



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 38th cycle

Research Area n. 2 - Sustainable Mobility

PNRR\_352 Research Field: ADVANCED NVH MODELLING

Monthly net income of PhDscholarship (max 36 months)
<b>€ 1400.0</b>
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>Sustainable mobility, as defined in the European Sustainable Development Strategy adopted by the European Council in 2006, aims to ensure that transport systems meet the economic, social, and environmental needs of society, at the same time minimising the negative impact on economy, society and environment. According to the Regional Office for Europe of the World Health Organization, environmental noise is an important public health issue, featuring among the top environmental risks to health. Road traffic is the dominant source of environmental noise, with an estimated 100 million EU citizens affected by harmful levels. Consequently, vehicle noise regulations are getting more and more stringent. At the same time, the need to preserve the health and well-being of passengers and the market expectations in terms of acoustic comfort inside a vehicle cabin, leads to an increasing attention of the automotive industry not only to exterior noise but also to interior noise issue. This results in a growing need for innovation in the field of vehicle NVH. The ongoing electric vehicle revolution and the consequent reduced contribution of the powertrain and other sound sources (such as the air intake and exhaust systems), exalts the importance of tyre/road interaction as the dominant contributor to vehicle exterior and interior noise. Tyre manufacturers are putting a big effort to produce tyres</p>



	<p>with improved NVH performances and acoustic design is becoming one of the key elements for the competitiveness of the tyre industry. The challenge of making tyres more and more silent requires developing advanced simulation tools to support the development of future products. The PhD scholarship is awarded by Pirelli Tyre, within the framework of the Pirelli-PoliMi Joint Labs agreement.</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>Physical acoustic modelling of the footprint region and of the radiated sound field, based on finite element simulation; exterior noise simulation including vehicle influence; finite element simulation of tyre structural dynamics; cabin interior noise simulation based on tyre/vehicle coupled models; indoor/outdoor testing and model validation.</p> <p>The candidate shall contribute to the development of advanced simulation tools. He/she will take part in experimental activities, to collect the necessary data for the advancement of the research and to allow for the validation of the proposed numerical models.</p>
<p><b>Educational objectives</b></p>	<p>The candidate will acquire high-profile skills and will be working on one of the most significant and challenging problems in NVH engineering, dealing with both theoretical and experimental methodologies. He/she will become an expert in advanced NVH modelling and experimental testing, including signal processing and system identification. The candidate is supposed to provide original contributions to the development and experimental validation of innovative simulation tools.</p>
<p><b>Job opportunities</b></p>	<p>Future job opportunities are primarily in the automotive field (especially in NVH area), i.e. R&amp;D departments of automotive industries (including automobile manufacturers, tyre manufacturers and vehicle component suppliers in general). Besides this, job opportunities comprise national and international academic and nonacademic institutions and organizations, engaged in innovation, research and technical development. Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to</p>



	Master of Science holders in the same field.
<b>Composition of the research group</b>	1 Full Professors 1 Associated Professors 0 Assistant Professors 3 PhD Students
<b>Name of the research directors</b>	Prof. Roberto Corradi

<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>	Pirelli Tyre 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>	Pirelli Deutschland GmbH
<b>By number of months abroad</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
<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 5.707, 13.</p> <p>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>