Vehicles with inductive charging systems (up to 200 kW) in Braunschweig

Institute

The Institute for Electrical Machines, Traction and Drives (german: IMAB) was founded in 1920 and has a great tradition in academic teaching and research in the fields of electrical machines and power electronics.

Today, two professorships cooperate closely at the institute: Prof. Regine Mallwitz is professor of Power Electronics, the chair of Electrical Machines and Drives is held by Prof. Markus Henke. This combination gives excellent preconditions for the comprehensive research and development of complete electric drive systems and power electronic equipment.

High speed motor test bench (up to 200 kW, 30.000 min-1)

Research

Currently, research topics focus on electromechanical drive solutions for hybrid and full electric vehicles including also auxiliary power supplies und battery charging topologies and decentralized energy systems powered by batteries or photovoltaic modules. Central aspects are small weight and size of all components and the whole system.

Increasing the engine's speed is one basic approach to increase its power density of drive systems. Intelligent system design, innovative circuit topologies and new component technologies are the key factors in power electronics.

Some of the latest general research topics in power electronics at IMAB are:

- Investigation of the potential of new, fast switching power semiconductors based on silicon (Si), silicon carbide (SiC) and gallium nitride (GaN).
- Approaches to overcome negative impacts of fast switching devices on gate drivers, EMI and passive components.

Full SiC boost converter (100 kW, 100 kHz)

- Improvements of the heat transfer in high density power electronic systems.
- Development and test of various prototypes in a power range from 1 kW up to about 250 kW.
- Development of reliability tests especially of semiconductor devices.

Staff and equipment

Traditionally, highly motivated and dedicated students and young scientists are attracted by IMAB. High competence in engineering and scientific work is passed down from generation to generation.

On more than 660 m² of laboratory area the IMAB is equipped with several test benches for rotating and linear electric machines as well as for power electronic devices and systems. Several DC and AC sources are available to emulate batteries or photovoltaic sources, electric machines or AC grids. A wide range of applications and power levels can be covered.

The institute's workshop is experienced in building all kinds of prototypes, making the path from scratch to the running system in the test field a short one.