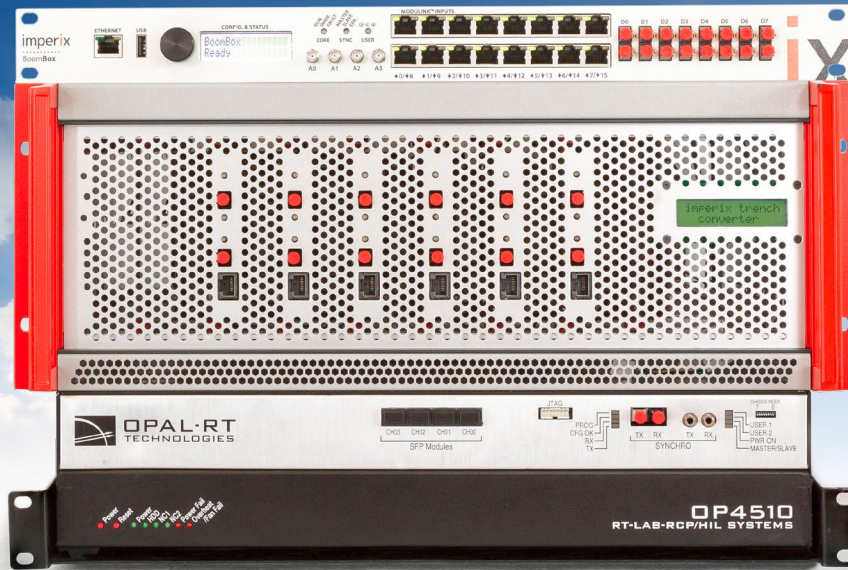


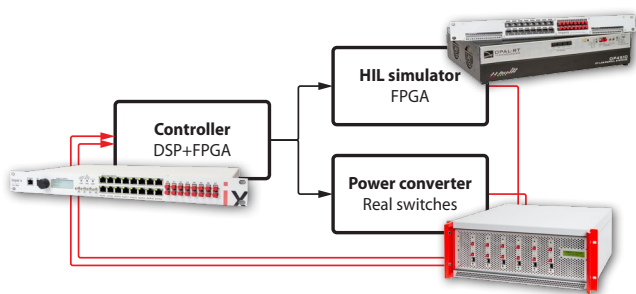
OP1300 POWER ELECTRONICS TEST BENCH

From simulation to real power



Modular, flexible and configurable, the Power Electronics Test Bench combines a state-of-the-art Hardware-in-the-Loop (HIL) simulator from OPAL-RT with Imperix's Rapid Control Prototyping (RCP) system and real power hardware. It enables rapid development of power electronics, drives and smart-grid applications across industry and academia.

A typical configuration is proposed with 6x power modules, 1x Boom-box RCP controller and 1x OP4510 HIL simulator, constituting a turnkey hardware and software solution to instantly start experimenting. For more advanced needs, customized passives and auxiliaries can be provided, typically enabling connection with the AC grid.



Flexibility and versatility

Benefit from a flexible hardware and software to experiment and validate any novel topology or control algorithm. Instantaneously jump from real-time simulation to the real power hardware by simply changing cable connections, without editing your control code.



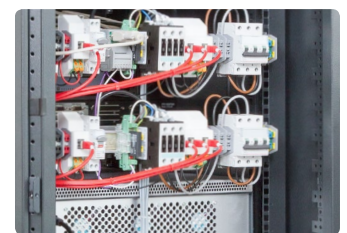
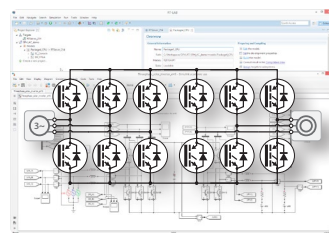
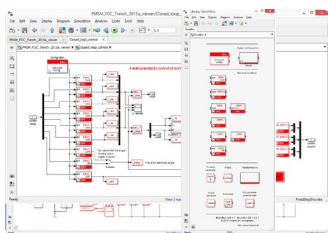
Performance

Execute high-performance real-time simulation of power converter on eHS and rely on the BoomBox and its software to help you design and generate closed-loop control code. Rely on software-independent protections to keep your bench safe at all times.



Time-to-application

With this test bench, it has never been more easy to speed up prototyping activities. The focus can now be set on the real research objectives, and meaningful experimental results can be achieved within few hours.



1. Imagine and develop

Imagine and develop your control on Matlab Simulink, and instantly download it into the Boombox, a high performance and easy-to-use power electronics controller.

2. Model and simulate

Simulate the power converters and their passive components on the OP4510, a high-fidelity and flexible HIL simulator based on RT-LAB and Matlab Simulink.

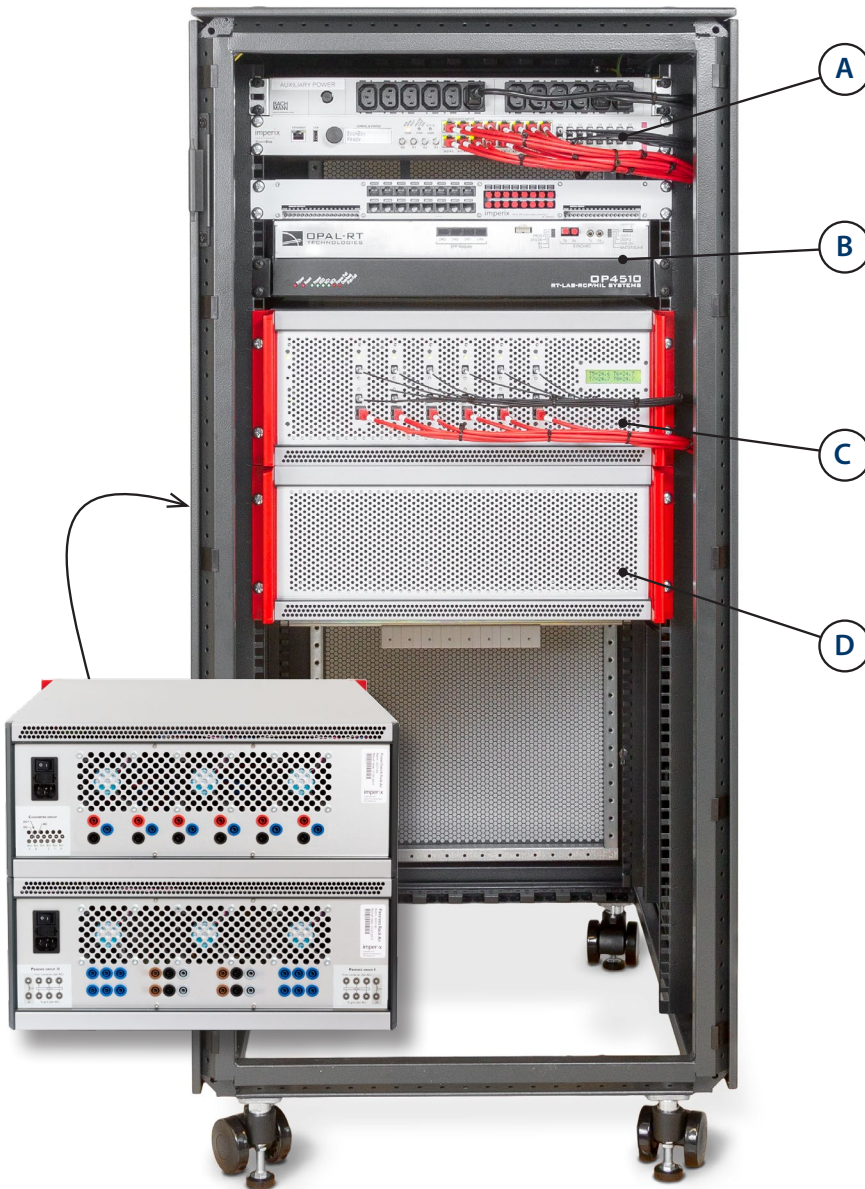
3. Debug and test

By connecting the RCP controller to the HIL simulator, test your control algorithms under all operating conditions. Observe any signal and produce insightful graphics.

4. Implement and validate

Connect the RCP controller to the real power hardware to test your control algorithms live and compare the experimental results with the previous simulation results.

SYSTEM OVERVIEW



TYPICAL CONFIGURATION

The Power Electronics Test Bench is delivered ready-to-use, and includes:

- » 18U cabinet with all necessary signal, power supply and optical fiber cables
- » Technical User Manual
- » Examples and tutorials (RCP controller and HIL simulator)

A. BOOMBOX RCP

The BoomBox is a high-performance rapid control prototyping (RCP) controller. It features:

- » 300 MHz TI DSP
- » Up to 200 kHz sampling frequency
- » 16 analog inputs, 16 fiber optic outputs, 4 analog outputs, 8+8 digital I/O, CAN.
- » Software-independent protections
- » Boombox Control software and automated code generation toolbox for Simulink

B. OP4510 HIL SIMULATOR

The OP4510 is a state-of-the-art platform for real-time HIL simulation. It features:

- » 4-core CPU, Xeon E3 processor 3.2 GHz
- » Kintex-7 XILINX FPGA, 325T
- » 32/32 digital I/O, 16/16 analog I/O
- » Fully integrated with Matlab Simulink
- » RT-LAB open real-time simulation software environment
- » eH564 power electronics simulation toolbox
- » Circuit editors compatible with SimPower-Systems toolbox

C. POWER STAGE

The power stage delivers ready-to-use and freely configurable power conversion, thanks to:

- » 6 independent half bridge power modules max 800V/32A or 400V/46A per module, galvanic isolation, up to 50 kHz switching
- » 1 sideboard for temperature monitoring and variable-speed fan control. LCD screen
- » 4U enclosure with front and back panels
- » Internal wiring and power supplies
- » 4 mm safety laboratory plugs

D. AUXILIARY RACK, OPTIONAL

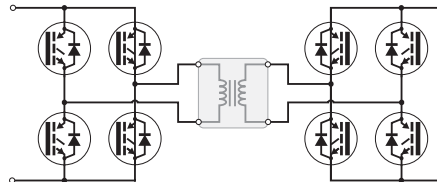
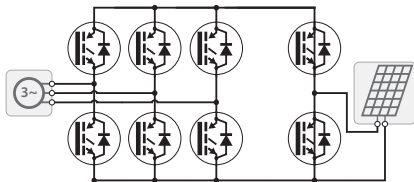
The auxiliary 4U rack is a customizable unit for the necessary passive components, filters, etc. The standard configuration features:

- » 4U enclosure with laser-cut front and back panels, forced air cooling and wiring
- » 6 independent inductors (2.5mH, 20A)
- » 2 LC-type common-mode filters (3-phase)
- » Optional: external voltage sensors
- » Optional: external relays and breakers

UNLIMITED TOPOLOGIES

You may use all six half-bridges to implement back-to-back converters, such as grid-tied v-speed drives, HVDC systems, etc. Alternatively, fewer modules may be sufficient for applications such as PV inverters, battery chargers, etc.

Thanks to the complete flexibility in the connections of the modules, isolated DC/DC are also supported, such as DAB, resonant converters or similar topologies. Interleaved DC/DC systems are of course within reach as well.



ABOUT IMPERIX

Imperix is a Swiss manufacturer of high-end and prototyping equipment for power electronics, with a special focus on their control. The company's products and software enable cutting-edge innovation and accelerate R&D activities in corporate and academic environments.

ABOUT OPAL-RT TECHNOLOGIES

OPAL-RT is a world leader in real-time simulation and Hardware-in-the-Loop (HIL) testing equipment for electrical, electro-mechanical and power electronics systems. Since 1997, OPAL-RT Simulators are used by engineers and researchers at leading manufacturers, utilities, universities and research centres around the world.

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