



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

OPEN SUBJECT Research Field: PRODUCT DEVELOPMENT IN THE INDUSTRY 5.0 ERA

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 Industry 5.0 paradigm promotes the development of sustainable, human-centric and resilient industrial ecosystems. According to this paradigm, technological transformations should also satisfy the need for timely and effective long-term solutions to societal challenges. Manufacturing processes and how products are developed should be thus further rethought in light of this paradigm. This research field concerns the methods and tools that support product development in the Industry 5.0 era, from idea generation to concept verification, embodiment, and detail design. The goal is to support industries in developing cutting-edge products that can contribute to the growth of a sustainable, inclusive, and resilient society. The specific research objective of the thesis will concern at least one of the following topics: design creativity enhancement, early concept evaluation through functional digital mock-ups, Virtual, eXtended and Augmented Reality applications, Digital Human Modeling, Artificial Intelligence (AI) for Design, Product Digital Twin, Green and Sustainable Design, Human-machine interactions.</p>
Methods and techniques that will be developed and used to carry out the research	<p>The research will be developed by referring to both emerging and established methodologies and technologies such as: Collaborative creativity, Bio-Inspired Design, Interactive Virtual Prototyping, Augmented, eXtended and Virtual Reality, Reverse Engineering, Knowledge Based Engineering (KBE) and AI for Design, multi-objective Optimization, Design for</p>



	Additive Manufacturing, Design for Sustainable Behaviour, Digital Twin.
Educational objectives	Operational competencies on up-to-date methodologies and technologies for developing innovative and user-friendly products. Capability to interpret technology evolution and the dynamics of product innovation. R&D skills for scientific and industrial applications. Soft skills in the delivery of scientific talks, drafting project reports and scientific papers, delivery of presentations to industry.
Job opportunities	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.
Composition of the research group	3 Full Professors 8 Associated Professors 4 Assistant Professors 16 PhD Students
Name of the research directors	Prof. Colombo, Cascini, Bordegoni, Ferrise

Contacts

Prof. Giorgio Colombo: giorgio.colombo@polimi.it, +39 02 2399 8259;
<https://www.mecc.polimi.it/ricerca/personale-docente/prof-giorgio-colombo>

Prof. Gaetano Cascini: gaetano.cascini@polimi.it, +39 02 2399 8463;
<https://www.mecc.polimi.it/ricerca/personale-docente/prof-gaetano-cascini>

Prof. Monica Bordegoni: monica.bordegoni@polimi.it, +39 02 2399 8260;
<https://www.mecc.polimi.it/ricerca/personale-docente/profssa-monica-bordegoni>

Prof. Francesco Ferrise: francesco.ferrise@polimi.it, +39 02 2399 8232;
<https://www.mecc.polimi.it/ricerca/personale-docente/prof-francesco-ferrise>

For questions about scholarship/support 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

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.

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).

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.