



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

**THEMATIC Research Field: ADVANCED MODELLING AND TESTING OF MATERIALS AND  
STRUCTURES FOR MACHINE DESIGN**

**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**

Working in the Machine and vehicle design group requires motivation in developing experimental and computational methods for the assessment of the structural integrity and advanced design of mechanical components and vehicles. The objectives of the research may range from the definition of new models of materials behaviour to the assessment of the structural integrity of large structures, from the experimental investigation on new materials to the design of components or vehicles with innovative features, with special focus on lightweight design. Between the problems related to Machine and vehicle design group, an actual topic is represented by modelling of structures, systems and components when subjected to extreme loading conditions. This is a scenario characterized by multiphysics, multiscale problems that may require innovative modelling approaches not limited to the standard non-linear numerical methods. The researcher's activity is then set in a highly interdisciplinary context, appropriately intersecting various branches of engineering related to expertise's of Machine and vehicle design group: e.g. material behaviour and structural integrity under several loading conditions including (but not limited to) extreme loading conditions as well as innovative modelling and design approaches including survivability approaches. Applications may be in, but not limited to, the field of Defense & Security and transportations (naval, aerospace, terrestrial).



Methods and techniques that will be developed and used to carry out the research	Depending on the specific research topic assigned, methods and techniques will comprise Finite element modelling, Boundary element modelling, Fracture mechanics, structural health monitoring and prognosis, Digital Twin for structural integrity purposes, machine learning and artificial intelligence, low and high velocity impact on structures, survivability analyses, multi-axial fatigue tests on specimens or on parts, non-destructive tests, high temperature tests, residual stress tests, tests on vehicle components, tests on gears, tests on power transmission, driving simulator tests, etc.
Educational objectives	The Doctor in Mechanical Engineering will be able 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. We provide doctoral candidates with high-level scientific training, fostering and refining research and problem-solving abilities.
Job opportunities	Structures/organizations aimed at innovation and/or research and technical development, high-tech SMEs, government departments ruling on public needs. Our last survey on MeccPhD Doctorates highlighted a <b>100% employment rate</b> within the first year and a <b>35% higher salary</b> , compared to Master of Science holders in the same field. Specifically, the skills and know-how developed during the PhD will allow to cover positions for design and integrity assessment of advanced systems and components in aerospace, automotive and mechanical companies involved in the green transformation.
Composition of the research group	1 Full Professors 3 Associated Professors 1 Assistant Professors 16 PhD Students
Name of the research directors	Prof. Marco Giglio, Prof. Andrea Manes

Contacts
Prof. Marco Giglio marco.giglio@polimi.it
Prof. Andrea Manes andrea.manes@polimi.it



For questions about scholarship/support [phd-dmec@polimi.it](mailto: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.