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Status of NASA's Space Launch System

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Abstract

NASA's Space Launch System (SLS) continued to make significant progress in 2015, completing hardware and testing that brings NASA closer to a new era of deep space exploration. The most significant program milestone of the year was completion of Critical Design Review (CDR). A team of independent reviewers concluded that the vehicle design is technically and programmatically ready to move to Design Certification Review (DCR) and launch readiness in 2018. Just four years after program start, every major element has amassed development and flight hardware and completed key tests that will set the stage for a growing schedule of manufacturing and testing in 2016. Key to SLS' rapid progress has been the use of existing technologies adapted to the new launch vehicle. The space shuttle-heritage RS-25 engine is undergoing adaptation tests to prove it can meet SLS requirements and environments with minimal change. The four-segment shuttle-era booster has been modified and updated with an additional propellant segment, new insulation, and new avionics. The Interim Cryogenic Upper Stage is a modified version of an existing upper stage. The first Block I SLS configuration will launch a minimum of 70 metric tons (t) of payload to low Earth orbit (LEO). The vehicle architecture has a clear evolutionary path to more than 100t and, ultimately, to 130t. Among the program's major accomplishments in 2015 were the first booster qualification hotfire test, a series of seven RS-25 adaptation hotfire tests, manufacturing of most of the major components for both core stage test articles and first flight tank, delivery of the Pegasus core stage barge, and the upper stage simulator. Renovations to the B-2 test stand for stage green run testing was completed at NASA Stennis Space Center. This year will see the second booster qualification motor hotfire, flight and additional development RS-25 engine tests, and completion of core stage test articles and test stands and several flight article sections. This paper will discuss these and other technical and programmatic successes and challenges over the past year and provide a preview of work ahead before the first flight of this new capability.