



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 38th cycle

Research Area n. 3 - Engineering Design and Manufacturing for the Industry of the Future

PNRR_352 Research Field: BATTERY MANUFACTURING FOR FUTURE MOBILITY

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

The new global scenario emerged in the last few years 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 transition towards a climate-neutral Europe requires fundamental changes in the way energy is generated and used. Batteries are a key technology for limiting carbon dioxide emissions from the transport, industry, and power sectors. To deploy batteries on a vast scale, they must be commercially successful, support scalability and cost-effective large-scale production. The research activity carried out with this scholarship can specifically focus on one or more subtopics within these main research frameworks:

- *Battery manufacturing for future mobility: smart and high volume laser manufacturing processes of solid state electrodes for rechargeable battery cells.*
- *Battery manufacturing for future mobility: design and control of flexible assembly systems for high speed and high accuracy assembly processes of solid state*



	<p><i>rechargeable battery cells.</i></p> <ul style="list-style-type: none"> •<i>Battery manufacturing for future mobility: high speed process monitoring, inspection, and control for manufacturing processes of solid state rechargeable battery cells.</i> <p>The described research activities are coherent with three of the six major areas of intervention (pillars) on which the PNRR will have to focus and in particular:</p> <ul style="list-style-type: none"> •Green transition •Digital transformation •Smart, sustainable and inclusive growth
Methods and techniques that will be developed and used to carry out the research	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.
Educational objectives	Doctoral candidates will acquire competences on design, optimisation, and sensing/controlling of new advanced manufacturing processes and systems.
Job opportunities	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.
Composition of the research group	7 Full Professors 7 Associated Professors 9 Assistant Professors 30 PhD Students
Name of the research directors	Prof. Colosimo, Moroni, Matta, Previtali

Contacts
<p><i>Names of the research directors:</i></p> <p>Prof. Colosimo Bianca Maria Prof. Matta Andrea Prof. Moroni Giovanni Prof. Previtali Barbara</p>



Contacts: 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	662.5 €
By number of months	6

National Operational Program for Research and Innovation

Company where the candidate will attend the stage (name and brief description)	Comau S.p.A.
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	TUM Munich (or) Shanghai Jiao Tong (or) Georgia Institute of Technology
By number of months abroad	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 5.401,42 euro.

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.