



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 40th cycle

**PNRR 630 Research Field: ROBOT-AIDED ADVANCED MANUFACTURING PROCESSES
FOR THE CONSTRUCTION AND FURNITURE SECTOR**

Monthly net income of PhDscholarship (max 36 months)
€ 1500.0
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 retail and luxury sectors often face complete renovation of the stores and their furniture. A fundamental component of the restoration activities is the realization of metallic structures both for structural and aesthetic purposes. From this point of view there is a great interest in developing novel approaches which reduce the environmental impact of such activities alongside increasing the efficiency and productivity of the production methods. The research activities conducted during the PhD research will enable the development of advanced manufacturing processes for the joining and finishing of metallic components exploiting low impact technologies on the environment (ranging from arc to laser welding as well as innovative finishing techniques). Moreover, the research will involve the integration of digital models and robotic approaches to support the digitalization of the manufacturing techniques. The research will assess alternative approaches to perform joints in metallic materials in order to guarantee appropriate mechanical properties whilst exploring materials with higher recyclability materials (such as Al-alloys). Moreover, the use of ecological finishing methods of the manufactured components will be explored in order to assess alternative solutions to current electroplating methods.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>Within the framework of the present research, novel approaches for the welding of structural and aesthetic components will be developed. The research will be</p>



	<p>components will be developed. The research will be conducted employing both robotised arc and laser welding systems. Researchers involved are required to design, develop and implement technological solutions to improve the current manufacturing methods. The research activities will require characterization of the joint in terms of both metallography as well as mechanical characteristics. Moreover, with regards to finishing processes novel approaches will be assessed as opposed to current electroplating techniques. Materials will also need to be characterised in terms of the surface quality and aesthetic appearance.</p>
<p>Educational objectives</p>	<p>The PhD candidate is expected to develop high level technical skills in the field of research previously mentioned. The candidate will need to operate independently both manufacturing and materials characterization equipment. Design of experiments techniques will be developed to conduct empirical investigations and assess their results. Moreover, the candidate will develop scientific communication skills by participating at international conferences and writing papers for peer reviewed journals. The researcher may also be involved in teaching activities further developing a strong scientific profile apt for a career both in the research and development field as well as in the university.</p>
<p>Job opportunities</p>	<p>Employment statistics of PhDs can be found at: https://cm.careerservice.polimi.it/en/employment-statistics/ .</p> <p>Within this research activity, the candidate will collaborate with Sice Previt, one of the leader companies in providing high-end solutions for the realisation of furniture shops for the retail and luxury sectors. Research activities will also be conducted in collaboration with the Technical University of Munich and the University of Stuttgart.</p>
<p>Composition of the research group</p>	<p>4 Full Professors 4 Associated Professors 4 Assistant Professors 15 PhD Students</p>
<p>Name of the research directors</p>	<p>prof. B.Previtoli, B. Colosimo, A.Matta, G.Moroni</p>



Contacts	
Phone +39 02 2399 8530 Email barbara.previtali@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	750.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Sice Previt 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)	Technical University of Munich/University of Stuttgart
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 6.114,50. 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>	