



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

**PNRR 117 Research Field: INNOVATIVE METHODOLOGIES AND TRIBOTESTING FOR  
SUPPORTING THE EVOLUTION OF INDUSTRIAL LUBRICATING OILS**

**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 proposed research focuses on mission M2C2 (renewable energy, hydrogen and sustainable mobility of PNRR). Governments and institutions have sustainable development goals: the improvement of energy efficiency and the reduction of CO<sub>2</sub> emissions currently become, in the industrial sector, the fundamental drivers that push research and development activity towards the optimization of rotating machines components, with special focus on lubrication systems too. In order to face the numerous challenges of the future, Eni and PoliMI have decided to support a doctoral research activity on the specific topic of Tribological Methodologies to support the development of innovative lubricating oils. Basically, the activity is directed towards the optimization, using also machine learning methods, of tribological testing methods and equipment for better discriminate the performance of lubricants in operating conditions as much predictive as possible of real applications.

**Methods and techniques that will be  
developed and used to carry out the  
research**

Tribotests, mechanical bench tests, surface analysis, application of machine learning methods (AI, ANN, KNN, etc.) to tribological methodologies.

**Educational objectives**

The educational objectives of the research are the acquisition of the advanced knowledge and empirical skills on tribological and mechanical testing in representative lubricated couplings of industrial machines.



<b>Job opportunities</b>	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.
<b>Composition of the research group</b>	1 Full Professors 3 Associated Professors 1 Assistant Professors 5 PhD Students
<b>Name of the research directors</b>	Prof. Paolo Pennacchi

<b>Contacts</b>	
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<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>	700.0 €
<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>	ENI S.p.A
<b>By number of months at the company</b>	6
<b>Institution or company where the candidate will spend the period abroad (name and brief description)</b>	Imperial College London
<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 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 the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed



by the regulations.