

# AEROSPACE ENGINEERING

## DIMEAS - Development of multifield finite element and surrogate models for digital twins of space structures

<b>Funded By</b>	Dipartimento DIMEAS
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<b>Context of the research activity</b>	<p>Development of structural models with multifield capabilities to simulate the damage and aging of structures exposed to harsh environments and thermal, thermo-chemical, and aero-thermo-chemical loads. Development of models to simulate the manufacturing process of space structures. Development of surrogate models with superior computational efficiency based on machine learning techniques. Development of surrogate models with superior computational efficiency based on machine learning techniques.</p>
<b>Objectives</b>	<p>This PhD scholarship is part of the Space It Up! project, funded by the Italian Space Agency (ASI). It involves collaboration with 33 Italian partners, including universities, research centers, and industries operating in the space sector. Space It Up! aims to enhance Italy's space technology for exploration and Earth observation. This scholarship falls under Spoke 2, which focuses on advanced design and analysis of space Missions and systems and Innovative digitalization, including system engineering and digital twin.</p> <p>The PhD candidate will engage in groundbreaking research and development of space missions and systems via system engineering and digital twins. The key areas of research include:</p> <ol style="list-style-type: none"> <li>1) Model-based concurrent engineering mission and systems design and analysis.</li> <li>2) Additive Manufacturing and Smart Production.</li> <li>3) Virtual reality for design, production, and testing.</li> <li>4) Digital twins and artificial intelligence tools for Earth-Observation missions and developing Extra-Terrestrial habitats.</li> </ol> <p>The scholarship, in particular, contributes to the following activities:</p> <ol style="list-style-type: none"> <li>1) Mathematical modeling of products and processes</li> <li>2) Digital twins and AI tools for long-life system design, manufacturing, and operations</li> <li>3) Digital twins and AI tools for testing of products and processes</li> <li>4) Validation and verification</li> </ol>

This PhD position offers a unique opportunity to contribute to the forefront of space technology, working within a highly collaborative and innovative environment. The successful candidate will gain hands-on experience and advanced knowledge in a multidisciplinary field that bridges aerospace engineering, materials science, and simulation technologies.

The scholarship provides access to state-of-the-art facilities and resources, enabling the candidate to work on cutting-edge research. In Space It Up!, PhD candidates will interact with experts from various institutions, gaining valuable insights and expanding their professional network.

This PhD scholarship is ideal for candidates passionate about space engineering and eager to contribute to developing technologies that will enable innovative Earth-Observation systems and extraterrestrial exploration.

**Skills and competencies for the development of the activity**

**Educational Background:** A Master's degree in Aerospace Engineering, Mechanical Engineering, Materials Science, or a related field.

**Technical and Soft Skills:**

Strong analytical and problem-solving skills.

Experience with simulation tools.

Proficiency in programming languages and software relevant to the research areas.

Ability to design and conduct experiments, analyze data, and interpret results.

Excellent teamwork and communication skills.