POLITECNICO DI MILANO

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: LASER MANUFACTURING TO PRODUCE TUBULAR AND SHEET COMPLEX AND SUSTAINABLE PRODUCTS

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	The need for highly efficient and optimised methods of production has become a fundamental aspect within the current industrial and environmental scenario. With the increasing demand of flexible production system which ensure a zero-defect production the implementation of digital manufacturing systems based on state of the art technologies is a vital component to ensure the sustainability of a XXI century production environment. Among the various manufacturing systems, laser-based technologies provide a flexible tool which can easily adapt to different processing conditions and configurations in terms of both material and geometries. The application of advanced sensing systems to laser-based manufacturing techniques enables the creation of a highly efficient production environment with enhanced productivity and real-time adaptability to different materials and geometries. The aim of the present research is to develop an adaptive monitoring architecture for the real time control of laser based manufacturing processes applicable to both tubular and sheet products. The research activities will hence explore state of the art technological solutions for the sensing of laser-based manufacturing systems and develop proof of concept solutions for the next generation of industrial machines.

Methods and techniques that will be developed and used to carry out the research	Design of the experiments to conduct empirical investigations. Optical modelling for the design of the sensing equipment combined with signal acquisition and analysis. Material and quality analysis of components produced to evaluate their properties. Development of process control strategies.
Educational objectives	Technical competences in the use and development of high-end manufacturing equipment and machine vision systems. Capability to design experiments on state of the art manufacturing systems and analyse their results. Design of advanced imaging and optical sensing system and their opto-mechanical implementation. Soft skills related to public speaking, tutoring and team management will also be developed throughout the course of the PhD.
Job opportunities	Following the PhD, career opportunities may be found in educational roles and research centers as well as in R&D and technical department of companies in key roles (such as R&D director, product manager, process manager, etc). 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	1 Full Professors 1 Associated Professors 2 Assistant Professors 5 PhD Students
Name of the research directors	Prof. Barbara Previtali

Contacts
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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

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Adige S.p.A. - BLM Group
By number of months at the company	6
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

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.

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 theteaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.