ENPULSION
# Thruster Simulator Suite

The **ENPULSION THRUSTER SIMULATOR SUITE** consists of hardware and software products that offer satellite manufacturers and satellite operators testing capabilities for ENPULSION thrusters and satellite hardware, including thermal and load simulation, error injection, and telemetry replay across all program phases: initial concepts, design phases, technology development, operations, and the end of mission.
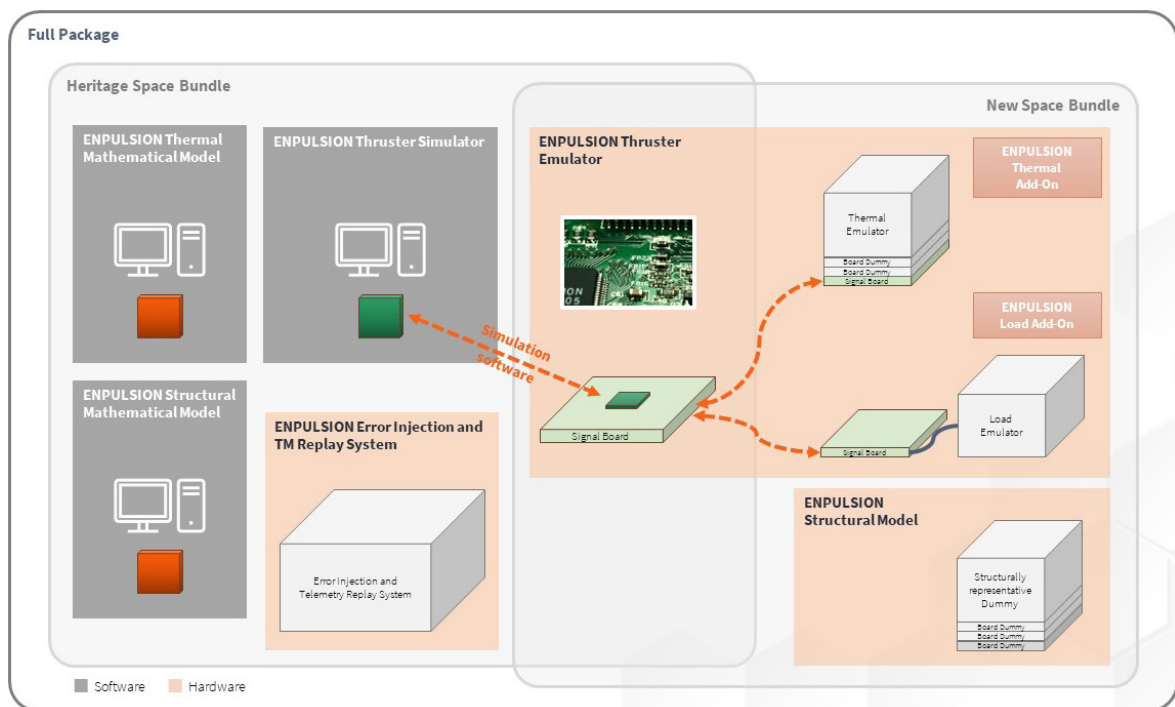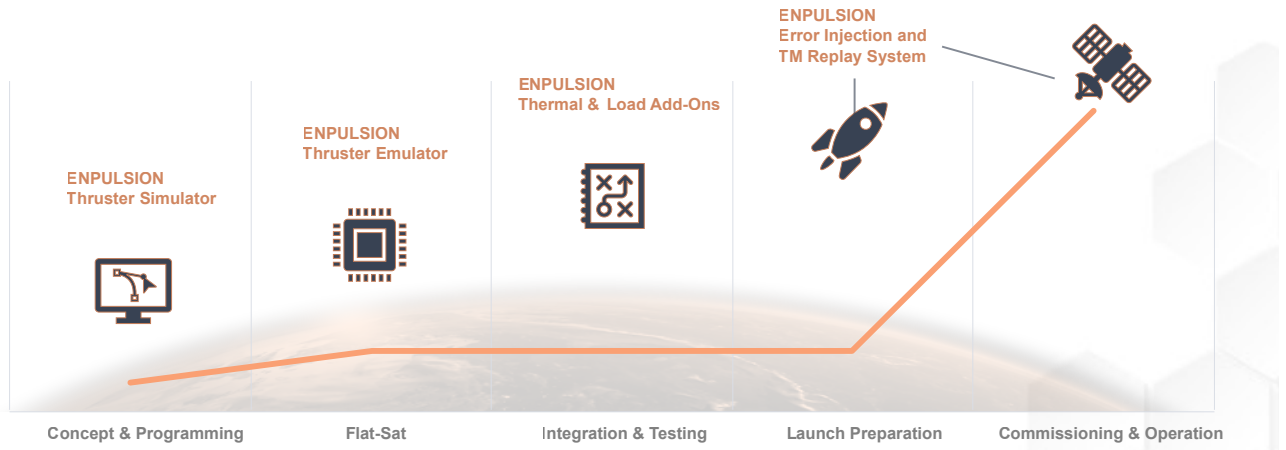

ENPULSION Thermal & Structural Mathematical Models

The ENPULSION Thermal & Structural Mathematical Models offer software simulations of the thermal and structural properties of ENPULSION thrusters to include in spacecraft concepts and initial design phases.

ENPULSION Thruster Simulator

The **ENPULSION Thruster Simulator** is simulation software that can be operated on a computer independently from any testing and/or satellite hardware. It offers the perfect environment for mission and AOCS analysis (TM/TC), up to 1000 times faster than real time. It contains a highly representative simulation for the **ENPULSION propulsion products**.

- ▷ **Easy and fast** to start and update.
- ▷ Up to **1000 times faster** than real-time.
- ▷ Easy way for customer support, "**looking at the same screen**" together.
- ▷ Offers the **perfect environment** for your mission and AOCS analyses (TM/TC).

- ▷ Can be used independently from any testing- and/or satellite hardware, or in conjunction with the **ENPULSION Thruster Emulator.**
- ▷ Available for the full range of **ENPULSION NANO**, **MICRO,** and **NEO*** product families.

* coming soon

Concept & Programming | Flat-Sat | Integration & Testing | Launch Preparation | Commissioning & Operation

ENPULSION Thruster Emulator

The **ENPULSION Thruster Emulator** is a standalone hardware that is functionally representative of a thruster *without the exposure to and safety constraints of high voltage.* It features realistic thruster operation and feedback, e.g. thruster subsection control, thrust and temperature readings supporting the *integration with the onboard computer and power supply* — without needing an expensive and complex setup. The model-based simulation is representative of a full **ENPULSION thruster** with a fixed emitter configuration. Optionally the following features can be ordered.

COMMUNICATION

The communication (TC/TM) is fully compliant in terms of hardware, protocol format and data contents.

AVIONICS TESTING

The intended use is in a flat sat or avionics test bench for hardware and software testing in a closed loop.

Available as separate and (mutually exclusive) *add-ons* for the ENPULSION Thruster Emulator:

ENPULSION THERMAL ADD-ON

A fully representative thermal load behavior.

ENPULSION LOAD ADD-ON

A fully representative electric or load behavior.

ENPULSION Structural Model

The **ENPULSION Structural Model** consists of a structurally representative model of your ENPULSION thruster e.g. used for vibration testing.

ENPULSION Error Injection and TM Replay System

The *ENPULSION Error Injection and TM Replay System* offers satellite manufacturers and satellite operators a wide range of testing capabilities that go far beyond simply "running a thruster". Commanded by a control PC to dry-run FDIR concepts, the *ENPULSION Error Injection and TM Replay System* lets you test your whole satellite setup for every possible error scenario. To investigate recorded failure cases in open-loop configuration, upload your telemetry data recorded during on-orbit operation of your spacecraft directly into your *ENPULSION Error Injection and TM Replay System* to re-run and deep-dive into the investigation on a detail-level never possible before.