



PhD in INGEGNERIA AEROSPAZIALE / AEROSPACE ENGINEERING - 38th cycle

PARTENARIATO PNRR Research Field: SUSTAINABLE COMPOSITES FOR AEROSPACE STRUCTURES II

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	<p>The use of composite materials in aerospace structures has a positive environmental impact thanks to the advantages that are found during the use phase of the aircraft in which they are introduced (less weight, lower consumption). However, the overall life cycle benefits of composite aerospace structures are often compromised by the negative environmental impacts associated with their manufacturing and disposal once they reach their end of life. A radical change is therefore necessary to develop more sustainable aerospace structures by introducing new high-performance lightweight composite materials from renewable sources and related new production techniques that meet the industrial needs of quality and reliability required by the sector. This research will be connected to the development of the Italian PNRR with a specific focus on the activities CENTRO NAZIONALE DELLA MOBILITA' SOSTENIBILE (CUP D43C22001180001 D.D. 1033 del 17/06/2022).</p>
Methods and techniques that will be developed and used to carry out the research	<p>This research aims to address research areas such as the characterization of new composite matrix, the study of sustainable production techniques aimed at reducing energy consumption (out-of-autoclave processes) and the development of design methodologies for aeronautical structures that envisage hybrid composites based on the use of sustainable constituents to maximize environmental benefits and with the prospect of increasing life cycle of structures (repairability, reformability, reuse).</p>



	<p>life cycle of structures (repairability, reformability, reuse). The PhD candidate will develop advanced manufacturing, testing, and modeling techniques for composites. Relevant test methods will be employed to quantify fracture and fatigue properties and to determine the allowables for the selected sustainable composites. The insight gained with this activity will allow design optimizations of aerospace structures in terms of weight, performance, and environmental impact thanks to the applied innovative composites. It is expected that the development of new composites and new manufacturing techniques will lead to a reduction in the costs of aerospace structures associated with a lower weight and an overall reduction of CO2 emissions.</p>
<p>Educational objectives</p>	<p>During the 3-years education, the candidate will become familiar with all the aspects related to the development, production, characterization, and modeling of innovative sustainable composites. The research will provide the opportunity to achieve high-level skills in the areas of experimental techniques, numerical modelling and in the structural design of aerospace composite parts. In particular, the researcher will acquire a deep knowledge in field of manufacturing of polymeric composite structures, including state-of-the-art procedures for production, comprehension of physical phenomena in the processing cycles affecting material performances.</p>
<p>Job opportunities</p>	<p>The PhD graduate will have high-quality theoretical and technological expertise in the field of innovative high-performance composites for aerospace applications. The competences acquired during the research will be appealing for manufacturers of composite parts for the aerospace, automotive, marine, and civil fields, which require highly skilled engineers having the capability to understand and manage manufacturing process of polymeric composites as well as the knowledge of their mechanical properties.</p>
<p>Composition of the research group</p>	<p>2 Full Professors 1 Associated Professors 1 Assistant Professors 0 PhD Students</p>



Name of the research directors	Prof. Antonio Mattia Grande
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Contacts	
Dipartimento di Scienze e Tecnologie Aerospaziali - Politecnico di Milano - via La Masa 34, 20156 Milano - Italy - tel. +390223998323 - fax +390223998334 - email: antoniomattia.grande@polimi.it - web site: www.aero.polimi.it	

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	2100.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
The PhD candidate will receive a desk, a personal computer. Apart from the compulsory ones, the PhD candidate will have the opportunity to follow additional courses, to receive economic support to attend summer schools and participate in conferences. There will be the possibility of paid teaching assistantship.