



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 40th cycle

**PNRR 630 Research Field: DESIGN OF HIGH MANGANESE AND ALUMINUM STEEL FOR  
LEAD-COOLED NUCLEAR REACTORS**

**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><b>Motivation and objectives of the research in this field</b></p>	<p>Activities necessary for the development of fourth-generation reactors and therefore related to the enhancement of plant safety and reduction of climate-altering gases. In particular, design of high manganese and aluminum steel to ensure proper performance in lead-cooled nuclear reactors</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>Alloy production with different chemical composition and thermomechanical process optimization by optical and electron microscopy, XRD, DSC and TGA analyses. Study on the lead corrosion on the steel and the life optimization will be performed with ad hoc test and the improve of this behaviour will be reached with the chemical composition of the alloy.</p>
<p><b>Educational objectives</b></p>	<p>At the end of this project the PhD candidate will be able to analyse several kinds of technological problems and choose the best solution for them. In particular, the candidate will gain deep technical knowledge on the production and the effect of the thermomechanical process on the new Mn alloy. Moreover, he will acquire knowledge on the metals-metals corrosion and the technology to improve them. The candidate will also learn how to manage the data obtained in the laboratory testing in order to conduct numerical analysis of the corrosion-erosion processes. Furthermore, individual soft skills such as, research planning, teamworking and lateral thinking</p>



	for problem solving will be developed during the research period.
<b>Job opportunities</b>	Employment statistics of PhDs can be found at: <a href="https://cm.careerservice.polimi.it/en/employment-statistics/">https://cm.careerservice.polimi.it/en/employment-statistics/</a> .
<b>Composition of the research group</b>	1 Full Professors 4 Associated Professors 1 Assistant Professors 5 PhD Students
<b>Name of the research directors</b>	Prof. Carlo Mapelli

<b>Contacts</b>	
Phone: +39 0223998272 Email: <a href="mailto:carlo.mapelli@polimi.it">carlo.mapelli@polimi.it</a> For questions regarding scholarship/support please contact <a href="mailto:phd-dmec@polimi.it">phd-dmec@polimi.it</a>	

<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	750.0 €
<b>By number of months</b>	6

<b>National Operational Program for Research and Innovation</b>	
<b>Company where the candidate will attend the stage (name and brief description)</b>	NewCleo
<b>By number of months at the company</b>	12
<b>Institution or company where the candidate will spend the period abroad (name and brief description)</b>	to be defined
<b>By number of months abroad</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
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.