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Author: Mr. Benedikt Determann
ArianeGroup, Germany

Mr. David Kalwar
ArianeGroup, Germany
Mr. Markus Jäger
Airbus Defence & Space, Space Systems, Germany
Mr. Daniel Pika
ArianeGroup, Germany

STATUS OF ORION EUROPEAN SERVICE MODULE PROPULSION SUBSYSTEM QUALIFICATION TESTING

Abstract

The ORION spacecraft is a multi-purpose crew vehicle designed to support missions beyond low Earth orbit. ORION will be launched by the Space Launch System (SLS).

NASA, ESA, European and US Industry are working together to develop the ORION spacecraft. ESA is responsible for the European Service Module and awarded a contract to Airbus Defence Space GmbH for its development and production of the first flight unit. The European Service Module provides translational thrust and 3 axis attitude control for the spacecraft, stores life support consumables for the crew module (oxygen, nitrogen and water), and provides thermal control and power.

For the qualification of ORION's propulsion subsystem (PSS) a representative propulsion qualification model (PQM) was built, comprising of a main engine, 8 auxiliary thrusters and a subset of RCS thrusters. The PQM is tested at NASA White Sands Test Facility (WSTF) in New Mexico, US. In August 2017 initial qualification testing has been performed in a blow-down mode without tank pressurization unit. All different engines and thrusters were ignited, including different firing combinations. After completion of the first part of the test program the PQM was put into storage conditions addressing the risk of stress corrosion cracking of lines in contact with MON. The 2nd part of the test campaign including pressurization function is performed in 2018 to conclude the qualification testing.

This paper presents the current status of the hot fire qualification test program for the ORION PSS. Furthermore, the PQM storage approach between first and second part of the campaign will be explained.