The View from Deep Space

John Crane supports historic Artemis II mission with critical equipment

Matthew Jaster, Director, Editorial Content

Artemis II space mission. Orion spacecraft with Moon. Elements of this image furnished by NASA.

NASA's successful Artemis II mission represented the first crewed lunar mission since *Apollo 17* in 1972 as well as a major leap forward in humanity's return to deep space exploration. The mission launched on April 1, 2026, and lasted approximately nine days, one hour and 32 minutes.

The goal was to validate the *Orion* spacecraft, space launch system (SLS) and move the needle for operational procedures on future lunar missions. The four astronauts also assessed life support, navigation and communication systems in deep space while sending some of the most beautiful photos of the moon back to Earth.

John Crane's contribution to the project formed part of a broader, multi-division effort across the Smiths Group, bringing together complementary technologies to support this mission-critical program.

Collaboration with the ArianeGroup

John Crane's introduction to the Artemis project began when the organization collaborated with the ArianeGroup.

"We came in contact with the ArianeGroup back in 2010 when they were looking for partners to provide sophisticated manufacturing capabilities for aerospace applications," said Jeroen Huizinga, senior director at John Crane. "They wanted to collaborate with us based on our experience as a filtration specialist making sieves for different applications."

The first physical product that came from this collaboration took a few years to develop as the companies worked together to optimize the design by combining ArianeGroup's experience and knowledge in space applications with John Crane's in-house manufacturing technology to create a working prototype.

The ArianeGroup is a contractor for the European launcher Ariane 6 and the M51 strategic missile. The organization has unique expertise in Europe in the field of spatial and orbital propulsion. ArianeGroup's contributions for the Artemis II mission included the propulsion subsystems, high-pressure helium tanks, propellant tanks, technical assistance, avionics assistance and complete final assembly and testing.

"We've worked with the ArianeGroup for several years on manufacturing technologies for the Ariane 5 and the Ariane 6 as well as the Artemis program," Huizinga said.

Ariane 6 is the new-generation launcher, designed to be modular, flexible, and versatile, to meet the needs of institutional and commercial customers in the space market.

A History of Manufacturing Excellence

John Crane, a member of Smiths Group, is a global leader in flow-control technologies and an innovator in solutions for rotating equipment across the energy and process industries. Its portfolio spans mechanical seals, couplings and filtration systems, supported by advanced service solutions and digital diagnostics for pumps, compressors, turbines and other rotating equipment.

John Crane supplied highly specialized filtration sieves for the Artemis II program, specifically for the spacecraft's propellant management devices (PMDs). These systems play a vital role in low-gravity environments by managing the separation of liquid and gas phases within

propellant tanks, enabling effective and reliable thrust during the mission.

"The challenge for this application is that the filtration sieves included a titanium outer ring and a thin, stainless-steel wire mesh which needed to be welded together. Most people will tell you that you can't weld titanium with stainless steel so our material scientists came up with a special procedure to weld the frames together so the components could endure the extreme vibrations, pressures and temperature variations needed for space travel," Huizinga said.

These components needed to be manufactured to exceptionally high specifications and offer consistent performance throughout the mission to ensure there was a guaranteed supply of liquid hydrogen for steering and engine operation, according to Huizinga.

Not exactly your run-of-the-mill industrial application by any stretch of the imagination. Liquid hydrogen was the primary propellant for Artemis II fueling both the core stage and upper stage. It is notoriously difficult to manage because tiny molecules can easily escape through microscopic gaps and seals.

NASA engineers, in fact, had to perform a series of tests on the liquid hydrogen sphere to ensure the tank functioned properly prior to the mission.

In addition to John Crane's contribution, other Smiths Group businesses supported the Artemis II mission. Flex-Tek supplied highly engineered components for the *Orion* SLS, including rigid tubing used for the safe transfer of fuel, gas and hot air within the rocket's main propulsion and air systems. Smiths Interconnect contributed high-speed cable assemblies and connectors critical to mission communications.

"Product reliability and integrity was absolutely key to the success of these components and everyone across the company knew what was at stake once the mission launched in April," Huizinga added.

Precision manufacturing of filtration sieves for the Orion spacecraft. **(Image: John Crane)**

Each filtration sieve is carefully assembled to support reliable propellent management in space. **(Image: John Crane)**

Across the Finish Line

The day of the mission there were nerves around the office. Huizinga said team members were paying close attention to the television as well as the skies above. Some engineers watched the launch take place on television while others patiently waited for live updates from NASA.

On the second day of the mission, NASA reported that *Orion* had performed a 5-minute, 49-second translunar injection burn using the European service module's (ESM's) AJ10 main engine. This was the only use of the main engine during the mission; subsequent maneuvers were conducted by the eight smaller R-4D secondary engines. The burn consumed approximately 1,000 lbs. (450 kg) of hypergolic propellant and placed the spacecraft on a free-return trajectory around the Moon, requiring only minor course corrections for the remainder of the mission.

By the sixth day, *Orion* had entered the Moon's sphere of influence and was officially 252,756 miles from Earth (beating the previous record held by *Apollo 13*).

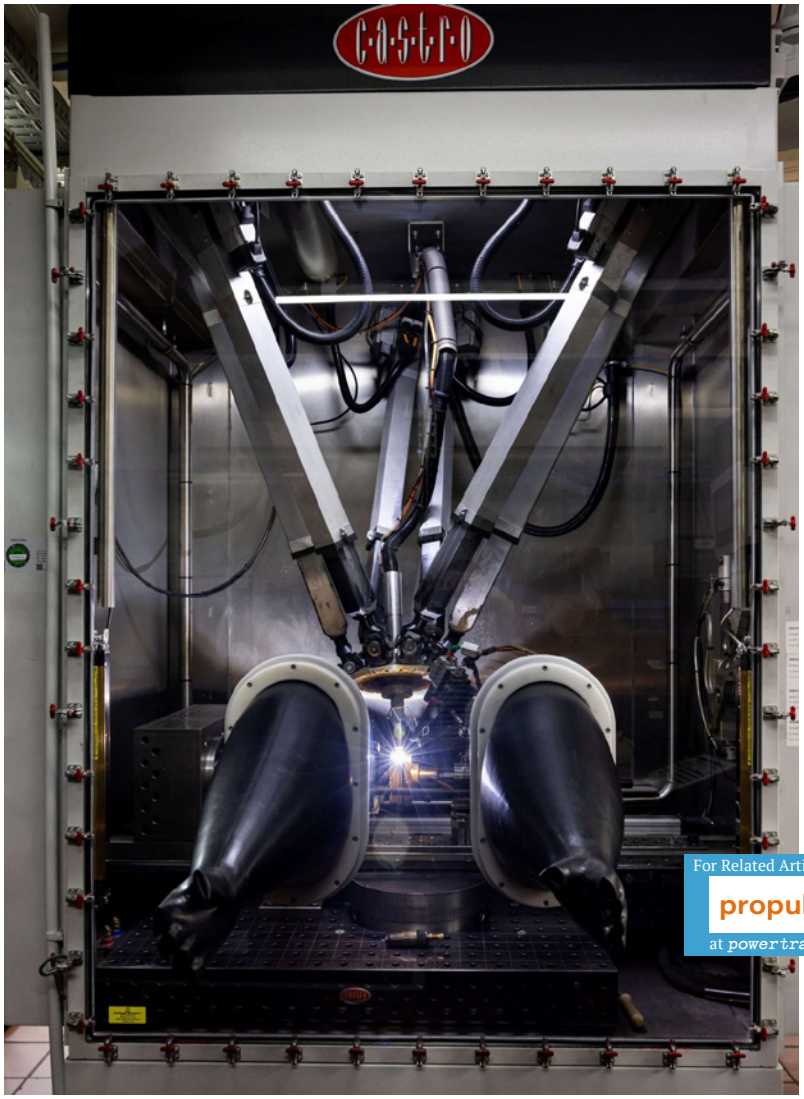
On day ten, *Orion* conducted an 8-second trajectory correction burn, the final firing of the ESM prior to reentry. NASA confirmed that the mission had consumed less than half of the fuel aboard the ESM. After the separation, the thrusters on the crew module fired for 19 seconds to push it away from the ESM and put it into the proper angle for reentry. Astronauts Christina Koch, Victor Glover, Jeremy Hansen, and Reid Wiseman returned to Earth safely on April 11, 2026.

Everyone involved in the Artemis II project at John Crane was keen to share the news of the successful mission.

"We have some nice samples and a display at one of the German plants that tells the story of how John Crane participated in the Artemis II project," Huizinga said. "I think all the different companies involved in the mission were extremely relieved and proud of their contributions to a project of this size and scope."

Ruben Alvarez, president of John Crane, said: "Artemis II is a powerful example of what's possible when deep engineering expertise, innovation and collaboration come together. At John Crane, we are proud to contribute specialized technologies alongside our colleagues across Smiths Group, helping enable a mission that pushes the boundaries of performance, reliability, and human exploration."

"Every piece of equipment for this kind of spacecraft needs to undergo a demanding qualification and



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Advanced welding technology helps produce mission-critical components for Artemis II.
(Image: John Crane)

acceptance program. During the sieve development phase, we had to combine the extensive sieve manufacturing expertise from John Crane with the space engineering know how of ArianeGroup. John Crane has proven to be a dependable supplier for such critical elements, and we are looking forward to continuing our cooperation," said Dr. Nicolas Fries, *Orion* propellant tank development lead at ArianeGroup.

What Comes Next

Huizinga believes Artemis III will be a continuation of the work John Crane has provided for earlier Artemis missions. During Artemis III, the SLS rocket will launch the *Orion* spacecraft and its crew to low Earth orbit and demonstrate rendezvous and docking capabilities with test versions from commercial human landing systems in development by Blue Origin and SpaceX. This mission is set to take place in 2027.

The company continues to collaborate with the ArianeGroup on filtration technology for other aerospace projects. The Smiths Group is also working on projects with the Indian space program.

The time and effort—not to mention the paperwork—needed to make the filtration technology work for Artemis II is something John Crane can celebrate for years to come.

Artemis II marked a historic step in inclusive space exploration and set a new human-distance record from Earth, inspiring global attention, and confidence in NASA's Artemis program. The mission bridged the gap between Apollo-era lunar exploration and the next generation of human spaceflight. The success of this operation will help NASA and other space agencies prepare a detailed roadmap for additional lunar missions as well as eventual missions to Mars.

"We played just a small role in a critical aerospace project and I'm always curious to know what they learned from the mission and what advancements will be applied to future space projects," Huizinga said. "The engineering and manufacturing capabilities alone, it's mind-blowing when you step back and think about it."

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nasa.gov/mission/artemis-ii

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