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SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

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OVERVIEW OF THE ELECTRIC PROPULSION SYSTEM "HEMP-THRUSTER ASSEMBLY" STATUS OF THE QUALIFICATION, LIFETIME TEST AND DELIVERY STATUS

Abstract

In 1998 the development of the new HEMP thruster technology (High Efficiency Multi Stage Plasma) for EP was initiated. In 2008 a complete HEMP- Thruster Assembly (HTA) including four thrusters, the power supply and control (PSCU), the flow control unit (FCU), harness etc. was ordered by the German Aerospace Center – Space Administration - for integration and flight on the SGEO satellite. Meanwhile the Satellite to fly on has changed, but the bus is the same. Two thrusters out of four will be integrated on the now selected "Heinrich Hertz" Mission H2SAT.

The manufacturing and formal environmental qualification of all qualification units has been completed successfully. The units are currently subject to lifetime testing. This test was activated mid of 2015 and will be finished by end of March 2018, achieving a Qualification Factor (QF) of 1.3.

The lifetime test is an integral part of the HTA system qualification. Two qualification models (QM 1 and QM 2) and one PSCU engineering qualification model (EQM) are performing the lifetime test. Both units are tested in the same vacuum chamber simultaneously. Each QM operates independently from the other one, performing a dedicated firing sequence. QM 1 demonstrates a required number of operational hours and cycles with a reduced "off" time. The QM 2 demonstrates the typical H2SAT operational cycling with a longer "off" duration.

The Manufacturing of the flight units (FM) is completed and the acceptance testing has been commenced. The respective PSCU - PFM has been delivered to Thales Electron Devices after successful acceptance testing, as well as the harness. All of these units have been subject to End to End testing and confirmed the adequacy of the system design.

Additionally, the successful computation of the plasma and the plasma- wall interaction in the thrusters as well in the test chamber will be presented, which helps to reduce the time for experiments.

In the presentation the status of the flight models and preliminary results of the lifetime- test near to QF 1 will be the main part – it has become reality.