POLITECNICO DI MILANO

PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 37th cycle

Research Area n. 1 - Advanced Materials and Smart Structures

THEMATIC Research Field: DESIGN AND OPTIMIZATION OF ADDITIVELY MANUFACTURED COMPOSITE STRUCTURES

Monthly net income of PhDscholarship (max 36 months)
€ 1325.0 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	New manufacturing processes like additive manufacturing offer the opportunity of achieving optimized shapes in various fields of application. This research aims at defining design methods for lightweight composite structures manufactured by additive manufacturing. The activities include the mechanical characterizations of the materials used, the development of structural optimization procedures specific to this type of manufacturing, the development of multiscale finite element models for the simulation of the mechanical response and the durability assessment of composite, additively manufactured parts. The main field of application is, but not restricted to, that of human prosthetic devices.
Methods and techniques that will be developed and used to carry out the research	This thesis aims at developing innovative design method for additively manufactured mechanical parts made of composite materials, based on optimization methods and on the application of the concepts of lightweight design.A mix of numerical simulations (process simulation and structural analysis) and experimental characterization will be developed and used to carry out the research. The research will be conducted at the Department of Mechanical Engineering of Politecnico di Milano. Previous knowledge or experience in at least one of the topics (structural optimization, finite element modelling,

	composite testing) will contribute to the achievements of the goals.
Educational objectives	The Candidate Doctor in Mechanical Engineering will learn how to define, start and carry out original research by working in a team or leading a research group. Both theoretical and experimental skills are mastered.It is also envisaged that selected candidates will develop a significant know-how for assessing the design improvements offered by new manufacturing processes.
Job opportunities	The experience gained in this PhD can offer opportunities of employment in Companies/Organizations/Research Centres aimed at innovation and/or research and technical development, high-tech SMEs, government departments ruling on public and social needs.
Composition of the research group	0 Full Professors 1 Associated Professors 1 Assistant Professors 6 PhD Students
Name of the research directors	Prof. Andrea Bernasconi

Contacts
andrea.bernasconi@polimi.it phd-dmec@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	564.01 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Funding for educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences); funding per PhD student per year: 2nd year: per student 1.534 euros 3rd year: per student 1.534 euros.

Teaching assistantship: availability of funding in recognition of support to teaching activities by the PhD student; there are various forms of financial aid for activities of support to the teaching practice.
The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability:
1st year: individual use
2nd year: individual use
3rd year: individual use

Desk availability:
1st year: individual use
2nd year: individual use
3rd year: individual use.