

SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

Author: Mr. Norbert Püttmann
DLR, German Aerospace Center, Germany, norbert.puettmann@dlr.de

Mr. Peter Holtmann
Thales Electronic Systems GmbH, Germany, Peter.Holtmann@thalesgroup.com
Dr. Stefan Weis
Thales Electronic Systems GmbH, Germany, Stefan.Weis@thalesgroup.com
Dr. Alexey Lazurenko
Thales Electronic Systems GmbH, Germany, Alexey.Lazurenko@thalesgroup.com
Mrs. Nicoletta Wagner
Airbus DS GmbH, Germany, Nicoletta.Wagner@airbus.com

ELECTRIC PROPULSION IN GERMANY: STATUS OF THE HEMP SYSTEM DEVELOPMENT,
PRELIMINARY RESULTS OF THE LIFETIME TEST**Abstract**

In 1998 the development of the technology for the HEMP thruster (High Efficiency Multi Stage Plasma) was initiated. It represents a new and cutting edge technology for Electric Propulsion (EP), based on the well-known technology of travelling wave tubes. In 2008 a complete assembly including four thrusters, power supply and control, flow control, harness etc. was ordered by the German Aerospace Center - Space Administration for integration and flight on the S GEO telecom satellite in the frame of ESAs ARTES 11 Programme. Two Qualification Models have been following the qualification processes. In June 2015 the lifetime test was initiated including two thrusters in one facility. In the presentation the status of the flight models and preliminary results of the lifetime- test will be presented. The Satellite to fly the assembly on has changed, but the bus is the same. Two thrusters out of four are needed to fly on the now selected "Heinrich Hertz" Mission. So DLR-Space Administration is free to fly two thrusters on another mission.

Furthermore, new satellite buses with higher power levels and the idea of using EP for orbit raising require higher ISP and thrust. Tests have proved that further developed HEMP- thrusters could meet those mission profiles. The technology has to be developed further for higher thrust and power levels, different voltages, longer operation times. DLR Space Administration has been supporting research and development of new technologies for EP at companies and universities. During the past years a profound infrastructure containing research, development and education has been evolved to make possible cutting edge technologies for electric thrusters, their subsystems, diagnoses and modelling. But more flight heritage is necessary.

It is planned to present additionally the existing and proven technologies to meet the requirements of future satellites, including technologies for the required subsystems and test facilities. The successful computation of the HEMP- plasma and the plasma- wall interaction in the test chamber helps to reduce the needs and time for experiments. The status of the development of the HEMP thrusters, the validation status and the status of the lifetime-test will be the main part of the presentation - it has become reality.