

ELECTRIC DRIVES LABORATORY

Laboratory of electrical drives and power electronics for industrial and automotive applications

The laboratory of electrical drives and power electronics can test electric motors, power converter and control system both for industrial application (traction, grid interface) and automotive applications (hybrid and full electric vehicles). Thanks to two different test rigs electric drive of a power up to 100 kW and torque up to 1500 Nm can be tested. Thanks to our expertise, customized (high-efficiency) power electronics hardware based either on silicon and wide-bandgap semiconductors can be developed according to the customer requirements. Moreover, wired or wireless solutions for condition monitoring of power electronics equipment, railway vehicles and infrastructure are available.

INSTRUMENTS & FACILITIES

100kW Motor test bench (2500Nm/6500 rpm)

Regenerative Motor Test Bench (35Nm/7500rpm) with PC based Data Acquisition and Control system and Power Analyzer Yokogawa PZ4000

Power Supply Units (1500W): 600V-2.5A; 300V-15A, 12,5V-120A

E4360A Modular Solar Array Simulator Mainframe, E4362A Solar Array Simulator DC Module, 130V, 5A, 600W

dSpace Real-Time board for electrical drives prototyping

Scopes, Current probes, Insulated Voltage probes, Industrial Electrical Drives, Laboratory Power Supplies

Development system for Embedded hardware and software (Microchip, Freescale, TI, STM) and Static Converters.

30kW IGBT-based three-level T-type three-phase converter with sensing interface (ETH, CAN, UART)

35kW IGBT-based H-bridge two-level converter module with sensing interface (aimed to modular connection towards MMC topologies)

20kW SiC-MOSFET-based two-level three-phase converter with sensing interface (ETH, CAN, UART)

Modular LCL-filter with distributed sensors and related interface (ETH)

Teaching kits for university students and/or academic initiatives: motorcontrol kit (BLDC, IM), power conversion kit (DC-DC, PV, MPPT)

ACTIVITIES

HSD AC MOTORS HIGH EFFICIENCY ELECTRIC MOTOR TESTING

No load test and magnetizing curve

Parameters identification test

Load test, efficiency measurement and thermal behavior

Full speed test in field weakening condition

Test on ac induction and ac permanent magnet synchronous motor

ELECTRIC DRIVE TEST FOR HOUSEHOLD APPLICATION

Parameters identification test

Load test, efficiency measurement and thermal behavior

Full speed test in field weakening condition

Test on ac permanent magnet synchronous motor with vector sensorless control

SOLAR SIMULATOR

MPP Validation

Solar Inverter Tests-Rig

METHODS TO ACHIEVE ENHANCED RELIABILITY OF POWER ELECTRONIC SYSTEMS

Reliability model of most fragile components of power electronic equipment used in traction drives and grid interface

Development of wired or wireless solutions (e.g. BLE) for condition monitoring of power electronics equipment

Development of customized (high-efficiency) power electronics hardware based either on silicon and wide-bandgap semiconductors

METHODS TO IMPROVE THE SAFETY AND RELIABILITY OF RAILWAY VEHICLES AND INFRASTRUCTURE

Development of wired or wireless solutions (e.g. BLE) for condition monitoring of trains and infrastructure

Development of customized smart sensor nodes for low cost and high flexibility (edge computing) monitoring systems

