

IAF SPACE PROPULSION SYMPOSIUM (C4)  
Electric Propulsion (4)

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## PPS®X00 HALL THRUSTER DEVELOPMENT AT SAFRAN

**Abstract**

The low-power PPS®X00 Hall thruster is under development in the framework of the CHEOPS project<sup>1</sup>, with the ambition to develop the competitiveness of European electric propulsion technologies and provide the smallsats market with a compact and highly cost efficient propulsion system in the early 2020s.

With the smallsats industry going through a quick and significant expansion driven by multiple constellation projects, the development of a cost-competitive propulsion system able to meet the demand of these hundreds of platforms is challenging, be it from technical, industrial and programmatic perspectives:

- The system must be capable of operating for thousands of hours in LEO or MEO with a fair performance level at a few hundreds Watts.
- The challenging cost target imposes an innovative design approach, which relies, when feasible, on COTS components rather than developing specific high-end parts.
- The production rates are about 10 to 100 times higher than those typically met for comsats.
- The market cyclical demand requires fast and efficient development approaches to meet the short time-to-market requirement.

Based on these considerations the PPS®X00 architecture development has been driven by the design-to-cost philosophy. Reaching the target cost of the end-product is at the core of the design methodology and will be monitored during each development phase and design iteration.

Several innovations have been incorporated in the discharge chamber and magnetic circuit designs to propose competitive and reliable solutions while keeping a performance level matching the flight requirements.

The PPS®X00 development passed its first project review, the Concept Review, in the fall of 2017. This milestone validated the pre-project design selected out of tens of architectures and concepts during a trade-off addressing the technical, cost and production-ability aspects.

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<sup>1</sup>CHEOPS project (Consortium for Hall Effect Orbital Propulsion System) is a European space project led by Safran Aircraft Engines that has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement 730135.

The preliminary design phase is currently ongoing. A prototype and an engineering model are designed and manufactured. Several performance tests on both models are planned in 2018. Coupled tests of the EPS will then occur before a partial life test on the EM is performed.

Several elementary models, such as the structural model, will additionally bring quantitative figures for confirming the architecture ability to withstand the environmental requirements and allow to adjust models.