Lunar Exploration (3)
Lunar Missions planned (2A)

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ORION: EM-1 AND BEYOND STATUS

Abstract

Orion, the Multi-Purpose Crew Vehicle, is a key piece of the NASA human exploration architecture for beyond earth orbit (BEO), along with the Space Launch System (SLS). Lockheed Martin was awarded the contracts for the design, development, test, and production planning for Orion through the Exploration Mission 2 (EM-2) in 2021. In December 2014 NASA and an industry team led by Lockheed Martin executed the Exploration Flight Test-1 (EFT-1) mission. Numerous lessons learned from the 4.5 hour, 60,000 mile flight that flew 15 times higher than the International Space Station have been applied to optimize the Orion design for future flights to increase crew safety, lower mass, lower cost, and shorten production schedules. The next flight of Orion, launched on the first flight of SLS, is Exploration Mission One (EM-1), and manufacturing is well under way. This uncrewed flight will perform a mission to the moon for a duration longer than three weeks. EM-1 also includes the first flight of the European Service Module (ESM), a key international partnership between NASA and the European Space Agency. The EM-1 critical design review has been completed, the EM-1 crew module structure is being outfitted and tested at Kennedy Space Center, and the ESM structural test article has been tested at NASA's Plum Brook Station. The production of the Ascent Abort 2 (AA-2) vehicle has begun. Procurement has also begun for the EM-2 mission, which will return humans to deep space for the first time since 1972, and will be the first flight on SLS with the Exploration Upper Stage (EUS). Lockheed Martin is also working with our NASA partner on the affordable production of Orion and the development of exploration architectures. Through implementing production lessons learned, process improvements, and increasing vehicle reuse, significant cost savings will be realized. As part of NASA's NextSTEP cislunar habitat study, and independent studies like Mars Base Camp, Lockheed Martin is taking advantage of the inherent robust deep space capabilities of Orion to enable future exploration missions. This paper will discuss the progress of the current EM-1 and AA-2 production, preparations for the first crewed flight of EM-2, and current planning for production of EM-3 and on.