



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

PARTENARIATO PNRR Research Field: CIRCULAR ECONOMY AND SUSTAINABLE MANUFACTURING FOR MADE IN ITALY

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	
<p>Motivation and objectives of the research in this field</p>	<p>The fourth industrial revolution (namely Industry 4.0) and European starting plans (Horizon and NextGenerationEU), with their strategic orientations for EU research and innovation, calls for accelerating the twin (i.e., green and digital) transition. A paradigm shift to address various challenges including digital production, big data analysis and artificial intelligence, global production sustainability and circular economy, climate changes and smart cities is required. In this framework, advanced, smart, and sustainable manufacturing processes and systems act as key enabling technologies for providing high-precision, high-value, and high-performance custom-designed components at minimum waste. The research activity carried out with this scholarship can specifically focus on one or more subtopics within these main research frameworks:</p> <ul style="list-style-type: none"> - studying innovative closed-loop process sensorization, monitoring and control solutions to achieve a zero-defect and zero-waste manufacturing of complex geometries thanks to artificial intelligence; - maximize the possibility of printing, with adaptive parameters, recycled powders capable of studying circular and sustainable manufacturing; - create multi-material artifacts without the need to resort to welding thanks to an integrated system of highly sensorised multi-material deposition and printing. <p>The research activity is financed in the framework of the</p>



	<p>MICS (3A-ITALY - <i>Partenariato Esteso per il Made in Italy Circolare e Sostenibile</i>, PE0000004) - Spoke 6 (Additive Manufacturing as disruptive enabler of the twin transition) as part of the National Plan of Recovery and Resilience (PNRR, M4 C2 <i>Dalla ricerca all'impresa</i>).</p> <p>Norms of Reference:</p> <p>CUP D43C22003120001 - D.D. 1551 del 11/10/2022.</p> <p>D.D. 341 del 15/03/2022 Avviso pubblico per la presentazione di Proposte di intervento per la creazione di "Partenariati estesi alle università, ai centri di ricerca, alle aziende per il finanziamento di progetti di ricerca di base" nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 "Istruzione e ricerca" - Componente 2 "Dalla ricerca all'impresa" - Investimento 1.3, finanziato dall'Unione Europea - NextGenerationEU.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>Rigorous experimental methods, physical models, and numerical simulations will be combined to design, implement, and validate the innovative solutions proposed. Team-working will be stimulated with the aim of providing appropriate solutions to actual challenges, which require multidisciplinary skills.</p>
<p>Educational objectives</p>	<p>Doctoral candidates will acquire competences on design, optimisation, and sensing/controlling of new advanced manufacturing processes and systems, as well as on measurement and characterization of innovative products.</p>
<p>Job opportunities</p>	<p>Italy and Lombardy Region have leading positions in manufacturing worldwide. Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.</p> <p>List of Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research: MIT - Massachusetts Institute of Technology, TUM - Technical University of Munich, ESA - European Space Agency, Shanghai Jiao Tong University, Georgia</p>



	Tech University, STIIMA-CNR www.stiima.cnr.it , ATV S.p.A., Ansaldo Energia S.p.A., Avio Aero, BLM Group, GE Avio s.r.l., Camozzi Group, Caracol, Leonardo - AgustaWestland S.p.A., Lima Corporate, Marposs S.p.A., Prima Industrie S.p.A., Tenova S.p.A.
Composition of the research group	4 Full Professors 3 Associated Professors 6 Assistant Professors 18 PhD Students
Name of the research directors	Colosimo, Matta, Moroni, Previtali

Contacts	
Research Supervisors: - Prof. Bianca Maria Colosimo - Prof. Andrea Matta - Prof. Giovanni Moroni - Prof. Barbara Previtali	
For questions about scholarship/support please contact 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	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707,13.</p> <p>Our candidates are strongly encouraged to spend a research period abroad, joining high-level research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months (approx. 700 euro/month - net amount).</p>



Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. 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.