

Electrical circuits

- Ideal Switches
- Electric Machines
- Linear/Nonlinear Components
- ▶ plexim.com/plecs/electrical

Controls

- Analog
- Digital
- PWM-Generators
- ▶ plexim.com/plecs/control

Thermal

- Loss Look-up Tables
- Heat Sink Concept
- Thermal Networks
- ▶ plexim.com/plecs/thermal

Magnetics

- Complex Geometric Structures
- Saturation
- Hysteresis
- ▶ plexim.com/plecs/magnetic

Mechanical

- Translational / Rotational Motion
- Friction
- Non-Idealities
- Torsional Stiffness
- ▶ plexim.com/plecs/mechanical

Tools

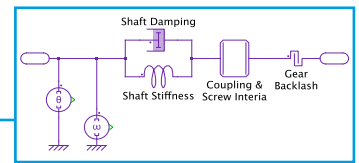
- Steady-State
- Frequency Response
- Fourier Analysis
- ▶ plexim.com/plecs/tools

MOTOR DRIVES

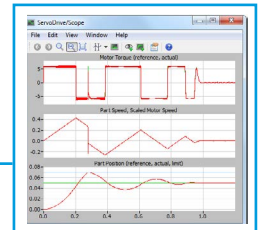
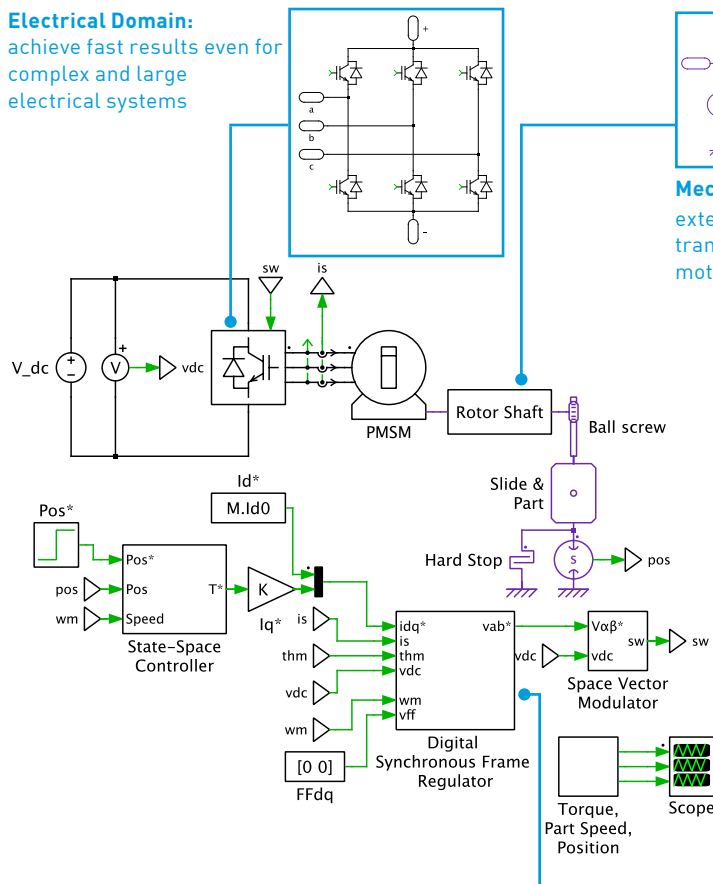
Servo Drive with Optimum Braking

This PLECS library model illustrates a servo drive application, combining the PLECS electrical, control and mechanical domains. The system includes an inverter with field-oriented control that supplies a servomotor coupled to a ball screw gear. The output of the gear is attached to a slide, which holds the part that is being position-controlled for manufacturing (e.g. milling) operations. An Optimal Speed Limit algorithm is included to enhance position control.

Electrical Domain:
achieve fast results even for complex and large electrical systems

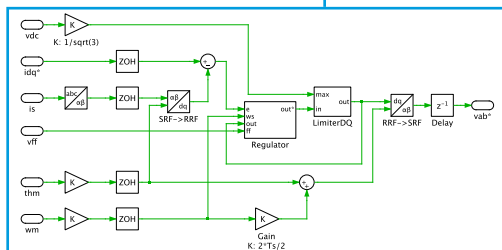


Mechanical Domain:
extend your model with translational and rotational motion



PLECS Scope:
display and analyze your simulation results

Control Domain:
implement and verify your control design



PLECS® is the tool of choice for high-speed simulations of power electronic systems. It is available in two editions: PLECS Blockset for seamless integration with MATLAB®/Simulink®, and PLECS Standalone, a completely independent product.

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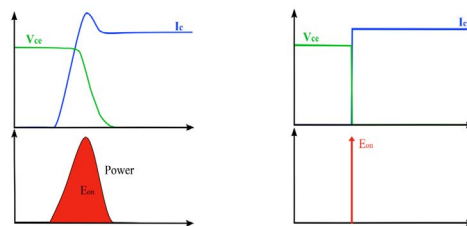
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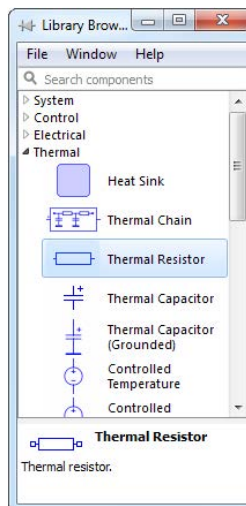
Fast and efficient simulation

PLECS uses ideal component models where possible to simplify switching transitions and allow large simulation steps. At the circuit and system level this results in fast and efficient simulation, since only the details affecting the circuit response are modeled. Simulation of thermal losses during ideal switching is enabled by means of thermal look-up tables.



Comprehensive library

The PLECS library comprises essentially all components used for power electronic systems. Continuous and discrete signal processing blocks let you create almost any analog or digital control. In addition to a range of standard electrical components, the library offers specialized elements for power electronics. Ideal and non-ideal semiconductor switches are included as well as customizable converter, machine and transformer models.



C-Code and simulation scripts

Simulation scripts allow you to automate simulations and pre- or post-process the results. Custom functionality can be implemented in the C-Script block using the C programming language. The code is compiled internally in PLECS, making the use of additional development tools unnecessary.

Analysis tools

PLECS offers a steady-state analysis tool to rapidly calculate the steady state of a switched power electronic system. It is particularly useful for electro-thermal systems containing transient processes with time constants differing by orders of magnitude. The AC Sweep and Impulse Response Analysis tools calculate the small-signal transfer function and loop gain of a system. This allows you to easily check the gain and phase margins of a specific controller design.

PLECS Scope

The PLECS Scope is a convenient tool for viewing and analyzing simulation results. It is also used to easily customize data for reporting purposes. The PLECS Scope can be placed in a Simulink model or in a PLECS schematic. The main features of the PLECS Scope are:

- ▶ View handling: Zoom (square, vertical, horizontal), view history, save view.
- ▶ Results overlay: Show results from different simulations in the same scope and store them to a file for future sessions.
- ▶ Data cursors: Read out data points from individual signals and apply functions to the data set (e.g. THD, RMS, Min, Max...).
- ▶ Curve properties: Edit color and line styles by defining palettes or directly editing individual curves.
- ▶ Data export: Print the current view directly from the scope or export it to a bitmap or PDF file to include it in a report.
- ▶ Fourier analysis: Display the Fourier spectrum of datasets with a click of a button.

