

LUNAR PROGRAMS



Artist's conception of a gateway habitat.
Image credit: NASA

NASA is leading a sustainable return to the Moon with commercial and international partners to expand human presence in space and gather new knowledge and opportunities. In 2017, Space Policy Directive-1 called for a renewed emphasis on commercial and international partnerships, return of humans to the Moon for long-term exploration and utilization followed by human missions to Mars. Aerospace is partnered with NASA in this endeavor and is involved in every phase and journey.

Humans must return to the moon for long-term exploration and utilization of deep space, but lunar

exploration is more than a stepping stone to Mars missions. The phased plan includes sending missions to the moon and cislunar space for exploration and study, and the construction of the Deep Space Gateway, a space station intended to orbit the moon. Aerospace provides support to these missions in areas such as systems engineering and integration, program management, and various subsystem expertise.

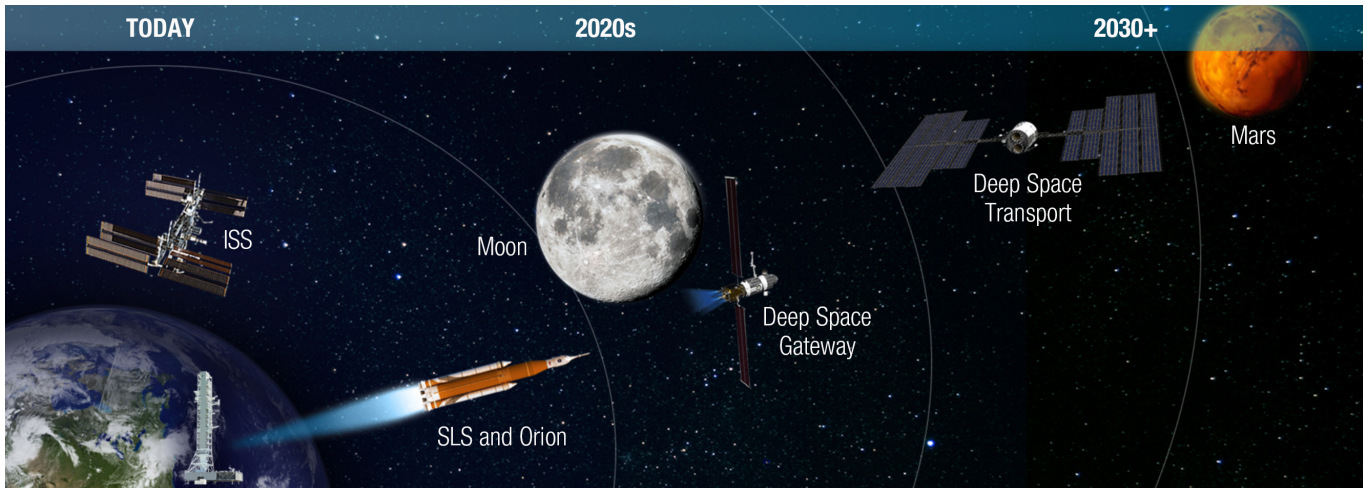
Current Lunar Programs

GATEWAY INITIATIVE

NASA's Gateway is conceived to be an exploration and science outpost in orbit around the moon that will enable human crewed missions to both cislunar space and the moon's surface, meet scientific discovery and exploration objectives, and demonstrate and prove enabling technologies through commercial and international partnerships. Aerospace is helping with the technical planning systems engineering and integration, data management, program management for the integrated high-level gateway system.

Aerospace is partnered with NASA to return humans to the Moon in every phase and journey, including the:

- › Planning and supporting the first lifecycle review of the Gateway Initiative
- › Design, systems engineering and integration, and operational concepts of the EVA system
- › Ground testing of the NEXTStep deep space habitat module prototypes
- › Design and test of the Orion capsule avionics



Projected exploration timeline. Image credit: NASA

NEXT GENERATION SPACE SUITS

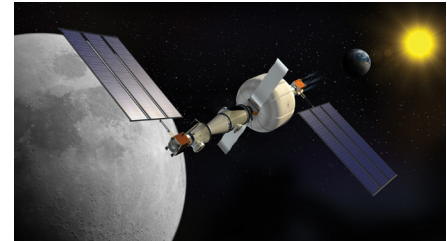
For future needs, Aerospace is working with NASA on design requirements, systems engineering and integration and operational concepts for the exploration EVA system, including the xEMU demo next generation suit, and its airlock and vehicle interfaces. The requirements for the exploration suits vary greatly from the existing suit, as astronauts will need to walk on the surface in partial gravity, be protected from lunar dust entering the suit and potentially binding to mechanisms and sustain astronauts during the -183°C, 14-day lunar night.



NASA's next generation xEMU prototype space suit. Image credit: NASA

NEXTSTEP HABITATS

Aerospace is participating in the NASA Gateway Ground Test Team, coordinating and executing the ground testing of the NEXTStep deep space habitat module prototypes and helping to downselect the finalists from six contractors – Northrop Grumman, Boeing, Lockheed Martin, Sierra Nevada Corporation, Bigelow Aerospace, and Nanoracks. Aerospace employees are participating as ground test experts, subject matter experts, and working with test subjects that will live and work in each of the mockups, performing activities that simulate three days of astronaut life aboard the Lunar Gateway.



Concept image of Sierra Nevada's Gateway concept featuring their habitat design. Image credit: Sierra Nevada Corporation

ORION CAPSULE AVIONICS

The NASA Orion capsule will eventually transport astronauts to the Moon, and is currently the only vehicle built for this purpose. Aerospace has a key role in the design and test of the avionics aboard Orion including the data handling subsystems, interfaces with other parts of the capsule, flight software, power, and wiring. The Orion team has over 130 cumulative years of avionics expertise and works closely with the NASA contractor on all aspects of the systems. An uncrewed Orion capsule mission (EM-1) is scheduled for launch in 2020, and the first crewed mission is scheduled for 2023.



Spacesuited engineers demonstrate how four crew members would be arranged for launch inside the Orion spacecraft, using a mockup of the vehicle at Johnson Space Center. Image credit: NASA

The Aerospace Corporation

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