

GRID SOLUTIONS TESTING FACILITIES

Empower



- Energy Security
- Fault Mitigation
- Grid Stability & Reliable Power Delivery
- Resiliency & Sustainability

Optimize



- Power & Energy Systems
- AI Driven & Cyber-Secure
- Grid Monitoring & Protection
- Control Solutions

Comprehensive Microgrid Capabilities

State-of-the-art microgrid facility for design, test, and validation of various power system control, protection, and management techniques.

By leveraging open-source control techniques in combination with multiple Semikron converter units, the microgrid can be readily configured to evaluate novel solutions for both utility power systems and DC-based electrified platforms.

Real-Time Digital Simulator (RTDS) to emulate assets in the power grid. Power Hardware-in-the-Loop (PHIL) and Controller Hardware-in-the-Loop (CHIL) evaluations are utilized to ensure prototype viability.

**Two decades of
power system
analysis**

**480V AC or 1KV DC
system-level
testbed**

**MW-capable
microgrid facility**



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Microgrid Facility & Hardware

Central Control Room

- Dedicated low lab with established safety protocols, adjacent to the high-power testing area.

Power Electronic Building Block (PEBB) Converters

- Single modular electronic power package, easily modified to create various power converter packages.
- AC to DC (passive and active rectification), DC to AC (inverter, DC to DC step up (boost), and DC to DC step down (buck).
- 10 PEBB converter modules, including a Semikron Semistak RE power converter assembly, which features an IGBT based Skiip 4 intelligent power module (IPM) in a three-phase half-bridge configuration.

Real-Time Digital Simulators (RTDS) - including a Novacor 2.0 and an OPAL-RT simulator.

- CHIL applications, including both Doble F6150 and Omicron 256 plus amplifiers.
- GTNET card communication protocol modules, interfacing with Woodward genset controllers and the SEL-351 protection relay.
- SEL Real-Time Automation Controller (RTAC) to test grid management and control, selected to ensure novel control solutions are easily-integrated across public and private electrical grid systems.
- Supports analog I/O and digital communication protocols, including IEC 61850, Modbus, and others.

Megawatt-Scale Power Grid Equipment

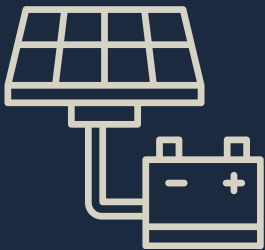
- Motors/Generators: One 2 MVA, 12,000 rpm
- Genset: 100 KVA, 3-phase 480 V
- Resistive Loads: 1.3 MW Resistive Load and 2 MW Chopper
- Rectifiers: 3.2 MVA (diode), 1.2 MVA (controlled), 1 MVA (Toshiba)
- VFD Inverters: 1 MVA (Toshiba), 500 Hz, 60 hp, 45 kW (ABB Ultra-Low Harmonic), 400 Hz, 347 hp, 259 kW (Allen-Bradley)
- Utility Power: Two 480 Vac 3-phase utility supplies

Other Highlights

- Medium Voltage Alternating Current (MVAC) Tree Branch Test Site/High-Impedance Fault for Intelligent Sensor
- Inverter-Based Resource (IBR) Protection, Grid-Forming (GFM) & Grid-Following (GFL) inverter controls to connect solar and battery systems to the electrical grid
- Spin Test Bunker
- Power Switching, Filtering and Fault Events



Solar Power & Energy Storage



Data Center Dynamic Load Solutions

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