

The Institute has been intensively built up during one decade and is now composed of the Laboratories of Electricity Market, Electrical Machines and Drives, Applied Electronics, Control Engineering and Digital Systems. The core competencies of the Institute are in power electronics, industrial electronics, electrical drives technology and in electricity distribution networks and business. At present 6 professors, 15 postdoctoral researchers, 30 postgraduate students and 4 laboratory technicians form the staff of the Unit. The Institute is led by professors Jarmo Partanen and Juha Pyrhönen. The Institute coordinates and is an active member in the national Graduate School in Electric Energy Engineering (GSEEE).

Key Research Fields & Competence Areas:

Energy Conversion and Efficient Electric Energy Use

- Energy-efficient electrical motors and drives technology
- Power electronic network interfaces for distributed energy production (wind and hydro power)
- Power electronics applications in energy transmission networks, e.g. DC-distribution at $\pm 750 V_{DC}$

Electrical machines

- Permanent magnet machines for wind power and industrial applications
- Large high speed machines for industrial applications
- Electrical drives and process machinery condition monitoring and diagnostics
- Industrial energy efficiency monitoring systems

Future energy sources

- Fuel cell power electronic converter technology

Institute Highlights:

- Large solid rotor induction machines (e.g. 8 MW, 12000 rpm)
- Large direct driven wind mill generators (e.g. 3.5 MW, 16 rpm)
- Techno-economic models for electricity and energy markets
- 1000 V AC-distribution systems and low-voltage distribution systems
- DC power delivery systems
- Electricity market regulation models
- Large Russia Program for cooperation in the field of education and research with several Russian universities

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