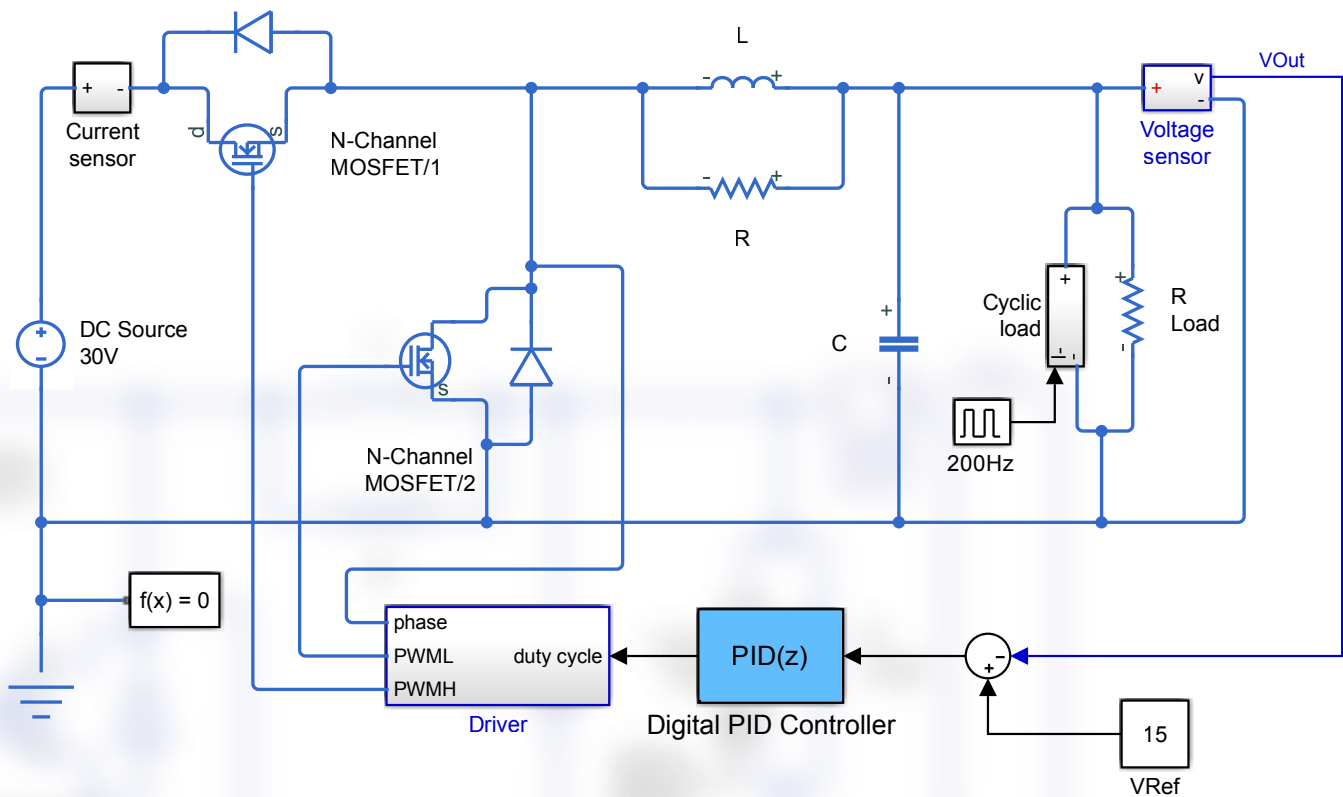




Simulink for Developing Digital Control for Motors, Power Converters, and Battery Systems

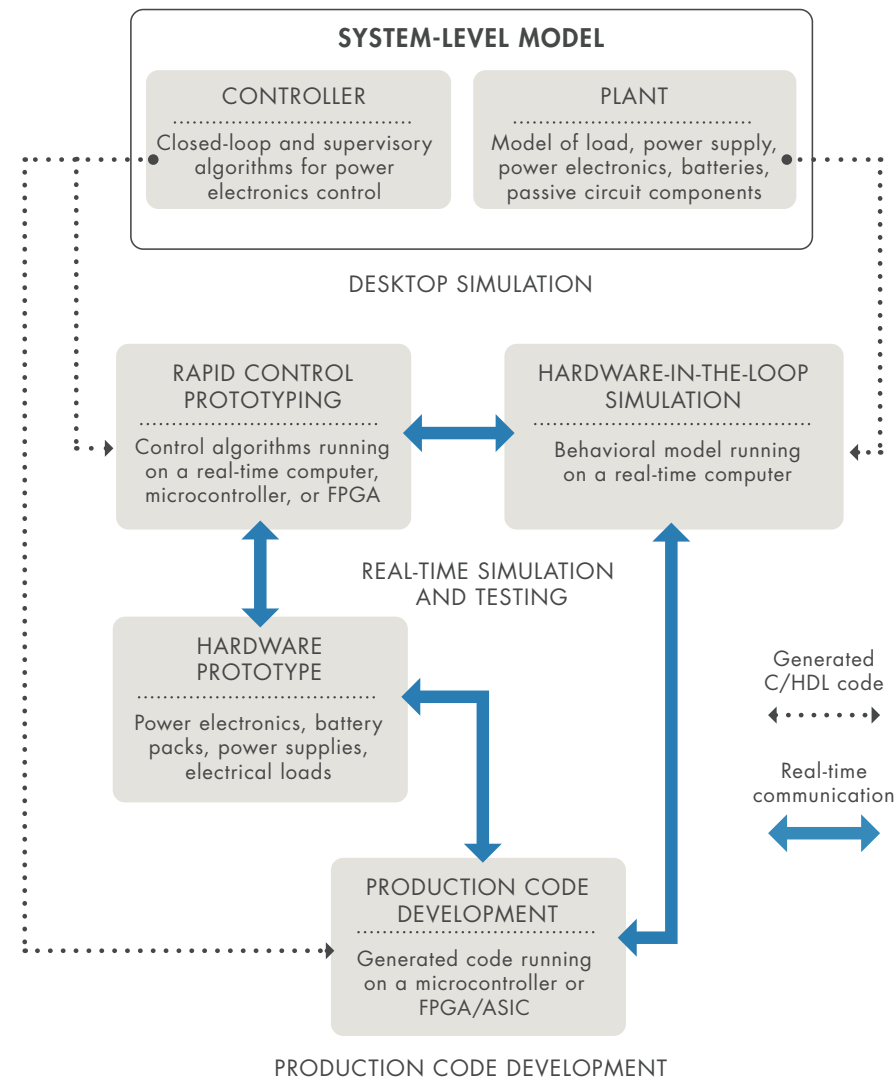


“Simulink and Embedded Coder enabled us to open the door to new markets. With increased productivity from extensive stimulation and efficient code generation, we have confidence in our ability to produce the systems that larger customers are asking for in the time frames they want.”

— Dr. Robert Turner, ABB

Digital Control Design for Power Electronics

Simulink® makes it easy to try new control algorithms, test them, and deploy them to hardware without manual coding. It includes control design and modeling add-on libraries and third-party tools to simulate your power electronic controls algorithms and generate code for real-time testing and production implementation.



Use system-level models for desktop simulation, real-time testing and simulation, and production code development.

Desktop Simulation

Simulate power electronics control systems on a PC or in the cloud

Model power sources and loads using hundreds of prebuilt models and third-party simulation tools

- Simulink and *Simscape*™ electrical libraries of AC and DC components and machines
- Cosimulation with SPICE, PSCAD™, and other electrical simulation environments
- Support for importing magnetic flux linkage data from FEA motor design tools

Choose the right level of fidelity for IGBTs, MOSFETs, and other power electronics components

- Fast ideal switching
- Behavioral
- Physics-based

Develop and verify multilevel feedback and supervisory control algorithms

- Multirate, multiloop feedback design
- Auto-tuning in time and frequency domains
- Fixed-point design support
- State machine support for mode control and fault handling

Real-Time Simulation and Testing

Generate C and HDL code to test digital controller models in real time

Perform real-time simulation using *Simulink Real-Time*™ and Speedgoat hardware

- Rapid control prototyping
- Hardware-in-the-loop up to 1 MHz sampling using an FPGA
- Floating-point support for FPGAs for easier modeling



Other hardware vendors providing Simulink support via C-code generation

- dSPACE®
- ETAS®
- National Instruments®
- OPAL-RT

Production Code Development

Generate readable, compact, and optimized C and HDL code from any Simulink model

Develop production-ready code

- Design real-time applications targeting floating- or fixed-point processors
- Perform software-in-the-loop (SIL) and processor-in-the-loop (PIL) simulations
- Generate code for motor control applications with *Motor Control Blockset*™
- Reuse legacy code

Target leading microcontrollers, FPGAs, and SoCs

- ARM®
- Infineon®
- Intel®/Altera®
- Microchip/Atmel®
- Microsemi®
- NXP™
- STMicroelectronics®
- Texas Instruments™
- Xilinx®

What You Can Do with Simulink

- Test new ideas using simulation with hundreds of ready-to-use blocks for electrical, mechanical, and thermal systems
- Extend your simulation model with thousands of proven *MATLAB*® functions
- Build custom electrical component models with MATLAB, Simscape language, and C code integration
- Develop and test algorithms for controls, plus signal processing, state logic, and integrated analytics
- Combine discrete, continuous, synchronous, asynchronous behaviors in one model
- Profile and analyze your model by recording signals and single stepping through its execution
- Cosimulate with other electrical simulation environments using S-functions or the FMI standard
- Speed up model testing and parameter tuning using parallel simulations and local and global optimization functions
- Perform formal model and code verification across the workflow to meet industry standards including AUTOSAR, DO-178C, EN 50128, IEC 61508, IEC 62304, and ISO 26262

Learn More

Power Electronics Control Design with Simulink

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Trial Software

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- *Power electronics hardware-in-the-loop (HIL) testing*
- *Power electronics simulation*
- *Power factor correction*
- *Pulse-width modulation*
- *Small-signal analysis*

Customer References

mathworks.com/motorandpowercontrol-references