://bit.ly/StateofNASAJSC>



MADE IN BREVARD
Team members Rebekah Tolatovicz and Ryan Vondenhuevel represented Orion at the Made in Brevard expo in Florida. The expo featured 30 local manufacturing companies, including some which manufacture parts for the Orion spacecraft. The expo helped showcase how products made on the Space Coast are making a difference across the globe.

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

- NASA's Orion Blog [Blogs.NASA.gov/Orion](https://blogs.nasa.gov/orion)
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JUNE

- New Astronaut Class Introduced
- Launch Abort System Qualification Test
- White House Guests Tour Kennedy Space Center