

# Power System (PS) teaching laboratory

## Courseware

OP1140



"Learning the basis of power systems using HIL helped me be prepared for industrial challenges."

François Berthelot  
Business Unit Manager -  
Eastern North America  
Sales Engineer

The Power System (PS) teaching laboratory is intended to perform transient stability analysis of electric grids. The basic power grid example, covered in all fundamental electric grids courses, is analyzed in time-domain and phasor-domain.

As learning outcomes, students will understand concepts of infinite source, synchronous alternator (with or without damper windings), transformers, buses, faults and power system stabilizers.

### MAIN BENEFITS

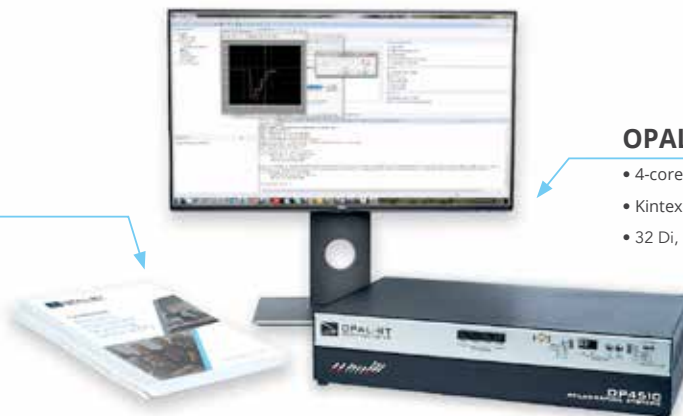
- Learn power systems stability concepts and interact in realtime in a safe environment.
- Interact with an intuitive and versatile graphical user interface (GUI) for all modules.
- Visualize the impact of faults and stabilize the system using power systems stabilizers.

The grid is composed of an infinite source connected to a synchronous alternator via one transformer and three buses. The alternator can be equipped with rotor damper windings. A power system stabilizer is available and can be triggered according to the tests that are running.

### COURSEWARE

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Power System (PS)  
teaching laboratory  
Modules 1 to 3

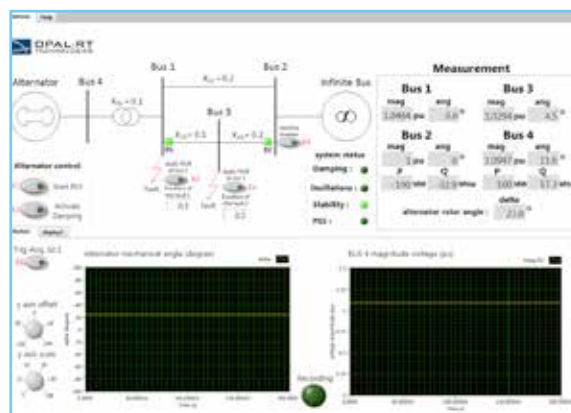


#### OPAL-RT OP4510

- 4-core CPU, Xeon E3 3.5 GHz
- Kintex-7 XILINX FPGA, 325T
- 32 Di, 32Do, 16 Ai, 16Ao



## OUR POWER SYSTEM (PS) TEACHING LABORATORY COMES WITH THREE MODULES



### OBJECTIVES

- Analyze transient stability of power systems in time-domain and phasor-domain.
- Visualize the power flow of the system.
- Use the intuitive Graphical User Interface (GUI) to apply faults on buses and observe the impacts on key signals.
- Activate the alternator rotor's dampers and understand their effect.
- Start the power system stabilizer to recover from faults.

### MODULE 1:

Power Flow w/o Faults  
**Laboratory Exercises include:**

Analyse, measure and validate the power flow of the system due to a three phase short-circuit occurring on bus 1.

### MODULE 2:

Damper Windings  
**Laboratory Exercises include:**

Same as in module 1, plus the alternator rotor is equipped with damper windings.

### MODULE 3:

Faults & Recovery  
**Laboratory Exercises include:**

Transient stability analysis of the system due to a three phase short-circuit occurring on bus 3.