

SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

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LOW POWER HALL ELECTRIC PROPULSION ACTIVITIES AT SITAEL

Abstract

Low power electric propulsion is an enabling technology for a number of future missions, especially the ones involving mini- and micro- satellites. Current trend is to launch many low-cost spacecraft to accomplish a wide variety of tasks, ranging from Earth monitoring to communication. A brilliant example of it is the idea of developing a constellation of small satellites placed in LEO and capable of granting full internet coverage all over the world. In such a case an efficient propulsion system is extremely beneficial in order to save propellant and maximize the payload mass. Lightness is privileged, while internal redundancy is not strictly required (as it is implicitly provided by the large number of satellites constituting the constellation). Another relevant application is the de-orbiting of small satellites, a task that has now to be mandatory accomplished by each spacecraft operating in LEO.

To respond to these market needs, Sitael is actively operating in the field of low power Hall Thrusters, developing in house devices that operate at different power levels, small cathodes and all the necessary diagnostics to validate and qualify them.

The present work describes the main ongoing activities, presenting the development status of HT100, MSHT100, HT400 and small heated cathodes. HT100 underwent an intensive series of tests in order to investigate its structural behavior and to better assess its expected lifetime. The thruster has also been successfully coupled with a PPU BB, showing solid performance in an extended voltage and power range. Tests with alternative propellants have been carried out as well. MSHT100 (magnetically shielded HT100) has been tested at the end of 2016, showing promising results in term of expected lifetime. Results obtained from recent experimental campaign are here presented, illustrating also the short-term roadmap towards the full space qualification of the thruster units.