

UNIVERSITÄT DER BUNDESWEHR MÜNCHEN

IPEC is focused on High Power Converter Systems for application in

- Energy transmission and Energy distribution
- (Wind power, solar power, solar-thermic power, DC-Super grid)
- Large electric drives (Traction, electric ships, electric aircraft)
- Electric vehicle drives (LEV, electric passenger cars)

and new Converter architectures enabling

- Modular, scalable hardware
- Fault tolerant operation
- Fully digital control and integrated sensors

These systems are developed and investigated thoroughly with respect to industrial feasibility. The equipment at IPEC includes laboratories for investigation of High Power Converters up to 20kV in the MW-Range and Electric Drives up to 1kV in the 100kW-Range.

Advanced Multilevel-Converters for High- and Medium-Voltage

High Voltage Direct Current Transmission (HVDC) is becoming a key enabling technology for the integration of regenerative sources into the grid. While the conventional AC-Networks are getting more and more inefficient or unstable under the new conditions, an electronically controlled DC-Grid will be extremely valuable.



Advanced Multilevel-Converters are the most promising systems for these requirements. New concepts, suitable for these applications, are developed at IPEC (E.g.: Modular Multilevel Converter, M2C). Research is concentrated on industrial scalability, safety, fault tolerant operation and the digital control system. At the control side, the new systems offer vastly extended degrees of freedom. Therefore, many research projects are focused on new digital control schemes, for improved exploitation of these new possibilities.

Large Drives with Medium-Voltage represent another important field for Modular Multilevel Converters, applied e.g. for industrial drives and electric Ships.

Ultra light converters for mobile applications (MHF)

The successful development results of Multilevel-Converter for the High Power range has led to a significant extension of research projects, focused on mobile applications. In this area, industrial scalability, modularity of the hardware and fault tolerant operation are very important, too. Additionally, ultra light weight and minimized space are essential points. These requirements are best met by new multilevel topologies, which allow for the elimination of passive filters. New converter topologies (MHF) enabling and integrated control and sensors are developed and investigated in several research projects.

