



Five years of SCALEXIO –  
Looking back and to the future

HIL





# Revisited Simulation

In 2011, SCALEXIO was introduced as the new dSPACE hardware-in-the-loop (HIL) system. Tino Schulze, responsible for HIL test systems at dSPACE explains the past development and the plans for the future.





*What did dSPACE expect when introducing SCALEXIO® five years ago? Were these expectations fulfilled?*

Yes, definitely. With SCALEXIO, we have a strong technology that covers current and future developments such as new in-vehicle bus systems, the increased use of electric drives, new motor functions, advanced driver assistance systems, and functions for autonomous driving. SCALEXIO-based HIL systems address all of these system requirements. Furthermore, we have recognized the trend towards larger and more complex simulation models and support it with high, scalable computing power in the shape of SCALEXIO Processing Units and easy configurability via the ConfigurationDesk® software. Here, too, our expectations were met.

*What application areas can SCALEXIO be used for?*

After watching SCALEXIO on the market for 5 years, we can say that it addresses all application areas – from small systems for component tests up to large networked setups for validating complete E/E systems.

New setups are usually built with SCALEXIO because the system makes it easy for our customers to meet their project requirements. For example, we use the SCALEXIO data bus IOCNET to build large HIL systems with distributed I/O channels controlled by a central real-time PC. This opens up entirely new possibilities for HIL setups.

*What is the difference between SCALEXIO and its market competitors?*

Our unique selling point is SCALEXIO's broad support for automotive requirements. With just one system, dSPACE offers the entire range of applications from a single source: from pure bus tests up to highly specialized setups for testing electric drives. This is SCALEXIO's strong suit. We also provide I/O boards whose individual channels provide the possibility to simulate faults. The electrical faults can then be configured easily and safely with the configuration software ConfigurationDesk. This and the flexible I/O channels make it easy to adjust the SCALEXIO HIL simulator for different projects, especially

for component tests. In addition to an excellent connection to MATLAB®/ Simulink®, ConfigurationDesk makes it possible to integrate other model formats, such as Functional Mock-up Units (FMUs), making our customers flexible and fit for the future.

*Why is SCALEXIO the avant-garde in HIL simulation?*

SCALEXIO systems provide a high flexibility in terms of channels and functions. Because the system is configured only via software, changing the system setup only requires minor hardware changes. In addition, dSPACE regularly updates the SCALEXIO Processing Units with new, more powerful variants. The high flexibility, outstanding computing power and easy modification ensure that SCALEXIO users are prepared for the challenges of the future.

*How does dSPACE support the transition to the SCALEXIO world?*

To make the first steps easier, customers can use the dSPACE test and experiment software of dSPACE Simulator for SCALEXIO, too. They can

SCALEXIO's unique technology addresses the current and future challenges of testing mechatronic components.



## SCALEXIO Profile

- Hardware-in-the-loop simulator
- Industrial PC as the processing unit for high computing power
- High flexibility through comprehensive I/O functions
- Integrated signal conditioning and failure simulation
- Completely software-configurable
- Model integration via Simulink® or Functional Mock-up Interface
- Support for virtual ECUs
- Comprehensive support for bus simulation
- Connection of electronic loads for simulating electric drives

For HIL tests, dSPACE provides a one-stop solution: Software, hardware, process integration and support on-site at the customer.

continue to use existing software such as ControlDesk®, AutomationDesk, MotionDesk, ModelDesk and ASM with only minor modifications. SCALEXIO also supports the common test automation and modeling tools from third parties. Here, dSPACE consistently uses industry standards like Functional Mock-up Interface (FMI) and XIL API to create a largely standardized connection that makes it easier to use existing software. It is also possible to couple SCALEXIO and dSPACE Simulator via a real-time-capable connection. And, of course, our experienced dSPACE Engineering teams provide worldwide support for customers who introduce a new system, offering turnkey projects, on-site support, and trainings, for example.

### *Are there any special projects that you would like to highlight?*

Yes, there are. Especially in aviation. For example, we had an aviation project with more than 1,500 channels. Those are special conditions, but not unusual for the aviation industry. Daimler even took SCALEXIO to the test track. SCALEXIO's software configurability made it easy for them to

adjust the system without having to modify the hardware. Another exciting field is research projects. Together with RWTH Aachen University, we are currently working on an international project to analyze how to use SCALEXIO on engine test benches. In this scenario, the remaining vehicle is simulated.

### *What developments do you have planned for the future?*

In the course of the year, we will introduce a new system size, SCALEXIO LabBox. Together with the SCALEXIO Processing Unit, SCALEXIO LabBox can be used on a desk, as a desktop simulator so to speak, or it can be installed in a larger system setup. For bus simulation, we will provide additional boards that support more bus systems and a software program for the central configuration of the bus simulation: the Bus Manager. And we have many more ideas, which we implement in close coordination with our customers.

*Mr. Schulze, thank you for talking with us!*

*As Lead Product Manager Hardware-in-the-Loop Testing Systems, Tino Schulze is responsible for the entire HIL tool chain at dSPACE GmbH, Paderborn, Germany.*

