AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

About AIT
Austrian Institute of Technology

The AIT Austrian Institute of Technology, Austria's largest non-university research institute is among the European research institutes a specialist in the key infrastructure issues of the future. AIT provides research and technological development to realize basic innovations for the next generation of infrastructure related technologies in the fields of energy, mobility, digital safety & security and health & environment.

Research Focus in the Field of Power Electronics

As an industry partner AIT focusses on design and validation methodologies using rapid prototyping as well as laboratory environment to lower design costs, and to increase development speed. This includes:

- Modelling and design of Smart Grid components, electric vehicle drives and battery systems
- Loss modelling, thermal design (CFD) and electro-magnetic design of power electronics and electric machines (FEA)
- Rapid prototyping and integrated design of components and controls for Smart Grid applications and electric vehicle powertrains involving hardware-in-the-loop-(HIL)-technologies
- Reliability of power electronic and energy storage systems

AIT Energy, Smart Electricity Systems and Technologies Laboratory, (SmartEST)

AIT Mobility, Dual-Inverter for Hybrid Electric Vehicle

Laboratories
SmartEST

- 3 independent laboratory grids with variable impedances for up to 1000 kVA, flexible star point configuration and grounding systems
- 2 independent grid simulators: 0 to 480 V 3-ph AC, 800 kVA
- 3-ph balanced or unbalanced operation
- Facilities grid compliance tests
- Environmental simulation:
  - LxWxH: 3.6 m x 2.6 m x 2.8 m
  - Temp.: -40° C to +120° C
  - Humidity: 10 % to 98 % r.H.
- Multicore real-time simulators
- P-HIL and C-HIL at full power in a closed control loop
- Configurable PV 48.6 kWp

High Power

- Low-voltage, high-current up to 150 kA, 700 V and 15 kA, 1500 V
- Medium-voltage tests up to 120 MVA
- DC tests up to 30 kA

High Voltage

- AC up to 600 kV / 1.5A

Electric Drives

- Synchronized acquisition of electrical, thermal and mechanical measurement data
- Real-time HIL for drive cycle control, vehicle emulation, etc.
- Several data-bus interfaces
- CAN-restbus simulation
- Several dynamometers,
  - P_{max} = 280 kW (at 3500 rpm),
  - n_{max} = 22000 rpm (at 100 kW)
- DC supplies, sinusoidal AC supplies, and drive inverters
  - Voltage up to 1.8 kV
  - Power up to 600 kW
- Control of cooling conditions, from -50° C to 220° C.

Batteries

- Cell characterisation, and modelling
- BMS development and tests
- Safety and abuse tests at cell, module and system level
- Environmental simulations
- Endurance and aging tests