

Research Interests / Projects

1. Energy Efficient Electric Drives

We are developing various methods to increase efficiency of drive systems e.g. by improvement of low load efficiency by motor design (e.g. $L_d > L_q$), software based multi dimensional optimum geometry parameter search, and online minimum loss search depend on both load and speed.

2. EV Control

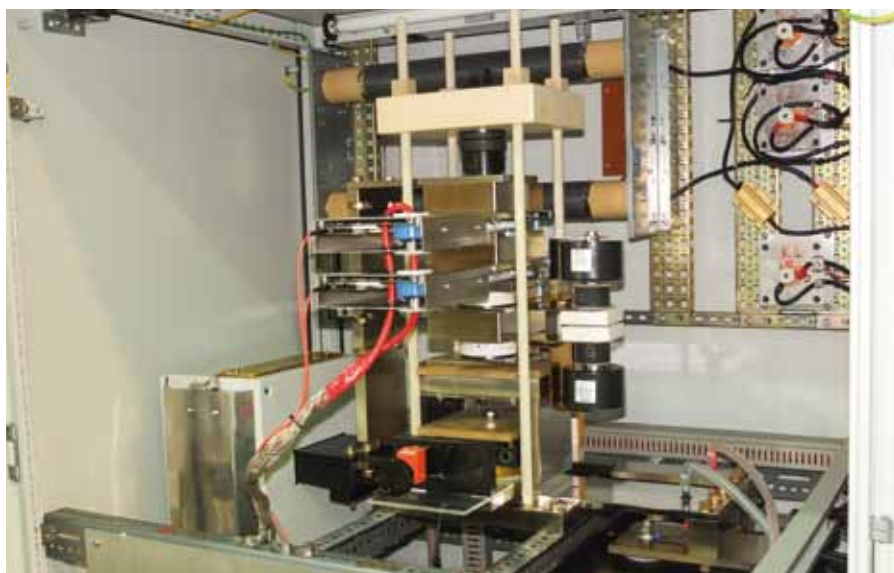
We design motor controllers for electric vehicles with minimum loss control strategies based on analytical or numerical algorithms.

3. Drive Production Technology

We are working on various technologies for large scale production, e.g. winding techniques combining high slots fill factors with low production cost, permanent magnet magnetizers including quality check during the magnetization process, and folded power electronics for motor integration.



Modular wind power generator



IGCT Magnetizer with Integrated Quality Control of Magnets

4. Wind Power

We realize small wind turbines for urban applications based on a modular system with permanent magnet generators, and we develop fast control systems for doubly fed induction generators according to latest grid connection requirements.

5. High speed drives

We have built several high speed drives with induction and switched reluctance machine in the 30,000 - 50,000 rpm range. Currently we set up a permanent magnet system.

Our lab provides power supply of up to 400 V, 50 Hz, and 630 kVA. There are several variable frequency supplies, liquid cooling units up to 100 °C and power measurement equipment for various

variable speed test benches. Our software includes analytical tools for classical induction, DC, synchronous and switched reluctance motor design (own and commercial tools), finite element software for electromagnetics and multiphysics, and mechanical construction software.



Foldable Power Electronics for Motor Integration