

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Launch Vehicles in Service or in Development (1)

Author: Mr. Garry Lyles  
NASA Marshall Space Flight Center, United States, martin.a.burkey@nasa.gov

NASA'S SPACE LAUNCH SYSTEM PROGRESS REPORT

**Abstract**

NASA's Space Launch System (SLS) continues to achieve assembly and testing milestones on its way to the launch of the first human spacecraft to the moon since the Apollo Program. Flight hardware for Exploration Mission 1 (EM-1) continued to be completed in 2018 and early 2019. SLS, along with the Orion crew vehicle and the Exploration Ground Systems (EGS) launch facilities to support them are critical to the nation's plans to return to the Moon to stay in a measured, sustainable fashion. Lunar exploration will expand our understanding of Earth's formation, serve as a proving ground for technologies for pushing deeper into the solar system, and inspire a new generation. Building on our International Space Station (ISS) experience in low-Earth orbit (LEO), NASA will its partnerships with industry and other nations to explore the Moon and advance its missions to farther destinations such as Mars. Working with its partners, NASA is leading development of the first human spaceship to stay in orbit around the Moon, known as the Gateway. The Gateway will be a temporary home and lab for astronauts farther in space than humans have ever been before. Astronauts will visit the Gateway at least once a year – with four crew members living there in deep space for up to three months at a time – and the Gateway will be important to building a permanent human presence on the Moon. SLS is the only vehicle capable of sending both human crews and large payload elements in a single launch to the Gateway. Through various planned performance improvements, SLS will increase from a trans lunar injection (TLI) payload of more than 26 metric tons (t) in its initial configuration to greater than 45t and four times more volume. This unmatched capability will reduce the complexity, cost, and risk associated with payload design, ground infrastructure and in-space operations and offer the best opportunity for mission success. EM-1 vehicle hardware is in final testing, outfitting and assembly. Structural components for the second and third flights are also in production. The major components of the EM-1 liquid and solid main propulsion systems are complete. Structural testing on the core stage engine and payload sections is complete. Intertank and hydrogen tank testing is under way, while oxygen tank testing will begin later in 2019. This paper will discuss details of 2018-2019 progress and the work ahead to ready SLS for launch.