

National Aeronautics and  
Space Administration



# ORION

MARCH 2016

# ROCKING OUT WITH ORION





# MEGAWATTS OF ENERGY TEST ORION'S SOUND STRUCTURE

During the first week of March, the Orion crew module that flew in space on Exploration Flight Test-1 had its own private rock concert. More than 1,500 speakers, generating nearly a megawatt of energy, surrounded the spacecraft and blasted it with sound loads similar to what future Orion missions will experience during launch and ascent.

This new type of acoustic testing, performed in the Reverberant Acoustic Lab of Lockheed Martin Space Systems' Waterton, Colorado, campus, is called direct field acoustic testing. The team is trying it out to see if it is a viable, cost-effective testing mechanism for future Orion missions.

"For a typical acoustic test, we move the spacecraft into a soundproof test chamber, close the door and pump sound through horns to recreate the sound spectrum that the launch vehicle will produce," said Dan Qvale, Orion mechanical test manager at Lockheed Martin. "Direct field acoustic testing allows us to bring the test to the spacecraft instead of having to bring the spacecraft to the test facility. Hundreds of speakers are stacked in a circle around the

spacecraft without having to move the vehicle into an acoustics chamber facility."

Future Orion missions, beginning with Exploration Mission-1, will launch aboard NASA's powerful Space Launch System rocket. To simulate the sound loads Orion will experience during launch, the team needed to evaluate a very high level of acoustic loads.

"The sound we subjected Orion to was louder than jet engines or a stadium rock concert," said Shane Roskie, the Orion test engineer and operations manager.

Using the new direct field acoustic testing will allow greater schedule flexibility and decrease testing costs, helping make the test and production of future Orion capsules more affordable and efficient.

Lockheed Martin also invited media to view the test set-up and to speak with Dan Qvale and Shane Roskie. Examples of the resulting media coverage included:

▶ Popular Science  
▶ FOX31 Denver

▶ CBS Denver  
▶ 9News

# TEST ENGINEERS PERFECTLY SUITED FOR ORION



Engineers at NASA's Johnson Space Center in Houston are evaluating how crews inside a mockup of the Orion spacecraft interact with the rotational hand controller and cursor control device while inside their spacesuits. The controllers are used to operate Orion's displays and control system, which the crew will use to maneuver the spacecraft.

# ASRC FEDERAL SHINES BRIGHT FOR ORION



Pictured above from left to right: Lockheed Martin Vice President & Orion Program Manager Mike Hawes congratulates Lloyd Gregg, vice president & general manager of spaceflight support services and Charlie Bengston, engineering and aerospace solutions group president, on receiving Lockheed Martin's prestigious Rigel Award.

Lockheed Martin recently honored ASRC Federal Space and Defense with the company's prestigious Rigel Award for 2016, which recognizes a small business subcontractor who performs above and beyond its contractual commitments. Named after the brightest star of the Orion constellation, the Rigel award is Lockheed Martin's Small Business of the Year Award for the Orion Program and is given to those subcontractors who shine above and beyond the call of duty for the prime contractor.

Headquartered in Beltsville, Maryland, ASRC Federal is a subsidiary of Arctic Slope Regional Corporation—an Alaska Native Corporation and Small Disadvantaged Business that was born of the needs of the Iñupiat people of the Arctic. ASRC Federal has provided highly qualified personnel to perform spacecraft final assembly, integration, and test at NASA's Kennedy Space Center Neil Armstrong Operations & Checkout building. ASRC has also demonstrated exemplary services in the development, integration, test, verification and launch support, and provided exceptional engineering services through the full life cycle for Orion Test Labs.

► [Read the full story](#)

# CALIFORNIA COMPANIES ARE MAKING ORION AND SLS A REALITY

NASA and Lockheed Martin Orion program management representatives visited several suppliers throughout the southern California region March 30–April 1 to view Orion elements in production and recognize the workforce for their hard work and dedication to the program. San Diego Composites in San Diego, Avatar Machine in Fountain Valley, and Morrell's Electro Plating in Compton, were among the companies visited. The team also joined representatives from the Space Launch System

Program at AMRO Fabricating Corporation in South El Monte, and Aero Pacific Corporation in Placentia, companies that are manufacturing structures for Orion and SLS. There are more than 762 companies throughout California that provide specialized components or manufacture complex, lightweight structures for Orion and SLS. Media coverage of the site visits included:

- ▶ **NBC San Diego**
- ▶ **KUSI News**

- ▶ **The San Diego Union-Tribune**



NASA Astronaut Rick Mastracchio signs autographs for employees at Avatar Machine in Fountain Valley, California.



Avatar CEO Denny Nguyen shows NASA's Rick Mastracchio and Lara Kearney some of the complex machining on the Orion backbone.



The team at Hi-Rel Connectors show their enthusiasm for Orion.



The Orion team gathers in front of San Diego Composites' massive autoclave that cures structures for the launch abort system.



Lockheed Martin's Larry Price talks to the AMRO team in front of the crew module section they just finished machining.



AMRO's SLS Program Manager Joe Biancha shows NASA's Rick Mastracchio and Boeing's Will Haas a machined panel for the EM-2 SLS engine section.



NASA's Rick Mastracchio joins the Aero Pacific team on the factory floor in Placentia, California.



Orion program representatives commend the Morrell's team for a job well done.

# THOUSANDS LEARN ABOUT NASA AT SXSW IN AUSTIN



Nujoud Merancy, (center) Orion mission planning and analysis lead for NASA's Johnson Space Center; Chris Crumbly NASA spacecraft/payload integration and evolution manager; NASA Astronaut Victor Glover; NASA Astronaut Jessica Meir; and Yves Lamothe, lead systems engineer for the Ground Systems Development and Operations Program presented at SXSW's "Next for NASA: the Journey to Mars" panel. The team highlighted the steps being taken to prepare humans to visit Mars including studies on the habitability of Mars, the use of the International Space Station as a testbed to study the effects of long-duration missions, the successful Orion 2014 test flight, the on-going manufacture and testing of the Space Launch System rocket, and development of other advanced new systems.

► [Read more](#)



# ORION TAKES CENTER STAGE AT SCIENCE NIGHT

Lockheed Martin Orion team members Brian Foss, Dustin Neill, and Rick Crockford took part in the Clear Creek Independent School District Science Extravaganza at Space Center Houston on March 2. Nearly 3,000 students and parents attended the third annual event to visit dozens of exhibits, enjoy hands-on science-themed activities, and explore Space Center Houston exhibits and educational experience displays. A full-scale training mockup of the Orion spacecraft is on display at Space Center Houston as part of their future space exploration exhibit.



Dieter Jobe, legislative fellow for Rep. Posey (R-FL-8) in Washington, visited the Neil Armstrong Operations & Checkout building at NASA's Kennedy Space Center in Florida to view the Orion crew module pressure vessel and receive a program update on March 9. Accompanying Jobe (second from left in photo), were Joe Mayer, Lockheed Martin government relations; Scott Wilson, NASA Orion production operations manager; and Jules Schneider, Lockheed Martin Orion assembly, integration, & production senior manager.

# ORION HONORED AT GODDARD MEMORIAL DINNER

NASA's Johnson Space Center Deputy Director and former Orion Program Manager Mark Geyer and the Orion Exploration Flight Test-1 (EFT-1) team were each honored at the 59th Annual Robert H. Goddard Memorial Dinner in Washington, D.C., on March 11 by the National Space Club and Foundation.

Geyer received the Astronautics Engineer Award for his many accomplishments throughout a distinguished career in aerospace and systems engineering, and particularly for his leadership in the development and successful flight test of Orion.

The Orion EFT-1 team was recognized with the Eagle Manned Mission Award for its successful execution of Orion's first flight test, which paved the way for the development of the first new American deep space crew vehicle in more than 40 years. Orion Manager Mark Kirasich accepted the award on behalf of the team.

Awards are selected by panels of experts from across the aerospace and defense industry, government and academia, and are a testament to the inspiring work of individuals across the United States.

► [Learn about other recipients](#)

# ORION INTERNATIONAL



International cooperation is seen at its best at the annual Orion European Service Module (ESM) progress meeting held in Bremen, Germany. Pictured here, Orion ESM project team members from across Europe join their U.S. colleagues from Lockheed Martin and NASA during a technical interchange meeting in March. Hundreds of employees in 11 European countries contribute to the Orion Program in their support to Airbus Defence & Space and the European Space Agency. The first ESM space flight structure for Exploration Mission-1 is scheduled to arrive in Bremen at the end of April.

## GO BACKSTAGE WITH ORION

At NASA's Johnson Space Center in Houston, engineer Heather Paul and Astronaut Chris Cassidy put on spacesuits to test out the next generation controller for the Orion spacecraft—NASA's deep space vehicle that will take humans on the #JourneyToMars.

► [Watch the video](#)



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