

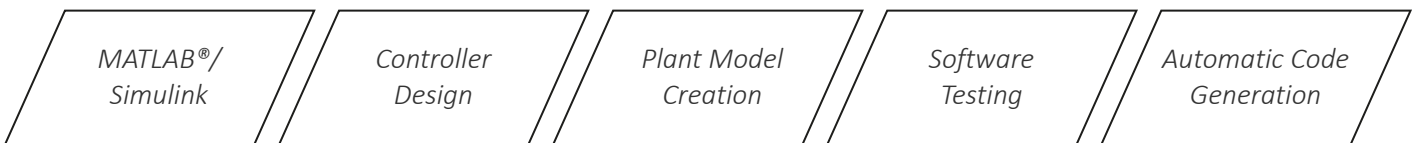
Model-Based Design

The fastest way to your finalized software

The Sokratel Model-Based Design Team is the competent partner for software development in the areas of **green energy, inverter design, and automotive** – together with you, we always find the best solutions for your challenges.

With our Team you can expect:

- **Support** from initial requirements to the finished operational software
- **Efficient approaches** to modeling and designing control systems and their environment
- **Predictive error detection and correction** with Simulink® toolboxes
- **Automatic code generation** for multiple target architectures such as microprocessors, ARM microcontrollers, FPGAs or MPSoCs



We can **rapidly cast your requirements into a root-level design concept**, which can then be further developed iteratively - from the initial idea to the prototype.

Since **continuous integration** can be used throughout the entire development process **from conception to testing**, a **quick reaction to new features** or restructuring as well as adaptation of the models is no challenge for us.

Model-Based Design Concept

Model-based design (MBD) provides an **efficient approach to modelling and designing control systems**. Both the controller and the plant model are implemented in **MATLAB® Simulink®**.



Advantages of Model-Based Design

- One Tool Environment
- Automatic Code Generation
- Early Bug Discovery due to Continuous Testing
- Intuitive Understanding
- Continuous Integration

By linking these models, we can analyse the controller optimally and adapt it to the environment and the plant. Simulink offers the possibility to **generate code for your target hardware from the Simulink models automatically**. Thus, the developed controller can be deployed on hardware without any further effort.

Solid Foundation of various MATLAB® Simulink® Toolboxes

- Simulink
- Simulink® Test™
- Simulink® Check™
- Simscape™
- HDL Coder™
- Design Verifier™
- Stateflow®
- Control System Toolbox™
- Signal Processing
- Simulink® Coder™
- HDL Verifier™

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Software Testing

The implemented controller models are checked and verified by a **rigid software test protocol**, starting with the smallest unit tests. This enables predictive error detection and correction at early stages of the development process.

Furthermore, the control software is tested with **Model in the Loop (MiL)** simulations to precisely analyse and adapt the controller behaviour. To test VHDL® code for an FPGA, we extend these MiL simulations with FPGA simulations using external tools like Verilog® or HDL Verifier for MATLAB. Testing the models with physical hardware focusing on the communication to the actuators and sensors is also an essential step - **Hardware in the Loop (HiL)**.

We offer an experienced, efficient execution from the conception and creation of a HiL system, to the commissioning and development of tests, including HiL tests targeting CPUs and FPGAs. In addition, we provide support for the creation of **custom targets in Simulink**. Workflow and code generation are tailored to be hardware-specific, **even if the hardware is not supported out-of-the box by MATLAB** (such as custom FPGAs and MPSoCs).



Tim Krause
Sokratel GmbH
Head of Division Automation



Thomas Frei
Sokratel GmbH
Managing Director

Contact: contact-automation@sokratel.com



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