

HIL and RCP Simulation Systems for Electric Motors

Test bench

OP1600

OP1620



"Take your wind energy system control design further into real-world implementation, and speed up the testing and tuning of your actual controller with OPAL-RT's RCP and HIL courseware".

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ELECTRIC MOTOR LABORATORY CURRICULUM GOALS

The OPAL-RT system, combined with Festo hardware, enables educators to fully teach the V-cycle principles used in the industry. Students and researchers can build a model and then validate the same model against a real system.

This laboratory combines the best of both OPAL-RT and Festo solutions to deliver academic researchers and teachers the ideal Hardware-in-the-Loop (HIL) and Rapid Control Prototyping (RCP) simulation system to conduct experiments and teach in the fields of electrical machinery, power converters and wind energy generation.

TEST BENCH OFFER

OPAL-RT OP4510

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

OPAL-RT OP8660

HIL Controller Interface

- 16 High Current- max 15A
- 16 High Voltage Probes- max 600V



(8331, 8311, 8374, 8857)

(8540)

(8505)

FESTO OP1620

- Four Quadrant Dynamometer 2KW- (8540)
- Induction Motor DFIG- PMSM (8505)
- IGBT Chopper/ Inverter (8857)
- Line Inductors, Resistive Load and Capacitive Load (8331, 8311, 8374)



OUR HIL AND RCP SIMULATION SYSTEM FOR ELECTRIC MACHINES COMES IN TWO FORMATS WITH THREE MODULES EACH



OP1600

The **200 W Festo** Electromechanical Training System contains:

- Dynamometer (8960)
- Power supply (8821)
- PMSM (8245)
- DFIG, SYNC M/G, PMDC or SCIM (8231, 8241, 8213,8221)
- 2x 6-pulse IGBT (8837)
- Capacitive Load, Resistive Load or Line Inductors (8331, 8311, 8326-A)

OP1620

The **2-kW Festo** "Renewable Energy" System contains:

- Dynamometer (8540)
- Power supply (8525)
- PMSM (8505)
- Sync M/G, DC or SCIM (8507, 8501, 8503)*
- 2x 6-pulse IGBT (8857)
- Capacitive Load, Resistive Load or Line Inductors (8331, 8311, 8374)

* Optional

OBJECTIVES

- Cover the fundamental concepts of RPC
- Perform hands on exercises using Festo's power electronics and motor drive didactic hardware.

MODULE 1:

OP1600- OP1620
Fundamentals of RCP and operation

Laboratory Exercises include:

- Signal conditioning for RCP
- Interface with machines
- Interface with power electronics
- Control of driving dynamometers

MODULE 2:

OP1600- OP1620
Entry level application of RCP

Laboratory Exercises include:

- PID based speed control of machines
- Operation of 2-level inverter
- Regulation of a DC bus

MODULE 3:

OP1600
Advanced application of RCP

Laboratory Exercises include:

- Active filtering
- Advanced FOC control of a DFIG

MODULE 3:

OP1620
Advanced application of RCP

Laboratory Exercises include:

- Speed control of various machines: DC, IM, PMSM, WRIM.