HEMPT – Electric Propulsion
Recent results and product strategy

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The business unit Electron Devices of Thales Deutschland started at the end of the 90's with the development of a new propulsion technology, the HEMPT (**H**ighly **E**fficient **M**ultistage **P**lasma **T**hruster). Since then, the design has been qualified, has seen an unique and extended life test and the first flight units for the Germany technology satellite H2Sat are integrated on the satellite, which will be launched begin 2023.
Since the first product development, Thales has carried out a lot of improvements, highlighting the unique advantages (like flexibility, long life behaviour with small thruster, flexibility for Xenon and Krypton operation, simple and cost-effective design) of the HEMPT parallel to a continues improving the core performances of the thrusters.
Thales is currently a new design under final qualification, the EV0 thruster for LEO constellations for small satellites up to 1 t to support reliable and robustness operation at various operations conditions and orbits.
The HEMPT provides great benefits to the constellations market due to its unique ability of using different propellants without the need of any modifications and also due to its cost-effective design.
The EVO thruster design allow operation up to 700W and with a different acceleration anode voltage from 300 to 800V to allow different operation modes for the orbit rising, for attitude control in the final orbit and for the final debris at end of life.
The thruster can generate up to 32mN thrust with a specific impulse of 1330s in high thrust mode. The thruster can also be operated at a higher voltage in the fuel-efficient mode. With 800V it reaches an ISP of 1955s with a thrust of 25mN.
The flexible Thruster design allow power range from about 200W up to 700W, is able to operate with different propellant like Xenon or Krypton without design changes and can be adjusted to the thermal management of a satellite to minimise the impact in dissipation. All these flexibility aspects are today key for constellation driven by the low cost aspect.
Regarding the trend in the space market, already the next design evolution is under consideration, which will use the actual design to increase the thrust power in 2 steps up to 1,5kW and up to 3kW.

The final paper will provide an overview about the achieved results, the actual endurance test data for Xenon and Krypton and shoe the development strategy.

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