

ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

DM 630/Garrett Motion - Design of Sustainable High-Speed Traction Machines

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584] GARRETT MOTION ITALIA [01555150695]
Supervisor	VASCETTO SILVIO - silvio.vaschetto@polito.it
Contact	VASCETTO SILVIO - silvio.vaschetto@polito.it PELLEGRINO GIANMARIO - gianmario.pellegrino@polito.it
Context of the research activity	<p>The field of this PhD position includes design of high-speed traction machines including the electromagnetic, thermal, and mechanical, and economic considerations. The candidate will assess the current state of the art, then develop their own solution to the problem in collaboration with the university and Garrett. There will be the opportunity to build and validate the chosen concept and make recommendations based upon the learnings.</p> <p>Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP E14D24002420004</p>
Objectives	<p>Garrett Motion, as part of its zero-emission vehicle technology portfolio is developing new products including high-speed high performance 3:1 traction drive systems. Key performance characteristics include reduced weight and size, which also drives improved sustainability footprint through reduced usage of raw materials. As part of its future development in this area Garrett has a strong interest in further increasing these sustainability characteristics.</p> <p>The Power Electronics Innovation Center (PEIC) of Politecnico di Torino is a world-renowned, interdisciplinary research group covering innovation from the wafer technology to the final application (electrical or mechanical actuation). The PEIC multi-disciplinary team counts on experts in solid-state physics, electronics, electrical machines and actuators, mechatronics, electromagnetic compatibility, reliability, hardware security and data communications. The PEIC researchers belong to five departments of PoliTO and have accessible laboratory facilities. Our mission is to design and control power conversion solutions for electric vehicles powertrains and chargers, more electric aircrafts, energy production and harvesting from renewables, smart power converters for electrical grids, more efficient variable speed</p>

drives, just to name key applications. Garrett is a cutting-edge technology leader delivering differentiated solutions for emission reduction and energy efficiency. They are passionate about innovating for mobility and beyond. With a nearly 70-year legacy, Garrett serves customers worldwide with passenger vehicle, commercial vehicle, aftermarket replacement, and performance enhancement solutions.

The activities of the PhD candidate will be devoted to the design of high-speed traction machines, including the electromagnetic, thermal, and mechanical, and economic considerations. The candidate will assess the current state of the art, then develop their own solution to the problem in collaboration with the university and Garrett. There will be the opportunity to build and validate the chosen concept and make recommendations based upon the learnings.

Skills and competencies for the development of the activity

Candidates with a strong academic background electrical engineering and/or a related field with a focus on the design of electric machines are preferred. Experience in finite element software for electrical machine design, and programming languages such as Python and VBA are a plus. The candidate should self-motivated, flexible, and can work independently or as part of a team.