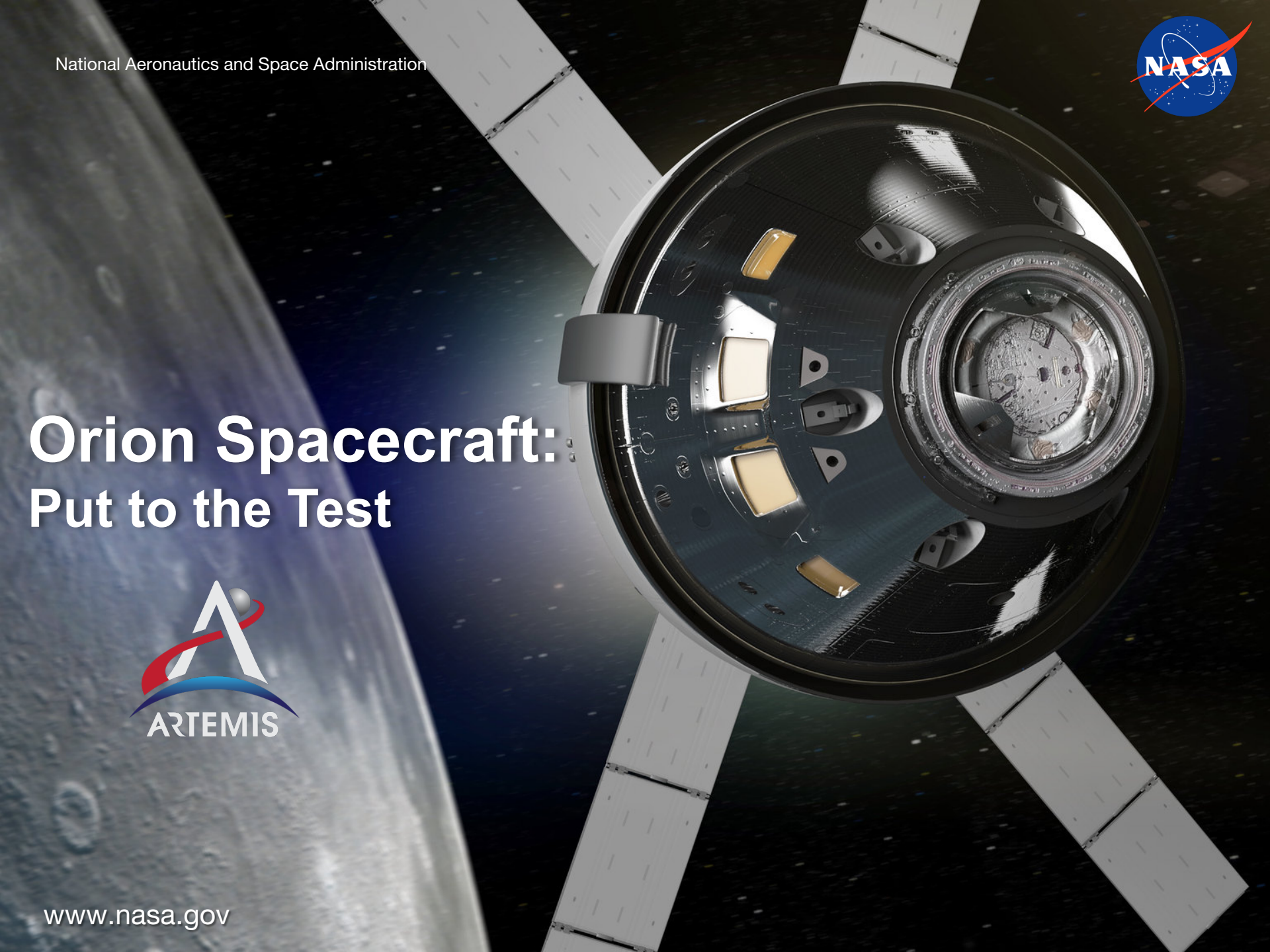
National Aeronautics and Space Administration



Orion Spacecraft:
Put to the Test

ARTEMIS

www.nasa.gov

Named after one of the largest constellations in the night sky and drawing from over 50 years of spaceflight, the Orion spacecraft is America's next generation spacecraft that will take astronauts to exciting destinations never before explored by humans. The Orion program uses unique facilities at NASA's Neil A. Armstrong Test Facility in Sandusky, Ohio, to evaluate the spacecraft. To date, five major Orion related tests have been conducted at the test facility's Space Environments Complex (SEC), which houses three of the world's largest and most capable simulated spaceflight test facilities: Space Simulation Vacuum Chamber, the Reverberant Acoustic Test Facility (RATF), and the Mechanical Vibration Facility (MVF).

Crew Module Backshell Testing
February 2015

At the SEC, engineers and technicians conducted an acoustic test of the Thermal Protection System. Using the power of RATF – 160 decibels, which is as loud as having firecrackers go off right by your ear – to simulate acoustics during a launch abort, NASA confirmed the thermal panel design met requirements.

European Service Module Structural Testing
Nov. 2015 - March 2017

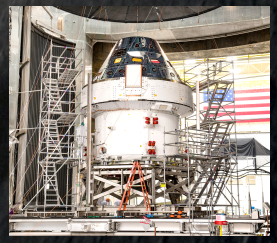
NASA, ESA (European Space Agency), Lockheed Martin, and Airbus completed evaluation of the full-size test version of Orion's European Service Module (ESM) at the SEC. The ESM will provide life support systems for the crew, as well as propulsion and power during future Artemis missions. The first test focused on the successful solar array after transport from Europe. Next, the ESM went to RATF, where it was blasted with over 150 decibels. It was then placed on MVF to simulate launching on the Space Launch System rocket. A final solar wing deployment was conducted to verify Orion's power system.

Launch Abort System Panel Testing
July– Aug. 2017

In summer 2017, RATF tested Orion's ogive panels and hatch, which protect the crew from harsh sounds and vibrations during a launch abort. The launch abort system keeps astronauts safe if there is an emergency during launch by pulling the crew module away from the spacecraft.

Ascent Abort 2 Acoustic Test
August 2018

NASA engineers used RATF to conduct abort-level acoustic tests for Orion's Ascent Abort-2 flight test crew module, simulating the conditions the test module would experience during flight. The test was successful, verifying the vehicle structure workmanship and computer modeling predictions, while also confirming the operation of test capsule's avionics.



Artemis I Crew Module and Service Module Testing
Dec. 2019-March 2020

An international team of engineers and technicians completed four months of testing of the Orion spacecraft for Artemis I. It began with thermal vacuum testing to simulate flying in and out of sunlight and shadow in space while Orion's systems were powered on. The second phase was an electromagnetic interference and compatibility test to simulate the effects of internal and external radio frequencies on the spacecraft's avionics and electronics. The test campaign completed weeks ahead of schedule, confirming the spacecraft will perform safely and as designed during future Artemis missions.

A series of increasingly challenging missions awaits, and the Orion spacecraft will take us farther than we've gone before, including sending the first woman and next man to the Moon.