

IAF SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (1) (5)

Author: Mr. Alexandre Briges
SAFRAN, France, alexandre.briges@safrangroup.com

Mr. Vincent Guyon
SAFRAN, France, vincent.guyon@safrangroup.com

Mr. Julien Rabin
Safran Aircraft Engines, France, julien.rabin@safrangrou^p.com

COUPLING TEST OF PROPULSION SUB-SYSTEM : TMA 5000, PPU ELEKTRO, AND XFC
PPS®5000**Abstract**

Safran Spacecraft Propulsion (SSP) has demonstrated perfect coupling between a PPU ELEKTRO and its PPS®5000 Thruster and XFC, when integrated on a propulsion sub-system including a Gimbal mechanism (called TMA 5000).

This coupling test featured the largest system scope performed by Safran to date, since done with all parts of the propulsion sub-system:

- The Hall Thruster PPS®5000, its heater plate, both with extended harnesses
- A gimbal mechanism provided by Beyond Gravity on which thruster and heater plate were mounted
- A PPU provided by Airbus Defense and Space (ADS)
- A XFC with high length of tubing between it and the thruster

While the Thruster has significant test history (including qualification up to 17.2 MN.s), flight heritage and several platforms including it, its integration on such a system called for additional testing for confidence.

The goal of the test was to check functional compatibility between parts of the system, update performance models, receive new thermal balance data for system models, and derisk some hitherto untested system configurations throughout the complete operating domain of the Thruster.

It was the opportunity to check the design margins regarding several spacecraft parameters such as piping setup, harness impedance and inductance, and other custom use cases.

It was the 3rd Coupling Test between the PPS®5000 and the PPU ELEKTRO, but the first one since both had flight heritage, which allowed SSP to take into account also some flight scenarios during the campaign.

The operating domain tested covered 2.5kW/300V to 5kW/300V; 2.5kW/375V to 4.5kW/375V; 2.5kW/400V to 3kW/400V, as well as various start-up conditions.

The test was performed in February 2023 in the MVTF4 chamber of the Aerospazio facilities. Very few anomalies were observed, but a lot of insight was gained for operating the PPS®5000 Thruster on custom platforms.