



POWER ELECTRONICS INNOVATION CENTER OF POLITECNICO DI TORINO (POLITO)

Mission

The Power Electronics Innovation Center (PEIC) main goal is to provide efficient and reliable power conversion solutions for strategic applications, such as hybrid and electrical vehicles, infrastructures for electrical battery charging, more electric aircraft, electrical energy production from renewables and advanced production systems for industry.

Description

The PEIC is a newly created inter-departmental laboratory located in five POLITO departments (Energy, Electronic and Telecommunications, Mechanical and Aerospace Engineering, Applied Science and Technology and Control and Computer Engineering). The PEIC team consists of 60 researchers belonging to different cultural areas. As a result, the center will rely on a common ground of multi-disciplinary knowledge and testing environment.



WBG converter prototype for the transmitter coil of a wireless charger while driving.

Research Topics

- Wide-band gap (WBG) converters, having high power density, efficiency and reliability at a competitive cost and complaint with the EMC constraints.
- 3D integration of power electronics

in electromagnetic actuators for electro-mechanical energy conversion systems

- Power devices and modules packaging technologies, sensor integration and electromagnetic-thermal-mechanical modeling and simulation.
- Internet of Power (IoP) applied to power converters open to the cloud by means of innovative bidirectional optical transmission.
- Reliability of power electronic components and converters and dependability of power conversion systems.
- Modeling and simulation of electrical energy systems.
- Electromagnetic compatibility
- Systems on Chip (SoC) and integrated circuits for smart power.
- Sensorless control and plug-in control of electrical drives.
- Advanced testing of motor drives.
- Diagnostics and prognostics of electro-mechanical systems.
- Design of electrical machines and actuators, including mechanical gearbox.



Test rig for testing of electrical motors.

Academic –Industry Cooperation

The PEIC gives a particular attention to national and international collaborations with universities, companies and other engineering organizations. The PEIC

members have an important experience in technology transfer to companies for new products.



750 kVA inverter for testing of aircraft generators.

Education

Politecnico di Torino is a leading technical university in Italy and it has a recognized position in electrical and electronic engineering. The PEIC will have a decisive impact on the PhD education and in general on the training of future experts in power electronics.

Laboratory facilities

The PEIC will invest in the next two years about 2 million Euros on key testing equipment that will be integrated with the existing one in the following laboratories:

- Enertronica laboratory.
- Power electronics laboratory.
- Servo actuators laboratory.
- Materials and microsystems laboratory.
- Microelectronics EMC laboratory
- Optical transmission laboratory.



Materials and Microsystems Lab cleanroom.