



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 38th cycle

Research Area n. 1 - Advanced Materials and Smart Structures

PNRR_351_DOTT_RICERCA Research Field: INNOVATIVE MATERIALS AND ADVANCED
PROCESSES

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**

One of the main aims of the national PNRR consists in the development and the uptake of new manufacturing processes to strengthen the Italian industry and improve product performance and sustainability. This is strongly motivating the development of innovative and sustainable structural and functional materials with advanced and new properties and related processes. Future materials need to be designed/optimized according to their specific processing route (e.g. materials for additive manufacturing), need to possess specific thermal and physical properties to fulfill special functions (e.g. phase change materials for thermal storage) could preferably show variation of their properties within the volume of a single components (e.g. multi-materials, gradient 3D lattices, metal-ceramic composites). Even more, they could act as smart materials adding a further dimension to materials science, being able to react to external stimuli by providing a change in their behavior or properties. In addition, metalworking processes also require extensive innovation to allow the control of both traditional and new materials according to reliable, cost-effective and sustainable criteria. The PhD candidate will develop a multidisciplinary approach and will work in an international environment strictly cooperating with European world-class universities, research centers and industries.



Methods and techniques that will be developed and used to carry out the research	<p>The Material research group has expertise on microstructural and mechanical characterization of advanced metallic alloys. The methods to be used will involve thermodynamic modelling of alloy microstructure, tools for experimental analyses on phase and microstructure analyses (optical and electron microscopy, EBSD, XRD, DSC, etc) and mechanical characterization among others by tensile testing, fracture toughness, fatigue testing, creep. For more details about infrastructures, see: https://www.mecc.polimi.it/us/research/departmental-laboratories/</p>
Educational objectives	<p>At the end of the PhD cycle the candidate will be able to define, design and carry out original research programs by working in a team or leading a research group in the field of smart materials. Opportunities will be offered for spending visiting periods hosted by project partners for scientific cooperation.</p>
Job opportunities	<p>Job opportunities are foreseen at national and international academic institutions, high-tech companies and SMEs involved in innovation and technical development sharing research with the Materials groups at PoliMi. Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared Master of Science holders in the same field.</p>
Composition of the research group	<p>4 Full Professors 7 Associated Professors 2 Assistant Professors 10 PhD Students</p>
Name of the research directors	Prof. Riccardo Casati

Contacts

Phone: 02 2399 8638 *Email:* riccardo.casati@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	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)	
By number of months at the company	0
Institution or company where the candidate will spend the period abroad (name and brief description)	Fraunhofer Institute für Werkstoff und Strahltechnik (IWS)
By number of months abroad	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 5.401, 42.</p> <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.</p>