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NASA SPACE LAUNCH SYSTEM COMPLETES INTEGRATED STAGE GREEN RUN TESTING

Abstract

With completion of a full flight-like test of the world's largest rocket stage, NASA's Space Launch System (SLS) is now ready for integration and launch of the first Artemis mission to the Moon. SLS is the world's most powerful, capable launch vehicle, designed for transporting crew and cargo to support the NASA Artemis program's goal to explore the Moon and develop the technologies and experience for human exploration of Mars. With all other major components for the Artemis I launch vehicle already at NASA's Kennedy Space Center (KSC) for a planned 2021 launch, a major objective of the program's 2020 effort was the year-long "Green Run" test series of the Artemis I core stage at NASA's Stennis Space Center (SSC). The SLS core stage is the largest rocket stage in the world. Designed to validate the design, performance, workmanship, and readiness for launch, Green Run consisted of eight major tests culminating in a hotfire test of the stage and all four engines to provide all the data needed to certify the stage for flight. In parallel, significant progress has been made on other elements of the program. The Artemis II core stage major components are structurally complete and in various stages of outfitting. The Artemis III core stage liquid hydrogen tank is structurally complete and work is ongoing on the engine section. The Artemis II solid rocket motor segments are complete and casting has started on the Artemis III motor segments. Artemis II RS-25 engines have completed processing for stage integration, and Artemis III RS-25 processing is underway. Stacking the Artemis I solid rocket boosters on the Mobile Launcher (ML) at KSC is continuing. With stacking complete of the aft skirts, exit cones and the aft, center and forward motor segments, stacking of the forward assemblies will complete booster stacking. With the Artemis I Interim Cryogenic Propulsion Stage (ICPS) ready for integration at KSC, manufacturing is continuing on the Artemis II upper stage. Upper stage engines for the first three Artemis missions are complete. Planning is continuing for the Exploration Upper Stage (EUS), a more powerful upper stage that will replace the ICPS on Artemis IV. The EUS Critical Design Review (CDR) was completed in 2020. Likewise, the Artemis I Orion Stage Adapter (OSA) and Launch Vehicle Stage Adapter (LVSA) are complete, and their Artemis II successors in manufacturing. This paper will present SLS progress in 2020 and 2021 in greater detail, as well as upcoming plans.