Space Liquid Propulsion (H-IMP)

Type of Infrastructure

Liquid & Hybrid Space Propulsion combustion chamber test bench

Main technical features

H-IMP is a specialized facility designed for testing and evaluating combustion chambers used in liquid and hybrid rocket engines. This test bench plays a crucial role in the development and optimization of space propulsion systems and It allows to study and validate various technical features of combustion chambers under realistic operating conditions.

The H-IMP facility features a sophisticated propellant supply system that caters to both liquid and hybrid rocket engines, utilizing high-pressure storage tanks, pumps, and flow control valves. It incorporates an ignition system with spark igniters or electric igniters devices for reliable and consistent ignition. Accurate thrust measurement is achieved through load cells or force transducers. Advanced sensors monitor pressure and temperature to analyze combustion efficiency and detect instabilities. A comprehensive instrumentation and data acquisition system captures data from sensors such as pressure transducers, temperature probes, and flow meters, aiding in performance analysis. Safety measures like interlocks, emergency shutdown systems, and containment structures mitigate hazards. Control and automation systems enable precise management of propellant flow rates and test parameters, ensuring repeatability and reducing human error. The H-IMP test facility is an indispensable tool for developing and optimizing space propulsion systems, providing valuable insights for the enhancement of combustion chamber developments and designs.

Application Domains

- Basic research activity on combustion processes of both liquid (Ox and HC) and hybrid propellants, using a highly productive and flexible test bench.
- Assembly, integration and testing of small combustion chambers (1-3 injectors) or breadboards, up to 10kN of thrust.

Main measuring instruments/techniques

Application of advanced diagnostic techniques (PLIF, OES, HIS)

Operational Status

The construction phase of H-IMP is currently underway, and is expected to be completed by the first half of 2023.

CIRA Test Center (TC) Capabilities