

Orion



Houston: We are Go for Exploration!



KSC, JSC launch and mission control centers simulate Orion's first flight operations

In just a matter of months, NASA will send its new human-rated spacecraft into space for the first time. And back here on the ground, the Mission Control Center in Houston will be at the helm under the command of Mike Sarafin, lead flight director for Exploration Flight Test-1 (EFT-1), (above left).

It's a milestone for which Sarafin's flight control team of about two dozen people has been preparing for two years, and in May they participated in their first joint integrated simulation, along with the Mission Management Team, the Test and Launch Control Center and the Engineering Support Team, all located at NASA's Kennedy Space Center in Florida. Covering the pre-launch and in-orbit phases of Orion's mission, the teams had to deal with the kinds of problems that could require real-time decisions before and during the actual mission.

With no crew aboard Orion for the first two missions, flight

controllers will serve as the eyes and ears monitoring the health and status of the spacecraft. If something goes wrong, it will be up to them to fix it. That's not exactly a new concept for the team members, all of whom have experience at space shuttle flight control consoles under their belt. Skills such as understanding a failure, its impact and its workaround are talents that are bred into flight controllers at NASA's Johnson Space Center in Houston.

But this won't be quite like any mission they've flown before.

EFT-1 is the first flight event that will use the new mission control equipment and flight software platform. A lot of the training with the flight control team has helped wring out the system. The testing has revealed flight software problems the team was able to work through and repair with plenty of time to spare. They have done simulations, tested out new tools and communication loops in the redesigned control room, and verified that Orion-formatted data could successfully be transmitted to mission controllers. The preparations are not complete, but the team will be ready when it's time to launch.

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As NASA's prime contractor for the Orion Program, Lockheed-Martin is responsible for conducting EFT-1 and its mission manager, Bryan Austin, is directing the test. The primary control area will be Hanger AE on the Cape Canaveral Air Force Station, Florida, which is used to support NASA evolvable expendable launch vehicle missions.

Lockheed-Martin personnel in both Houston and Denver participated in the two-day simulation, as did personnel

from the Orion Program, Ground Systems Development and Operations Program, and United Launch Alliance. The simulation exercised the NASA Mission Management Team and Engineering Support Team decision-making systems and personnel.

See related video below:

Public Affairs Officer Dan Huot interviews Flight Director Mike Sarafin about EFT-1:

bit.ly/TnEx5e

Heat Shield? Check!

On May 30, the world's largest heat shield, measuring 16.5 feet in diameter, was successfully attached to the Orion spacecraft at the Operations & Checkout building at Kennedy Space Center in Florida. The heat shield installation marks one of the final steps in the spacecraft's assembly leading up to its first test flight this fall, Exploration Flight Test-1 (EFT-1).

The heat shield is one of the top mission critical elements that will be tested during Orion's first space flight as it protects the spacecraft from the extreme temperatures of reentry that can reach up to 4,000 degrees Fahrenheit. Comprehensive data from the test flight will influence design decisions most critical to crew safety to lower risks and safely carry humans on future missions to deep space.

The heat shield began its journey in January 2012 in Colorado, at Orion prime contractor Lockheed Martin's Waterton Facility near Denver. That was the manufacturing site for a titanium skeleton and carbon fiber skin that give the heat shield its shape and provide structural support during landing. The structures were shipped in March to Textron Defense Systems near Boston, where they were used in construction of the heat shield itself.

Textron installed a fiberglass-phenolic honeycomb structure on the skin, filled each of the honeycomb's 320,000 cells with the ablative material Avcoat, then X-rayed and sanded each cell to match Orion's design specifications.

The Avcoat-treated shell will shield Orion from the extreme heat it will experience as it returns to Earth at 20,000 mph. The ablative material will wear away as it heats up during



Orion's reentry into the atmosphere, preventing heat from being transferred to the rest of the crew module.

See related stories:

Orion in Final Assembly at Kennedy Space Center

lmt.co/TnGCxW

Heat Shield for NASA's Orion Spacecraft Arrives at KSC

1.usa.gov/TnGKxq

Airbus/ESA complete first critical review of NASA's Exploration Mission spacecraft

The European Space Agency (ESA) is a step closer to building their contribution to the future of human spaceflight and exploration by completing the preliminary design review of the European Service Module for NASA's Orion spacecraft that will send astronauts beyond low Earth orbit to explore our solar system.

The European team is contributing the service module and expertise to the Orion multipurpose crew vehicle with flight-proven technology used on ESA's series of Automated Transfer Vehicle supply spacecraft.

The European service module will provide power, thermal control, consumables and propulsion to the vehicle, including the crew module.

The cooperation highlights the major involvement of ESA, NASA and European industry on this important project, based on a long-standing partnership of the agencies across many areas of human and robotic spaceflight.

A Preliminary Design Review is one of a series of checkpoints in complex engineering projects. Having passed this review, the next step is to start the detailed design and procure the subsystems.

As the review process continues, the spacecraft design will be assessed again to ensure the safety and reliability of the overall system and its compliance with Orion requirements.

The teams developing the service module reviewed the documentation in April and May before meeting for a week in Bremen, Germany. Reviewers from ESA, NASA and the US prime contractor Lockheed Martin evaluated documents delivered by Airbus Defence & Space and European contractors.



The Preliminary Design Review concluded with a formal board on May 15 that provided the go-ahead for the next phase. The next major review milestone is the Critical Design Review scheduled for the end of 2015, aiming for Orion's first fully integrated flight test with the European Service Module and Space Launch System in 2017.

See related stories:

Airbus Defence and Space's system design of European service module for US MPCV spacecraft Orion approved by ESA
bit.ly/1lbVae7

The German Space Agency Is a Vital NASA Partner
1.usa.gov/1lbUC80

NASA Astronauts must first splash down to take off to an asteroid

NASA is planning to send astronauts to an asteroid in the early 2020s, and preparations are already underway in the world's largest swimming pool - the Neutral Buoyancy Lab at Johnson Space Center in Houston.

Wearing modified versions of the orange space shuttle launch and entry suits, NASA astronauts Stan Love and Steve Bowen went underwater on May 9 to work through mission operations for NASA's Asteroid Retrieval Mission (ARM). Find out how the astronauts learned to tackle this mission and what they might be wearing at: 1.usa.gov/1hIVRSW



Future of exploration showcased at 30th Space Symposium event



The prime contractors for NASA's Orion and Space Launch System (SLS) program came together to tell NASA's deep space story at the 30th Space Symposium conference held May 19-22 in Colorado Springs, Colo. The team showcased the new systems that will take humans farther into space than ever before, during events throughout the three-day conference.

A panel discussion about the inspiration and future of spaceflight took place with former astronauts Kent Rominger from ATK, John Grunsfeld from NASA, and Lockheed Martin's Mike Hawes and Boeing's John Shannon.

Four young engineers representing SLS and Orion participated in the Space Symposium New Generation activities geared at young professionals 35 and under. The panel highlighted a new generation of professionals that are working to help take the next steps for deep space exploration.

The SLS and Orion deep space industry team hosted the first inaugural SpaceSLAM! networking event that invited young professionals to pitch original STEM ideas in an entertaining format.

For more information about Space Symposium, go to:
bit.ly/1mZ5m8f



Lockheed Martin Orion Spacecraft CPE Henry Martinez, won the Dr. George Herzl award for "best paper" for his paper called "Testing Orion's Fairing Separation System", at the 42nd Aerospace Mechanisms Symposium held May 14-16 in downtown Baltimore.

Deep space exploration discussed at Houston forum



Orion & SLS team members had the opportunity to talk about deep space exploration with Congressman Randy Weber at a Houston Business Forum breakfast on May 13. Pictured from left to right are Lockheed Martin's Eric Perry & Linda Singleton, Weber, Lockheed Martin's Stephanie Hicks and ATK's Brian Duffy.



Lockheed Martin engineer Vanessa Aponte served on a STEM Panel for EICNetwork.tv on May 21. The webcast was sponsored in part by Lockheed Martin and can be viewed for play back online at: bit.ly/1oAPIGF



Lockheed Martin participated in the Family Day held at Kennedy Space Center on Saturday, May 10. The exhibit, which highlighted the Orion Program, was visited by hundreds of employees who brought family and friends to the event. Captain Orion, Lockheed Martin Test Engineer Herb Yamada, gave three kid-friendly, Science, Technology, Engineering and Math- (or STEM) themed presentations to large crowds of excited kids.

Space enthusiasts get onboard Orion at Comicpalooza. No joke!



More than 30,000 comic book fans turned out for Comicpalooza, held May 23-25 in Houston. NASA and Lockheed Martin volunteers staffed the exhibit area, which took over three floors of the massive George R. Brown Convention Center, making this event the largest comic convention in Texas.

Orion team staffers recruited cosplay characters and comic collectors to join the #ImOnBoard campaign by signing the banner and posting their "selfies" at the event.

In addition, NASA's Exploration Systems outreach leads Ashley Edwards, Barbara Zelon and David Hitt provided a panel discussion entitled "Top Secret: Mars Exploration Plan!"

Convention attendees were thrilled to learn about the upcoming flight test later this year and that Orion would one day transport humans to explore Mars. Some of the more interesting comments captured during the event:

"Wow! This is Science Non-Fiction at a Science Fiction Event!"

"No, Orion's propulsion system does not contain Dylithium Crystals."

Elmo was tickled to sign the #ImOnBoard banner for Orion's first mission. Hear what he thinks about flying into space on Orion in this interview with Space.com's Tariq Malik just before the launch of STS-135: bit.ly/SBK0t6

Learn more about Comicpalooza at <http://www.comicpalooza.com/>



The Orion Service Module Static Test teams at Michoud Assembly Facility in New Orleans, (upper left), Kennedy Space Center in Florida, (upper right), Glenn Research Center in Cleveland, Ohio, (lower left), and Lockheed Martin's Waterton Facility near Denver, (lower right), received Orion Program Manager Commendations for their outstanding efforts in the successful completion of the Orion Service Module Static Testing in support of Exploration Flight Test-1.



A is not just for Apples anymore. The 26 week spell-down to launch is now underway. Follow it on Facebook at: on.fb.me/1no0Jq4

Coming up in June:

- EFT-1 Crew Module / Service Module mating, KSC
- Parachute Test Vehicle (PTV-8) drop test, Yuma, Ariz.
- Exploration Day on the Hill, Wash. DC



Read more about Kevin Pfitzinger at: on.fb.me/1kEynJe