

AACHEN UNIVERSITY OF TECHNOLOGY (RWTH)

The Institute for Power Electronics and Electrical Drives (ISEA) of RWTH Aachen University has been working on Power Electronics, Power Semiconductor Devices, Electrical Drives and Electrochemical Energy Storage Systems for more than 45 years. Under the supervision of institute director Prof. Dr. ir. Dr. h. c. Rik W. De Doncker and the head of the Electrochemical Energy Storage Systems Group Prof. Dirk Uwe Sauer, the focus of ISEA is on research and development activities in close co-operation with national and international companies, as well as on public funded research projects. In addition, ISEA offers engineering services.

One of the main research areas of the institute are power electronics, drives and batteries for electric, hybrid and conventional vehicles. Researchers work on electrical architectures and drive trains on the system level and investigate, for example, the effect of different voltage levels and the utilization of DC/DC converters on the overall efficiency or the integration of the energy storage into the grid, as well as on the component level, for example designing highly efficient converters or investigating the aging behavior, diagnostics, and energy management of battery packs. Drive inverters including sensorless and highly dynamic torque control are also a major topic. A special focus lies on the design and realization of switched reluctance drives, which feature a low-



Integrated Power Unit (DC-DC converter and drive inverter) for hybrid electric vehicle, Europa-PlugIn project

cost robust design and are very suitable for compact high-speed drives. Also the acoustic behavior of drives is investigated and optimized. Device level research is conducted, too, such as specific package design for semiconductors for automotive applications.

Another main research area is sustainable energy. Also here, power electronics and storage systems are key technologies to



Bi-directional charger for electric vehicle, Smart-Wheels project

enable a largely renewable energy generation while maintaining a stable grid. As an example, ISEA works on highly efficient converters for solar applications and has developed a test bench for the characterization of commercially available photovoltaic inverters.



Macro battery cell, ePerformance project

Furthermore, the institute is also active in the research fields of traction applications, home appliances and industrial applications.

Currently, more than 70 scientists and engineers jointly research and study at ISEA together with more than 50 students. The close cooperation of experts for power electronics, drives and battery systems enables highly optimized systems for all the applications described above.