Hellenic Space Dawn Mission

From concept to orbit.

Emtech Space



isis SA
heron
GEOSYSTEMS HELLAS
LEO SPACE PHOTONICS
ΣΧΟΛΗ ΝΑΥΤΙΚΩΝ ΔΟΚΙΜΩΝ
HELLENIC NAVAL ACADEMY
HELLENIC REPUBLIC
National and Kapodistrian University of Athens
EST. 1837
ARISTOTLE UNIVERSITY OF THESSALONIKI

Acknowledgments

We express our deepest gratitude to the Hellenic Ministry of Digital Governance and the European Space Agency (ESA) for their trust, management, and continuous guidance throughout the Greek National SmallSat Programme.

Special thanks to the Greece 2.0 National Recovery and Resilience Plan and the European Union for providing the foundational funding that turned this ambitious vision into reality.



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Mission Overview

Hellenic Space Dawn mission is part of the Greek National SmallSat Programme, funded by the European Recovery and Resilience Facility (RRF) and managed by ESA on behalf of the Hellenic Ministry of Digital Governance. The Mission is designed to validate Greek space technologies in orbit.



Leadership

Emtech Space is an SME Greek Company specializing in advanced **Modeling, Simulation, and Validation** (MSV) for the space industry. We ensure the safety, reliability, and optimal performance of space systems across their lifecycle.

As the Prime Contractor, **Emtech** manages the entire scope of the HSD mission, from Project and Quality Assurance Management to Mission Analysis, Operations and the Development of the Ground Segment.

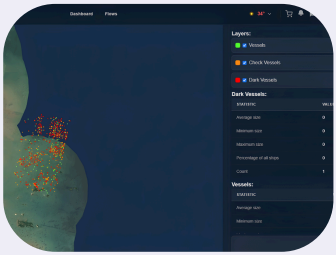
Emtech leads a **national consortium** of five Greek SMEs and three academic institutions.

Mission Objectives

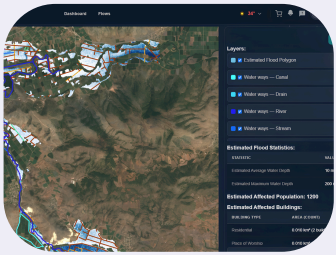
Earth Observation Applications

High-resolution imagery to support national and European environmental and security needs.

- Ship detection
- Agriculture and forestry
- Coastal and landslide monitoring
- Light pollution
- Urban land use monitoring









In Orbit Technology Validation

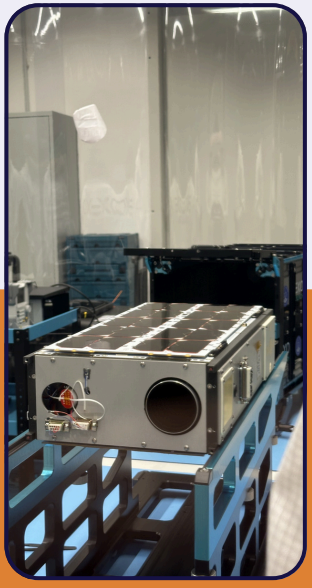
- **Sat-to-earth & Sat-to-Sat communications.**
  Testing high-speed laser links for both satellite-to-ground downlinks and RF Inter Satellite Link communication.
- **On-Board Processing.**
  Validating next-generation on board Edge processing for real time image compression, encryption and data analysis directly on the satellite.

Project Scale

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3	8	10+
Years of Development	Partners	Suppliers

30+	3+
People	Years Mission's Lifespan







Design Overview

Power System
4× 8U Deployable/Mounted Solar Panels (24 W/panel), Power Distribution Unit (10–36 V, 4 A, full protection), and an 84 Wh Battery Pack (14.8 V / 29.6 V).

Attitude Control System (ADCS)
4-wheel pyramid configuration with a control processor (EKF), Earth Sensor (0.2°), Sun Sensors, and a Star Tracker 3″ pointing / 30″ roll accuracy

On-Board Computer (OBC)
ARM Cortex-M7 @ 480 MHz processing core, featuring 2 MB Flash / 1 MB SRAM / 8 Mbit FRAM, microSD storage, and an embedded GNSS receiver with antenna.

TMTC (Telemetry, Tracking & Command)
Full-duplex S-Band Patch Transceiver (Tx 2200–2290 / Rx 2025–2110 MHz) and a high-performance RHCP S-Band Patch Antenna (>5dBi 70° HPBW

Data Downlink
High-rate X-Band Transmitter (DVB-S2, up to 33 dBm) paired with a 4x4 Patch Antenna Array (>16dBi), complemented by a high-bandwidth 1 Gbps Optical Terminal.

Edge Processing & Computing
CPPN onboard edge processor dedicated to high-speed image processing, mission encryption, and secure decryption algorithms.

Payloads

- **Earth Observation:** Multispectral/RGB Camera (~15 m GSD, 30 km swath)
- **Intercommunication**: RF ISL Transceiver (2200 MHz at 32 dBm TX, Rx 2025–2110)
- **Scientific**: HAMSL Unit (radiation-hardened analog-mixed-signal block library)

HSD Consortium

Emtech Space

Prime Contractor. Project and Quality Assurance Management. Responsible for simulator development, mission analysis, operations and the ground segment, ADCS validation.

ISD S.A. INTEGRATED SYSTEMS DEVELOPMENT

Handles the development of two payloads (HAMSL & HPDP), EDGE processing modules, the On-Board Software Development and Crucial AIT/AIV activities.

heron engineering

Responsible for all mechanical engineering aspects.

LEO SPACE PHOTONICS

Involved in the development of space optical communication systems.

GEOSYSTEMS HELLAS

Develops all Earth Observation applications and the Payload Data Ground Segment.

ARISTOTLE UNIVERSITY OF THESSALONIKI

Provides support in system simulations and expertise in CubeSat missions.

HELLENIC REPUBLIC
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Supports high-performance on-board processing for image compression algorithms.

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HELLENIC NAVAL ACADEMY www.hna.gr

Contributes to the simulation of optical communication experiments.

Suppliers

The success of the Hellenic Space Dawn mission was built on our suppliers, who did much more than just deliver products. They provided vital technical advice and consulting whenever we needed it. Today, this relationship is moving beyond a simple buyer-seller setup to become long-term partners on future projects, while also positioning ourselves to become a trusted supplier for their own upcoming commercial needs.

ENDUROSAT

AAC CLYDE SPACE

leaf space

GOMSPACE

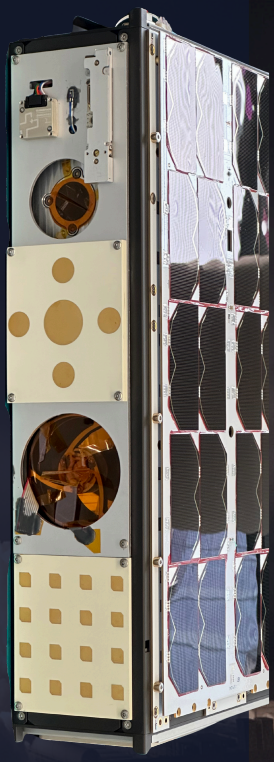
SPACEX

3D plus a HEICO company

EXOLAUNCH

SCANWAY.

TELESPAZIO a LEONARDO and THALES company



Technical Management

ISD acted as the technical lead for the Hellenic Space Dawn mission by leveraging their vast experience in spacecraft payload design AIT/AIV processes and more.

Payloads Development

European radiation-hardened Analog-Mixed Signal
IP library for rapid ASIC and SoC development. Accelerates space electronics design while reducing development, qualification costs, and technical risk.

High Performance Data Processor (HPDP)
Ultra-low-power, radiation-hardened processor delivering 40 GOPS with dynamic on-the-fly reconfiguration. Proven for demanding space missions with exceptional resistance to radiation and Single Event Effects (SEE).

On - Board Software Development

Using the Endurosat's SDK ISD ensured the implementation of all mission specific OBSW functions and the definition and maintenance of the Mission Database (MDB). ISD also still supports the software through patches and maintenance for the correct operation of the satellite.

AIT/AIV Process Management

In the context of the project ISD took the opportunity to develop their own clean room at their premises to support functional and environmental testing of the satellites. With experienced system engineers and with the support of HERON, ISD performed the full spacecraft integration and testing cycle ensuring that the spacecrafts are ready for flight and operation.

Mechanical Engineering Aspects

As a key partner in the HSD mission, Heron Engineering delivers the complete mechanical lifecycle of the satellites, ensuring their survivability in the harshest space environments.

Mechanical Design & FEA

Development of the CubeSat structural frame using advanced CAD models and static analyses.

Vibration Simulations

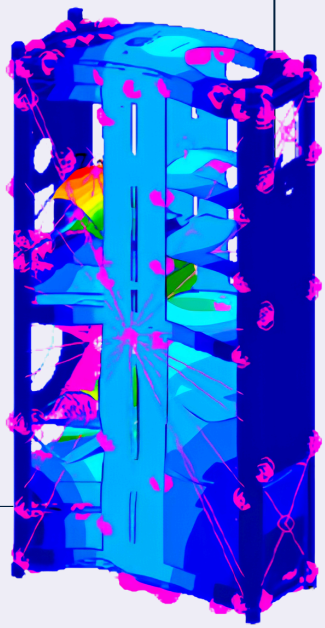
Digital simulation of the severe mechanical stress experienced during the launch phase.

Launch Loads | Random Vibrations | Shock & Fatigue

Thermal Analysis

Thermal control design to protect critical internal subsystems during extreme orbital temperature cycling.

Heat Transfer Mechanisms | Steady-State Analysis | Transient Analysis

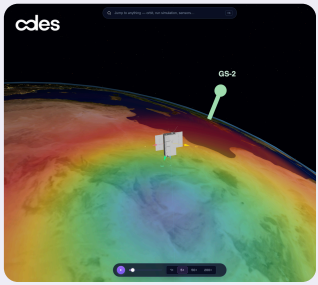


HSD Validation

A comprehensive validation chain that mitigates operational risks and refines system design.

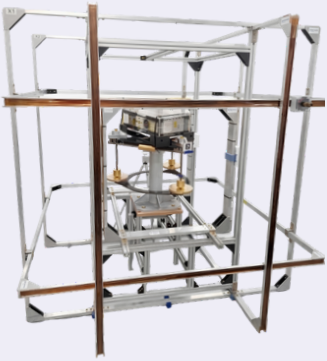
Holistic Mission Simulation

- Digital Twin & Subsystem Simulation
- Hardware-in-the-Loop (HIL) Integration
- RF Interference & Link Analysis
- End-to-End Operational Validation



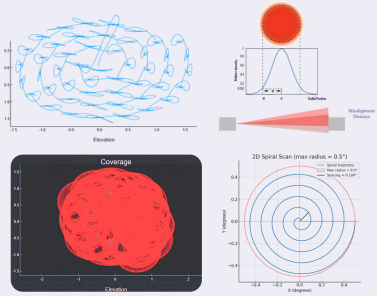
EOS ADCS Validation Facility

- High-Precision Orbital Magnetic Replication
- Frictionless Microgravity Simulation
- Magnetic Characterization and modelling
- Magnetic Cleanliness (PERM/DEPERM)
- Hardware in the loop to validate satellite ADCS functionality. (magnetometers, magnetorquers, reaction wheels, ADCS controller)

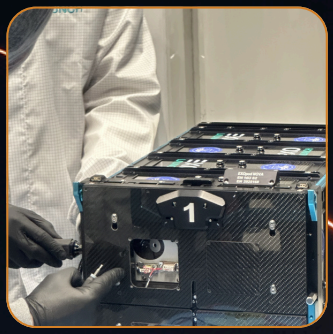


Optical Validation

- Validate Ground Infrastructure
- Acquire Spacecraft Signal
- Validate E2E Simulation/Atmospheric models



Launch Journey







Integration

Loading the satellites into their orbital dispensers.

Liftoff

Successful Liftoff and despatchment.

In Orbit

Deployment for both satellites into low-earth orbit.

Mission Operations

The facility is powered by EMTECH's custom-developed mission control software to command our satellites. From LEOP through routine operations to end of life, our fully redundant, dual-operator control room is run by a trained team for 24/7 operations. It is where our engineers spend most of their time, witnessing years of hard work turn into reality.

- Real-time telemetry processing and display.
- Command uplink and verification systems.
- Multi-operator workstation environment.
- Automated anomaly detection and alerting.

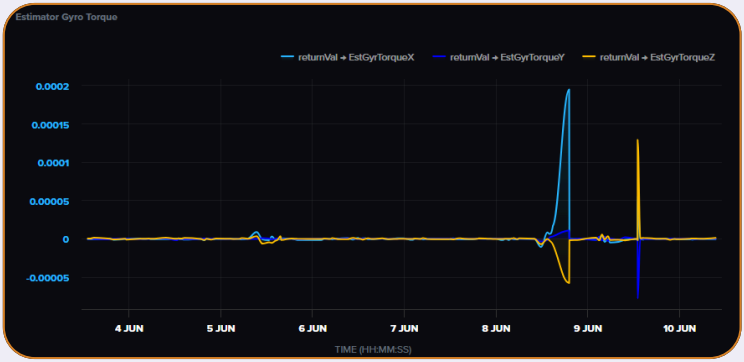


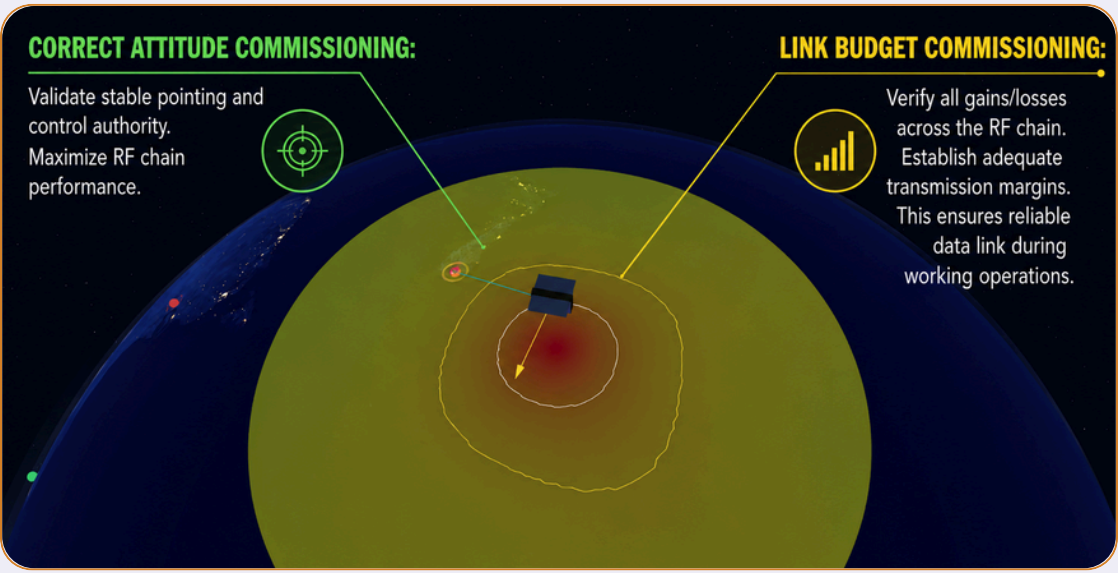
First Mission Outcomes

Platform Commission

Healthy Subsystems

The most critical phase of a CubeSat mission, where satellites are commissioned and transitioned into full operational mode.





New Product

EMTECH utilized its newly developed ADCS and Magnetic Test Facility **EOS** to ensure pointing accuracy.

- High-Precision Orbital Magnetic Replication
- Magnetic Cleanliness (PERM/DEPERM)
- Frictionless Microgravity Simulation
- Hardware-in-the-Loop (HiL)

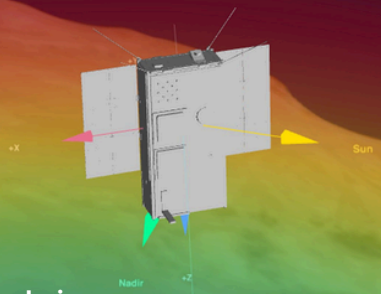


Spin-Off Company

Emtech Space

A new Spin-off was developed to support the entire mission lifecycle

GS-2



ccles

Validation Beyond Boundaries

- Digital Twin & Subsystem Simulation
- Hardware-in-the-Loop (HIL) Integration
- RF Interference & Link Analysis
- End-to-End Operational Validation

Mission Impact

New Technologies to Products

Developing intellectual property technologies and space products.

Business Growth

New opportunities for participating in future National and European space programs.

Career Opportunities

Greek graduates and engineers have the chance to work on real projects domestically.

Ecosystem Growth

Enhancing national space capacity by fostering collaboration between local SMEs, universities, and ESA.



HELLENIC SPACE DAWN

GREECE

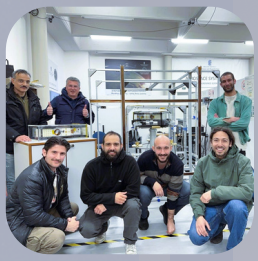
2023 MISSION

HELIOS & SELENE

Mission Success

Together, we can achieve great things.













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Thank you for your
continuous trust and support.

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