# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 41st cycle

## THEMATIC Research Field: DEVELOPMENT, VALIDATION, AND OPTIMIZATION OF COMPLEX, INTEGRATED SYSTEMS FOR AGRICULTURAL TRACTORS

| Monthly net income of PhDscholarship (max 36 months) |
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| **1500.0**<br>In case of a change of the welfare rates during the three-year period, the amount could be modified. |

| Context of the research activity | |
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| **Motivation and objectives of the research in this field** | Modern agricultural tractors are rapidly evolving into highly sophisticated machines that integrate advanced electronics, automation, and precision farming technologies. As their complexity increases, traditional design methods are no longer sufficient to ensure optimal performance, efficiency, and reliability. Therefore, advanced numerical modeling and simulation techniques have become essential tools in their development process. The combination of computational design with experimental validation allows for the design and realization of smarter, safer, and more sustainable tractors that meet the growing demands of modern agriculture. |
| **Methods and techniques that will be developed and used to carry out the research** | Computational methods such as multibody dynamics and finite element analysis will be utilized to investigate how different vehicle subsystems perform under a wide range of operating scenarios. In addition, modern artificial intelligence techniques, such as deep learning algorithms, will be adopted to support optimization processes. Experimental testing will be conducted to calibrate and validate the developed numerical models. |
| **Educational objectives** | The Ph.D. candidate will receive comprehensive training in advanced methodologies for the design and testing of ground vehicles and their subsystems, with particular focus on farm tractors. Throughout the program, the |

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| | candidate will develop the ability to address complex engineering challenges, define and assess key performance indicators (KPIs), and design and conduct experimental tests. The candidate will also gain experience in conducting independent research and coordinating small research teams. Training in communication, dissemination, and outreach will be integrated into the Ph.D. program. |
| **Job opportunities** | Future career prospects are within the automotive industry, particularly in research and development divisions of vehicle manufacturers and component suppliers. Further employment opportunities can also be found in both national and international institutions, both academic and industrial, actively involved in innovation, scientific research, and technological advancement. Furthermore, according to our latest survey of MeccPhD Doctorate, there is a 100% employment rate within the first year, with salaries being 35% higher compared to Master of Science holders in the same field. Employment statistics of PhDs can be found at: https://cm.careerservice.polimi.it/en/employmentstatistics/ |
| **Composition of the research group** | 2 Full Professors<br>3 Associated Professors<br>1 Assistant Professors<br>10 PhD Students |
| **Name of the research directors** | Prof. Giorgio Previati |

| **Contacts** |
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| Phone +390223998606 Email: giorgio.previati@polimi.it For questions about scholarship/support: phd-dmec@polimi.it |

| **Additional support - Financial aid per PhD student per year (gross amount)** | |
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| **Housing - Foreign Students** | -- |
| **Housing - Out-of-town residents** | -- |

| **Scholarship Increase for a period abroad** | |
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| **Amount monthly** | 750.0 € |
| **By number of months** | 6 |

| Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information |
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| Financial aid is available for all PhD candidates (purchase of study books and materials, fundingfor participation in courses, summer schools, workshops and conferences) for a total amount of € 6.114,50. Our candidates are strongly encouraged to spend a research period abroad, joining high-levelresearch groups in the specific PhD research topic, selected in agreement with the Supervisor.An increase in the scholarship will be applied for periods up to 6 months (approx. 750 euro/month- net amount). Additionally, PhD candidates who spend at least 3 months abroad are eligible for an extra reimbursement of €3,000 to cover travel expenses. Teaching assistantship: availability of funding in recognition of supporting teaching activitiesby 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. |