



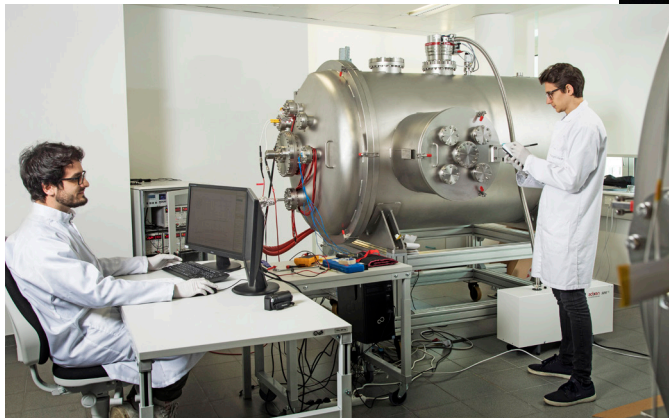
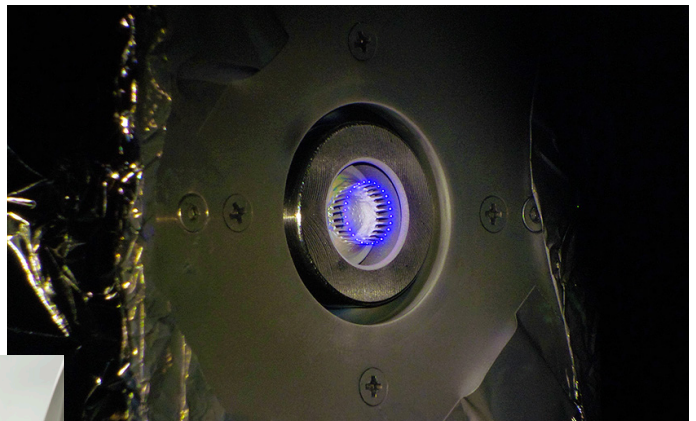
ENPULSION

FEEP Workshop

as of March 2024

The **ENPULSION FEEP Workshop** is conducted with an engineering unit of an ENPULSION propulsion system placed in a small-sized vacuum chamber. The setup allows for maximum flexibility by operating the thruster both using the ENPULSION EGSE GUI as well as operating the thruster using customer-furnished equipment, including OBC and EDU that can be placed table-top in air next to the vacuum chamber.

All the ENPULSION FEEP workshops are complemented by an in-depth discussion of the ENPULSION user manual, fostering understanding of the operational logic as well as constraints to facilitate customer-side implementation of the manual scripts.



ENPULSION's FEEP experts are available to jointly define the individual commissioning strategy based on specific mission needs and on-orbit capability.

Additionally, The ENPULSION FEEP workshop has been proven to be a very effective tool to decrease the required time for on-orbit

commissioning, both by verification of command scripts and hardware on an operational FEEP propulsion system, and by defining individual commissioning strategies, including defined data review points.



FULLY OPERATIONAL ENGINEERING HARDWARE

The engineering unit of an ENPULSION propulsion system placed in a small-sized vacuum chamber.



IN-DEPTH KNOWLEDGE

Discussion of the ENPULSION user manual, fostering deeper understanding to facilitate customer-side implementation.



TESTING OF CUSTOMER-FURNISHED EQUIPMENT

Operating the thruster both using the ENPULSION EGSE GUI as well as customer-furnished equipment, including OBC and EDU.



COMMISSIONING STRATEGY

Decrease required time for on-orbit commissioning by defining individual commissioning strategies, including defined data review points.



CONSTRAINTS OF OPERATION

The operation of an ENPULSION engineering unit in a small-sized vacuum chamber limits operation to thrust and power level (up to 100 μ N). Higher power levels would require different vacuum chamber facilities with according impact on scheduling and cost, and can be discussed individually.

3-DAY WORKSHOP AGENDA

(Can be adapted to specific customer needs which can be discussed individually)

FEEP THEORY AND USER MANUAL	<i>Introduction to FEEP physics and manual theory. Detailed discussion on ion emission, neutralization strategy, and how these are reflected in the operational scripts in the manual. Understanding the script logic allows the customer to tailor scripts to their specific operation needs.</i>	DAY 1 morning
THRUSTER OPERATION USING ENPULSION GUI	<i>Using the ENPULSION GUI allows direct and simple control of the thruster in the vacuum chamber, allowing to familiarize the user with operation of the FEEP thruster, providing understanding of the thruster feedback to commands sent.</i>	DAY 1 afternoon
OPERATION USING CUSTOMER-FURNISHED EQUIPMENT	<i>This section allows the customer to perform coupling tests of his equipment with the NANO thruster including thrust generation. This can include verification of customer-written commissioning and operation scripts on a thruster providing real feedback (at reduced thrust and power setpoints). This has been proven as an efficient way to de-risk and streamline in-orbit commissioning and operation.</i>	DAY 2 all day + DAY 3 morning
CUSTOMIZATION OF THE COMMISSIONING STRATEGY	<i>Tailoring of the commissioning strategy to the mission needs and on-board capability, identifying streamlined commissioning sequence and data review strategy. This has been proven as a valuable tool to reduce overall commissioning time as well as increase thruster availability by individually tailoring FDIR responses based on spacecraft capabilities.</i>	DAY 3 afternoon

LEAD TIME

The ENPULSION FEEP workshop needs to be scheduled 9 weeks in advance of the date.