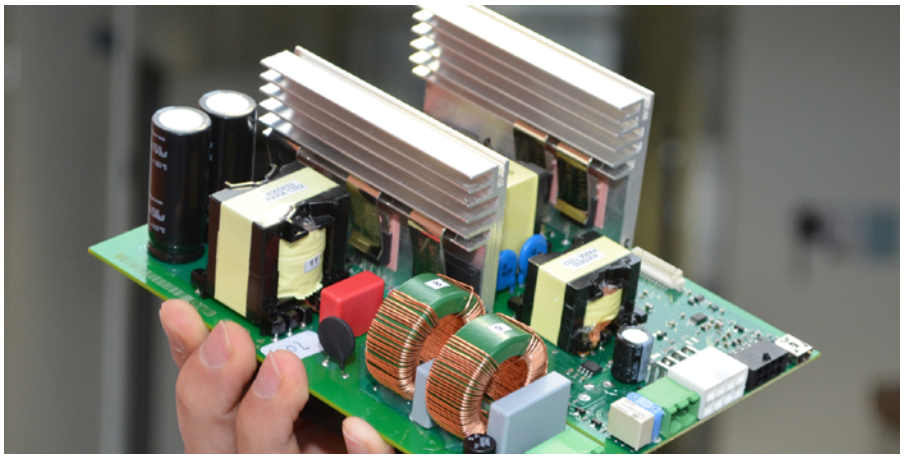

The Power Electronics Laboratory

The Power Electronics Laboratory at the OST Eastern Switzerland University of Applied Sciences focuses on modern Power Electronics research with a team of about ten specialists and graduate students. The vast majority of the projects are carried out in close collaboration with local or international partners in industry. The primary focus is on applications in the lower power range where typically switched mode techniques are employed.

Research Fields and Competence Areas

The R&D activities in the area of circuits range from classical PWM converters to resonant topologies for a large variety of applications. These include adapters, battery chargers, power factor corrector frontends, inverters, motor drives, high voltage sources to name but a few. Typical fields of application are industrial and consumer electronics, renewable energy systems, drives and chargers ranging from IT equipment to electric vehicles.
The scope of projects varies from feasibility studies and comparative investigations to simulations and analyses, the realization of prototypes all the way to industrialization and certification of complete designs.
Emphasis is also placed on advanced magnetic components. For example, optimized coupled inductors in multi-phase PWM converters or integrated magnetics placed in LLC-resonant converters are utilized to achieve high power density designs. The tools used include FEA simulations as well as lumped reluctance models.
A further research field is wireless charging for electric vehicles. Recent and current work includes prototypes for 3.5kW, 7kW and 22kW charger systems. The key to success is to optimize the coupler geometry and the electronic circuit simultaneously and not as separate systems. DC-to-DC efficiencies of well above 95% have been reached over an airgap of 16cm.

Finally, small signal analysis and modelling are integral parts of Power Electronics circuit design. Analytical derivation of the transfer functions of new topologies as well as loop gain measurements on existing circuits are tools to optimize analog or digital control circuits.

Equipment

The laboratory is equipped with state-of-the-art hardware and software tools. These include a climate chamber, an EMC test setup, a spectrum analyzer, a network analyzer, frequency response analyzers, power analyzers, a range of DC and AC power sources and sinks, as well as high-end oscilloscopes.