Next-Generation RS-25 Engines for the NASA Space Launch System

Richard O. Ballard
M/S XP20
NASA Marshall Space Flight Center
Huntsville, AL USA 35812
rick.ballard@nasa.gov

Abstract

The utilization of heritage RS-25 engine, also known as the Space Shuttle Main Engine (SSME), has enabled rapid progress in the development and certification of the NASA Space Launch System (SLS) toward operational flight status. The RS-25 brings design maturity and extensive experience gained through 135 missions, 3000+ ground tests, and over a million seconds total accumulated hot-fire time. In addition, there were also over a dozen functional flight assets remaining from the Space Shuttle program that could be leveraged to support the first four flights. Beyond these initial SLS flights, NASA must have a renewed supply of RS-25 engines that must reflect program affordability imperatives as well as technical requirements imposed by the SLS Block-1B vehicle (i.e., 111% RPL power level, reduced service life). Recognizing the long lead times needed for the fabrication, assembly and acceptance testing of flight engines, design activities are underway at NASA and the RS-25 engine provider, Aerojet Rocketdyne, to improve system affordability and eliminate obsolescence concerns. This paper describes how the achievement of these key objectives are enabled largely by utilizing modern materials and fabrication technologies, but also by innovations in systems engineering and integration (SE&I) practices.