

Politecnico di Milano

PhD in Mechanical Engineering

Research Area n.3 Manufacturing and Production Systems

Research Title: **POWDER TUBE - additive construction of tubular components by selective laser melting**

Scholarships and Financial support	
Monthly net income of PhD scholarship (max 36 months)	€ 1200 (In case of a change of the welfare rates during the three-year period, the amount could be slightly modified)
Number of scholarships	1
Beginning of PhD	1/5/2015
Deadline for application	23/03/2015
Context of the research activity	
Motivations and objectives of the research in this field	<p>The research is aimed at investigating the rapid fabrication of tubular products through the selective laser melting (SLM) process. The SLM is an emerging additive manufacturing process that uses a high brilliance laser to locally fuse a metallic powder to create 3D metal parts layer by layer.</p> <p>Aim of the research is to study the SLM process of tubular geometries so as tubular parts can be produced at an industrial level with the intended quality. The feasibility, repeatability and robustness of the SLM process will be investigated with the partnership of BLM Group.</p>

Methods and techniques that will be developed and used to carry out the research	The research will include five main steps: 1) assessment of the state of art at industrial and research level; 2) feasibility study of significant tubular features; 3) functional characterisations of the tubular features; 4) thermal modelling of the SLM process used in tubular part production; 5) adoption of monitoring sensors and strategies to improve robustness of the SLM process. The research will be carried out at the AddMe Lab, the new laboratory of the Mechanical Engineering Department dedicated to the additive processes of metallic products, in partnership with BLM Group.
Educational objectives	The methodology of the research will involve rigorous experimental approaches and physical models applied to the design, use and monitoring of the SLM process. Moreover the AM250 Renishaw SLM machine will be available at the AddMe Lab as well as all the resources and equipment of Mechanical Engineering Department necessary to experiment the SLM process and to assess the product final quality.
Job opportunities	The PhD course provides doctoral candidates with high-level scientific training, fostering and refining research and problem solving abilities by focusing on both theoretical and experimental skills. At the end of his/her PhD course the candidate will be one of the main experts in the European context of the additive manufacturing techniques for industrial metallic products and will be able to offer his/her skills and knowledge both to industrial companies or research institutes.
Composition of the research group	5 Full Professors 6 Associated Professors 5 Assistant Professors 15 PhD Students
Names of the research directors	Barbara Previtali
E-mail address, phone number and web-page	barbara.previtali@polimi.it +39 02 2399 8530 sitec.mecc.polimi.it
List of Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research	1. BLM Group - www.blmgroup.com 2. SITEC, Laboratory for Laser Applications – sitec.mecc.polimi.it 3. Renishaw - http://www.renishaw.com 4. Laser Zentrum Nord - http://www.lzn-hamburg.de
Additional support	
<u>Funding for educational activities</u> (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): funding per PhD student per year	2 nd year: euro per student 1370 3 rd year: euro per student 1370
<u>Teaching assistantship:</u> availability of funding in recognition of	There are various forms of financial aid for activities of support to the teaching practice.

support to teaching activities by the PhD student	The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.
<u>Computer availability:</u>	1 st year: <i>individual use</i> 2 nd year: <i>individual use</i> 3 rd year: <i>individual use</i>
<u>Desk availability:</u>	1 st year: <i>individual use</i> 2 nd year: <i>individual use</i> 3 rd year: <i>individual use</i>