

SPACE PROPULSION SYMPOSIUM (C4)
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ELECTRIC PROPULSION ONBOARD ALPHABUS

Abstract

ESA and CNES initiated the development of Alphasat platform, as a coordinated European response to the increased market demand for larger telecommunication payloads for new broadband, broadcasting and mobile communications services. With the Alphasat product line, European Industry extends its telecommunication satellite range significantly beyond the capabilities of the existing European platforms, such as Eurostar E3000 and Spacebus 4000, both with respect to maximum payload power and mass. Based on their extensive experience, Airbus Defence and Space and Thales Alenia Space lead, as co-prime contractors, a European Alphasat industrial team. The Xenon Propulsion Subsystem which provides the North South Station Keeping during the 15 years lifetime is under Thales Alenia Space responsibility. Snecma is in charge of the Thruster unit, the PPS®1350-G which has a thrust of 90mN and a qualified total impulse of 3.4 MNs.

The first satellite based on the Alphasat product line, Alphasat, was built through a Public Private Partnership between Inmarsat and ESA, with Airbus Defense and Space as prime contractor. It was launched on July 25th, 2013. The electric propulsion subsystem has shown good behavior in flight.

Driven by competitiveness constraints, ongoing developments on geostationary communication satellites aim to introduce electric propulsion not only for NSSK but also for orbit raising / orbit topping in complement of chemical propulsion. The Alphasat roadmap plans to introduce such combined propulsion on the platform.

This evolution requires more powerful thrusters in order to limit the transfer duration. Development activities achieved with the support of CNES confirmed the potential of a derived version of the PPS®1350-G, namely the PPS®1350-E thruster, at a power of 2.5 kW. The operating point - 7A / 355V - is chosen in accordance with the power available, the limits on materials, wires and PPU, and with minimum design evolutions. The objective is a quick development with drastically reduced risks ensuring competitiveness and serviceability for the short-term satellite market. The PPS®1350-E Engineering Model have clearly shown the flexibility of the thruster operation, delivering excellent performance (>140mN thrust, >1800s Isp, <40 divergence), the total impulse is estimated beyond 2.6 MNs. At the time of this abstract the qualification process is on progress: the CDR, ongoing, will be followed by a full qualification test campaign.

The paper will present the status of both PPS®1350-G and -E thrusters, and the perspectives of electric propulsion utilization on Alphasat for orbit raising and NSSK applications.