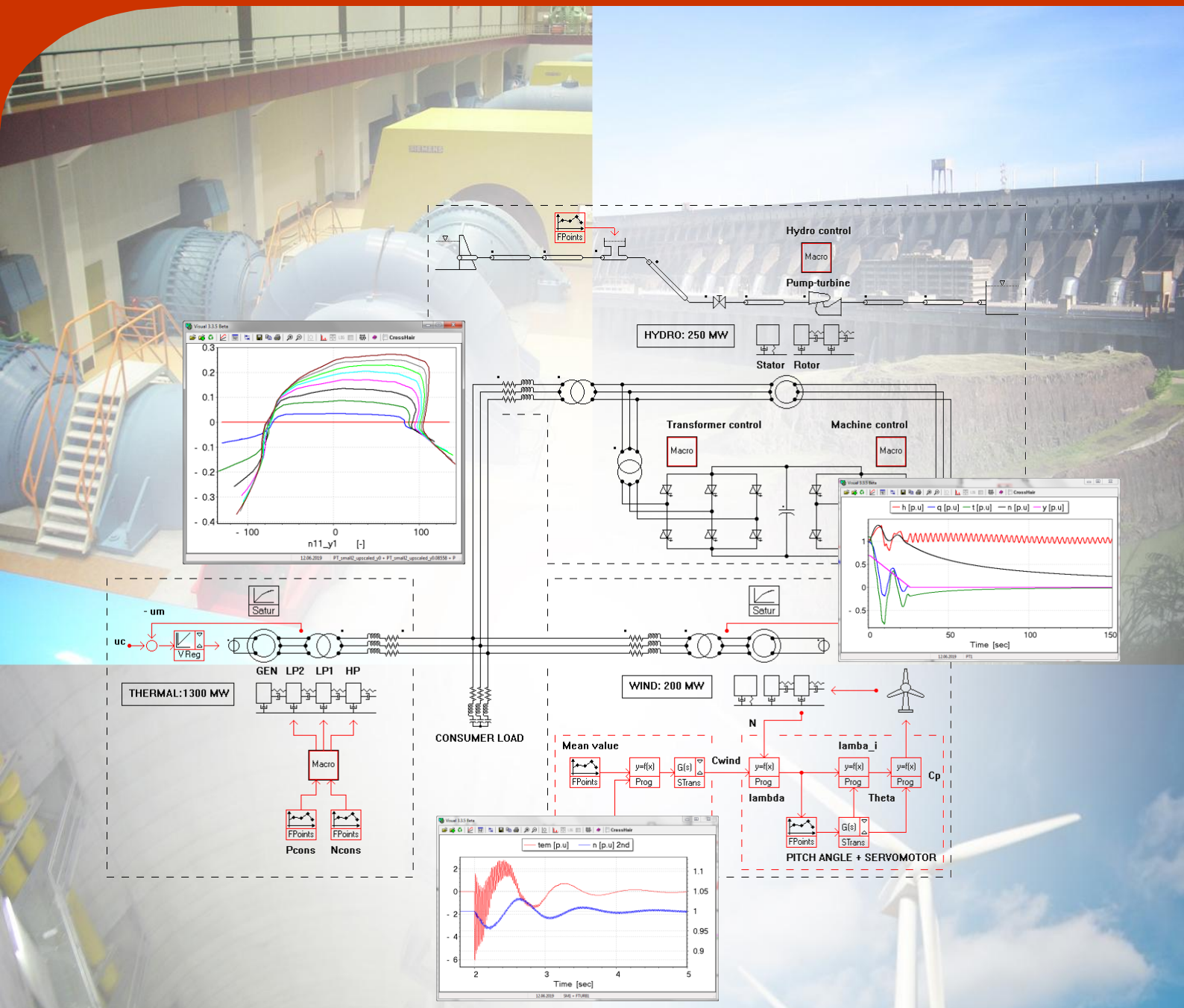
SIMSEN

Simulation Software for Hydraulic & Electric Systems Adjustable Speed Drives



Hydraulic and Electrical Transients
Water Hammer Calculation
Hydroelectric Systems
Power Network Stability
Complex Drives Control
Load Flow

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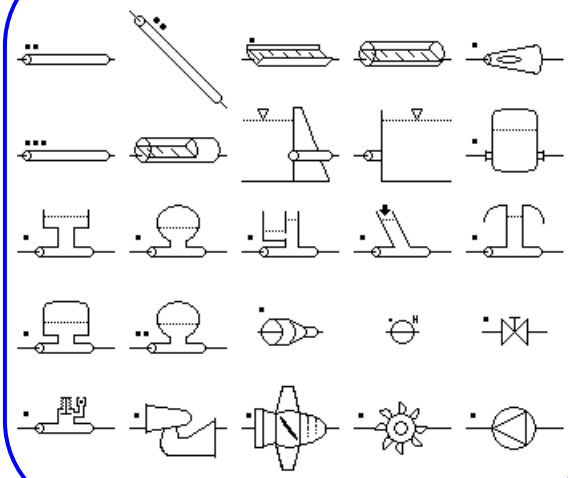
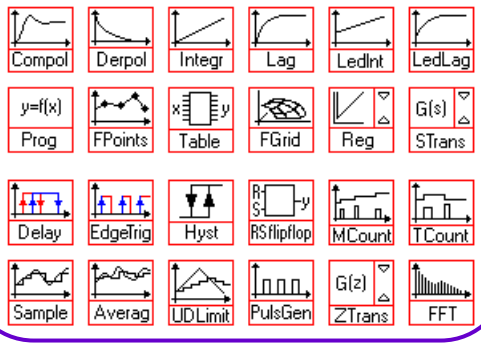
Libraries:

Hydraulic Systems



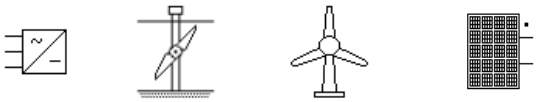
Analog & Digital Control Blocks



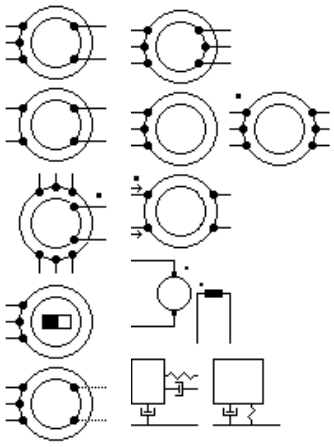
Application Coupling

Special Units

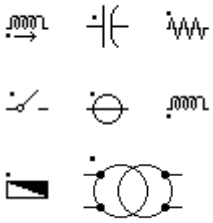
New Renewable and Average Converters



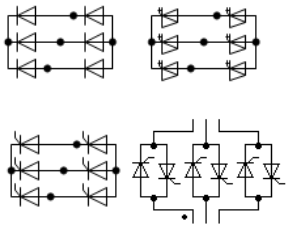
Electrical Machines and Rotating Inertias



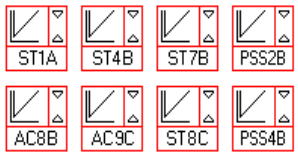
1 Phase Units



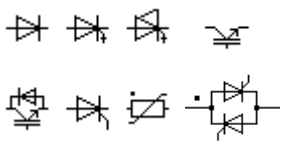
3 Phases Converters



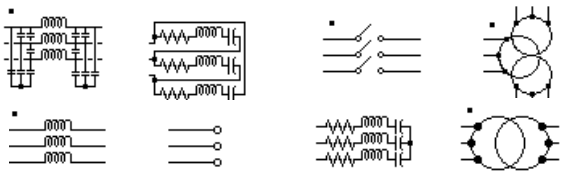
IEEE Standard Excitation Systems and PSS



1 Phase Semi-Conductors

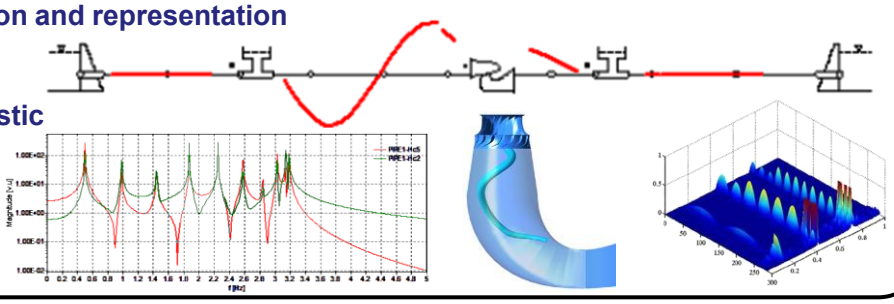


3 Phases Units



Available libraries

- Eigen values, eigen vectors calculation and representation
- Harmonic analysis
- Turbine and pump-turbine characteristic
- Coupling with 3D CFX and ANSYS
- Water column separation
- Open channel



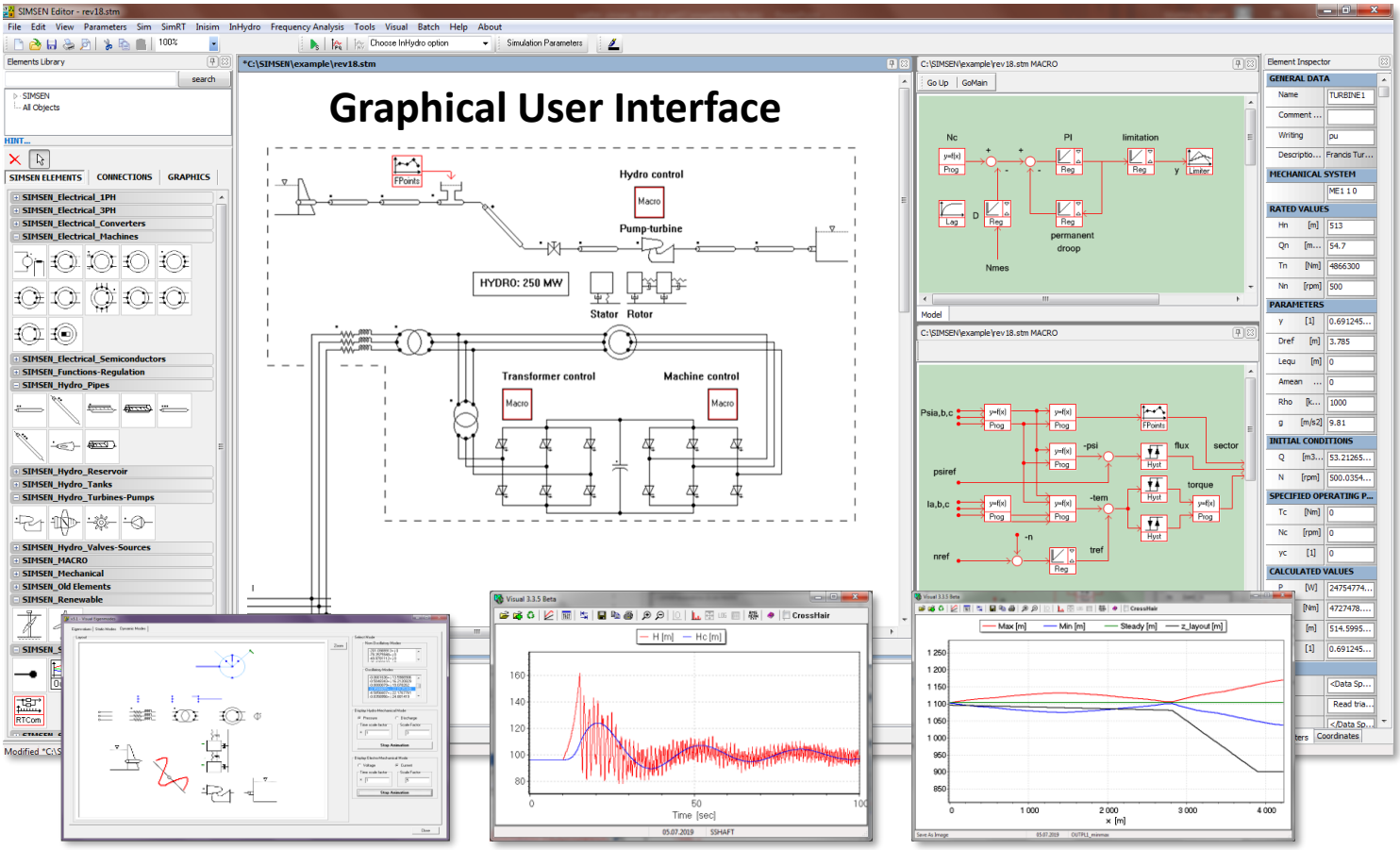
Simulation Software for Hydraulic & Electric Systems Adjustable Speed Drives

Features:

- ✓ From water to wire modelling
- ✓ Modular structure with arbitrary topology
- ✓ No restriction on the network size
- ✓ Three phases systems in ABC phase quantities
- ✓ Events detection and back-tracking
- ✓ Load-Flow calculation
- ✓ Parameterization
- ✓ Harmonics analysis, eigen values, eigen vectors calculation and representation

Hydraulic systems

- ✓ Water hammer calculation
- ✓ 4 quadrants transient behavior
- ✓ Francis/Pelton/Kaplan/Pumps and reversible Francis pump-turbines
- ✓ Surge tanks, surge shafts, differential surge tanks
- ✓ PID Turbine governors
- ✓ Hydroelectric interactions
- ✓ Cavitation/Water column separation
- ✓ Open channel flows
- ✓ Piezometric line visualization
- ✓ Database of realistic Francis & Pelton turbines performance hill chart



Electrical Power Networks:

- ✓ Electrical 3ph machines models 2.1-3.3 according to IEEE standard 1110
- ✓ Single phase synchronous machine model
- ✓ Electromagnetic transients in AC/DC
- ✓ Transient stability and general fault analysis
- ✓ SubSynchronous Resonance (SSR)
- ✓ Torsional analysis
- ✓ FACTS, HVDC, SVC
- ✓ Grid code compliance (FRT)
- ✓ IEEE Standard excitation systems and PSS

Regulation part:

- ✓ Easy definition of any control structure
- ✓ S-transfer functions, PID regulator
- ✓ Programmable unit, logical table
- ✓ Digital devices, Z-transfer functions
- ✓ Control devices, on-line FFT
- ✓ User defined DLL for control
- ✓ Coupling with external application (Matlab, Labview, EMTP-RV, Electromagnetic/Fluid FEM, HIL, etc)

Adjustable Speed Drives:

- ✓ DFIM FSFC modelling
- ✓ Power electronics converters
- ✓ Multi level modular converters (MMC)
- ✓ Voltage Source Inverters (VSI)
- ✓ LCI 6 and 12 pulses
- ✓ Cyclo-converters
- ✓ Analog / digital mixed signals simulation
- ✓ PWM PLL based control
- ✓ Vector control
- ✓ IGBT GTO Thyristor

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SIMSEN Research, Development, and Ownership:

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