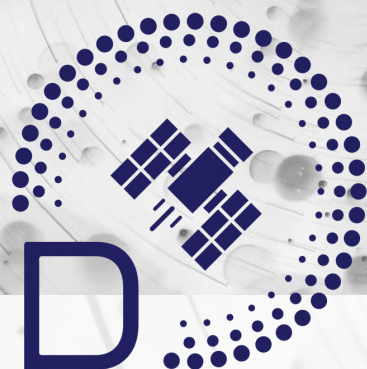




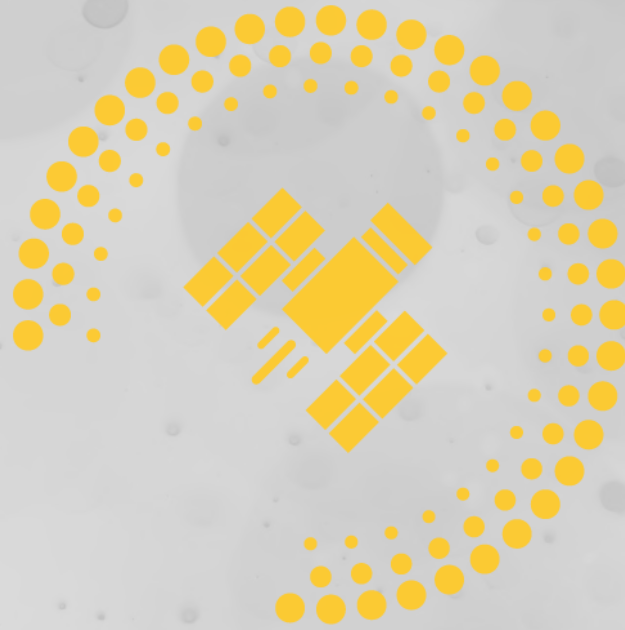
iFACT-MP

Fueling Space Differently



Funded by
the European Union

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Advancing Iodine-Based Electric Propulsion for Space Applications

iFACT-MP is a European research project focused on the development and validation of innovative iodine-based electric propulsion technologies for future space missions. By exploring sustainable and cost-efficient alternatives to conventional noble gas propellants, the project contributes to the advancement of next-generation in-space propulsion systems.

Throughout the project, the consortium successfully **developed and tested a 3 kW hybrid thruster unit compatible with iodine, krypton, xenon**, and potentially argon propellants. In parallel, significant progress was achieved in power processing systems and iodine control schemes; Europe's largest iodine-compatible test facility has been developed, tested, and is now available; electron-emitting ceramic materials; real-time iodine flow measurement technologies, as well as development and validation of the iodine storage tank and iodine fluidic regulator.

“Smaller Fuel. Bigger Mission.”

Key Achievements



Hybrid Thruster Development

Design, manufacturing, and validation of a 3 kW electric thruster compatible with multiple propellants. The anode is compatible with iodine, krypton, and potentially argon, while the cathode is compatible with noble gases.

Successful firing campaigns and environmental mechanical testing.

Identification of critical operational parameters for iodine-fed propulsion systems.



Advanced Power Processing Unit (PPU)

Development of a versatile PPU Breadboard enabling accurate control and validation of the propulsion system, including the iodine fluidic chain.

Integration of advanced safety mechanisms and user-oriented control interfaces.

Successful coupling tests with thruster and fluidic systems.



Key Achievements



Dedicated Iodine Test Facility

Commissioning Europe's largest vacuum test facilities, specifically designed for iodine propulsion systems.

Continuous remote operation capability with advanced plasma diagnostics and thrust measurement systems.



Innovative Electron Emitter Materials

Development of improved C12A7:e- ceramic electron emitters with enhanced thermal stability and current density.

Exploration of advanced doping and surface structuring techniques for higher-performance cathodes.



Real-Time Iodine Flow Measurement

Successful design and validation of a prototype laser-based iodine mass flow meter.

Real-time monitoring capability for improved propulsion system characterization and optimization.



Project Impact

*“Propulsion
Precision
Performance*

iFACT-MP contributes to strengthening Europe’s capabilities in sustainable electric propulsion technologies while supporting the transition toward more autonomous, efficient, and environmentally responsible space systems.

The project results pave the way for future iodine-based propulsion applications, reducing dependency on critical noble gas resources and enabling more compact and cost-effective spacecraft architectures.

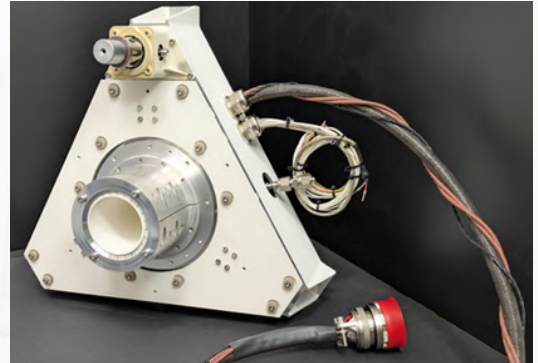
iFACT-MP brought together leading European industries, research centers, and universities, fostering multidisciplinary collaboration and accelerating innovation in electric propulsion technologies for space.



From Concept to Execution

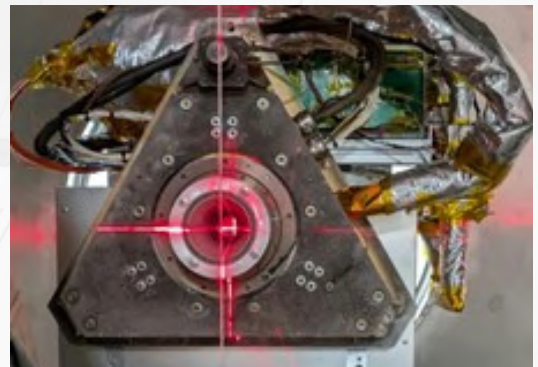
Picture 01

The integrated thruster unit



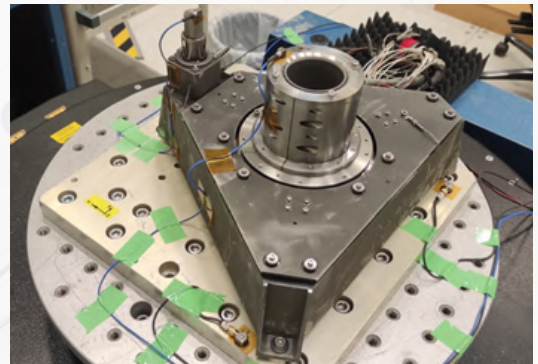
Picture 02

Alignment of the thruster unit in Aerospazio's vacuum chamber



Picture 03

Vibration testing of the thruster unit



Picture 04

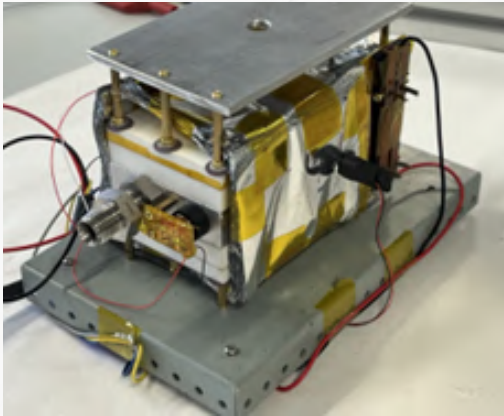
Firing of the hybrid thruster unit, with iodine for the thruster and krypton for the cathode





Picture 05

Vacuum Test Facility, main chamber view



Picture 06

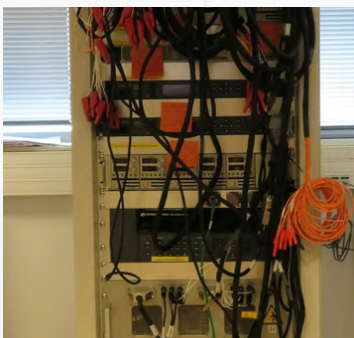
Mass flowmeter final prototype



Vacuum Test Facility, auxiliary chamber and control desk

Picture 07

Vacuum Test Facilities auxiliary Chamber and control test



Picture 08

Power Processing Unit



Picture 09 Processing steps for preparation of electron emitting C12A7 ceramic

iFACT-MP

Consortium



AIRBUS



UNIVERSITÀ DI PISA



CONNECT WITH US:

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-  **Duration:** 24 Months
-  **e-mail:** info@ifact-mp.eu



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