dSPACE Training 2019

January – July
### Program

**AUTOSAR**
- Introduction to the AUTOSAR Standard 4

**System Architecture**
- System Modeling with SystemDesk 5

**Virtual Validation**
- 6

**dSPACE Real-Time Systems**
- (PHS Hardware, MicroAutoBox, MicroLabBox) 7

**SCALEXIO**
- dSPACE Real-Time Systems (SCALEXIO Platforms) 8
- dSPACE SCALEXIO HIL System 9

**ControlDesk**
- ControlDesk Basic 10
- ControlDesk Advanced 11
- Workshop: ControlDesk Automation 12

**RTMaps**
- RTMaps Basic: Developing Multisensor Applications 13
- RTMaps Advanced 14

**Rapid Control Prototyping**
- RapidPro 15

**ECU Autocoding**
- TargetLink Basic 16
- TargetLink Advanced 17
- TargetLink AUTOSAR Support 18

**Test Automation**
- AutomationDesk 19

**Real-Time Testing**
- 20

**dSPACE Automotive Simulation Models**
- ASM Vehicle Dynamics Basic 21
- ASM Traffic 22
- ASM Engine Basic 23
- ASM Engine InCylinder 24
- ASM Battery 25

**FPGA**
- FPGA Basic 26
- FPGA Electric Drives 27

**Bus Systems**
- Bus Manager (for SCALEXIO and VEOS Platforms) 28
- RTI CAN MultiMessage Blockset 28
- dSPACE FlexRay Configuration Package 30

**Data Management**
- SYNECT Test Management 31
- Workflow Management (WFM) 32

**What We Offer**
- 33

**Registration and Location**
- 34

**Overview**
- 36
- Training Courses
- Workshops
- Dates

**Registration Form**
- 40
Welcome

dSPACE offers hands-on experience and practical exercises based on a well-founded theoretical background. Our user’s needs, the positive feedback from our participants, and our new product releases are all reasons why we are frequently introducing more courses.

Have a look at our training courses for developing multisensor applications (pages 11-12). Multisensor applications play an essential role in many areas, such as advanced driver assistance systems, autonomous driving, multimodal human-machine interfaces, robotics, and aerospace. You will learn how to use RTMaps from Intempora to acquire and process sensor data, record and play back data. You will also be able to integrate your own algorithms using Python, C++ or Simulink®.

In the Virtual Validation training course (page 6) you will learn to configure and run simulations during the ECU development process to detect errors as early as possible. dSPACE VEOS allows for the simulation of virtual processing units (VPUs) on a PC, i.e., no additional hardware is required. The tool can also be used to prepare simulation setups for hardware-in-the-loop simulations before the hardware is available.

The dSPACE Automotive Simulation Models (ASM) are a tool suite for simulating combustion engines, vehicle dynamics, electric components, and the traffic environment. The open Simulink® models are used for model-based function development and in ECU tests on a hardware-in-the-loop (HIL) simulator. Learn how to use these models in our various trainings courses (pages 20-24).

Our SYNECT Test Management training course (page 29) explains how to process test data with SYNECT Test Management, including all the steps from handling requirements, test cases, and execution plans to executing tests and evaluating the test results. It also covers SYNECT’s variant model and variant-dependent test execution.

The training courses take place in Paderborn, unless stated otherwise. Other courses are also being held at our project centers in Stuttgart and Munich. As an additional service, we can also provide on-site training exclusively for your company.

Check out all of the latest news and additions on our website: www.dspace.com/go/training

The dSPACE Training Team
Introduction to the AUTOSAR Standard

Over the last few years, the AUTOSAR initiative (AUTo-motive Open System ARchitecture, www.autosar.org) has successfully established a standard for automotive software architectures. This course introduces you to the main goals and contents of the AUTOSAR Classic Platform. Some of the aspects covered are the methodology behind the standard, the concept and purpose of the virtual functional bus (VFB), and the different layers of the standard software architecture, which are described in different templates (application layer, run-time environment (RTE), basic software).

Goals

- Get an overview of the AUTOSAR standard’s classic platform with the main focus on application software and system modeling
- Learn about the contents of and the relationship between the different documents and templates
- Familiarize yourself with the basic terminology (e.g. RTE, SWC, VFB)

Course Contents

- Introduction to AUTOSAR
- Methodology of AUTOSAR
- Concept of the virtual functional bus (VFB)
- Software architecture: application layer (software component template)
- System description
- Software architecture: run-time environment (RTE)
- Software architecture: basic software (Basics)

Participants

- Systems engineers, software architects, and software developers
- Anyone involved in the development process for automotive software

1-Day Training Course
Fee per person: € 520 (plus tax)

Dates
- March 12, 2019 (Paderborn)
- June 12, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
System Modeling with SystemDesk

SystemDesk is a tool for modeling, integrating, and simulating system architectures and distributed software systems according to the classic platform of the AUTOSAR standard.

This training course focuses on modeling. First, you will learn the necessary basics of the AUTOSAR standard on modeling software components and compositions. Next, you will model software components and compositions in SystemDesk and integrate TargetLink code for them. Finally, you will build and configure a system and compute a system extract.

Participants
- Systems engineers, software architects, and software developers

Goals
- Get an overview of the software component template of the AUTOSAR standard
- Model a software component in SystemDesk
- Integrate TargetLink code
- Build a top-level software composition and build and configure a system

Tools and Systems
- SystemDesk Modeling Module

Course Contents
- The software component template of the AUTOSAR standard
- Modeling software components
- Integrating implementations
- Building compositions
- AUTOSAR import/export
- Automation options

Please note:
The simulation features of SystemDesk and VEOS are covered by the separate Virtual Validation training course (page 6).

2-day training course
Fee per person: € 1100 (plus tax)
20% discount for universities

In combination with the Virtual Validation training course the overall fee per person is € 1450 (plus tax).

Dates
February 19-20, 2019 (Paderborn)
May 21-22, 2019 (Paderborn)
July 23-24, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
Virtual Validation

Errors during the ECU development process should be detected as early as possible. Thus, simulations and tests should be run in the early stages of the development process, preferably even before hardware-in-the-loop simulators or ECU hardware are available.

VEOS allows the simulation of what are called virtual processing units (VPUs) on a PC, i.e., without additional hardware. VPUs that represent real ECUs can be built with SystemDesk. VPUs that implement the behavior of the environment can be built from Simulink models or functional mock-up units. VEOS allows interconnecting these VPUs either directly or via virtual buses so that delays caused by bus communication can also be taken into account. Simulations running on VEOS can be accessed by the same tools as simulations running on hardware-in-the-loop simulators, i.e., ControlDesk and AutomationDesk. Therefore, VEOS can also be used to prepare simulation setups for hardware-in-the-loop simulations before the hardware is available.

Goals
- Overview of the different approaches to build VPUs
- Create VPUs from SystemDesk models
- Interconnect VPUs
- Run simulations of VPUs and observe the simulations in ControlDesk

Tools and Systems
- SystemDesk V-ECU generation module
- VEOS
- ControlDesk
- Bus Manager

Course Contents
- Configure and create virtual processing units in SystemDesk
- Connect virtual processing units in VEOS
- Include environment models
- Run and monitor simulations

Participants
- Systems engineers, software architects, software developers, software testers, ECU testers
- Recommended: Basic knowledge of AUTOSAR and system modeling with SystemDesk

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with ‘System Modeling with SystemDesk’ the overall fee per person is € 1450 (plus tax).

Dates
- February 21, 2019 (Paderborn)
- May 23, 2019 (Paderborn)
- July 25, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
dSPACE Real-Time Systems  
(PHS Hardware, MicroAutoBox, MicroLabBox)

This 2-day training course introduces you to the main features of dSPACE prototyping systems and dSPACE single-processor systems for PHS-based simulation.

This course covers only PHS-based platforms. For SCALEXIO platforms, please see the training course dSPACE Real-Time Systems (SCALEXIO Platforms) (page 8).

Participants
- Engineers working with rapid prototyping and hardware-in-the-loop (PHS-bus HIL) testing
- Engineers who are new to dSPACE or who plan to purchase dSPACE prototyping systems or simulators based on PHS in the near future
- Recommended: Previous experience with MATLAB® and Simulink®

Goals
- Set up dSPACE real-time hardware and relevant software
- Implement I/O in Simulink with dSPACE Real-Time Interface (RTI)
- Build real-time code with RTI
- Change parameters and capture data with ControlDesk
- Apply advanced features

Tools and Systems
- dSPACE PHS-based platforms (DS1006, DS1007, MicroAutoBox II, MicroLabBox, etc.)
- MATLAB/Simulink
- Real-Time Interface
- ControlDesk

Course Contents
1st Day – Basics
- Software/hardware setup
- Introduction to ControlDesk
- ControlDesk platform management
- Introduction to Real-Time Interface
- I/O implementation using Real-Time Interface
- ControlDesk project and experiment management
- ControlDesk instrumentation

2nd Day – Advanced Features
- ControlDesk basic data acquisition
- Basics on ControlDesk Bus Navigator
- Multitasking and interrupt handling
- Programming S-functions

2-day training course
Fee per person: € 1100 (plus tax)
20% discount for universities

Dates
February 12-13, 2019 (Paderborn)
May 21-22, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
dSPACE Real-Time Systems (SCALEXIO Platforms)

This 2-day training course introduces you to the workflow for SCALEXIO simulation systems, where you will be using dSPACE ConfigurationDesk and model ports.

This course covers only SCALEXIO platforms. For rapid control prototyping using the dSPACE Real-Time Interface (RTI) Library, see the training course for PHS-based platforms (page 7).

Participants
- Engineers working in control engineering in the fields of rapid control prototyping or hardware-in-the-loop testing
- Engineers who are new to dSPACE or who plan to purchase or use dSPACE SCALEXIO systems or simulators for prototyping in the near future
- Recommended: Previous experience with MATLAB® and Simulink®

Goals
- Set up dSPACE real-time hardware and relevant software
- Implement model ports in Simulink and configure I/O access using dSPACE ConfigurationDesk
- Build real-time code with ConfigurationDesk and Simulink
- Change parameters and capture data with ControlDesk
- Apply advanced features

Tools and Systems
- Multicore SCALEXIO hardware
- MATLAB/Simulink
- ConfigurationDesk
- ControlDesk

Course Contents
1st Day – Basics
- Software/hardware setup
- Introduction to ConfigurationDesk
- Workflow: from Simulink to a ConfigurationDesk project
- I/O implementation using model ports and ConfigurationDesk
- Introduction to ControlDesk
- ControlDesk platform, project and experiment management
- ControlDesk instrumentation

2nd Day – Advanced Features
- Measuring and recording in ControlDesk
- Task management
- ConfigurationDesk advanced information
- ConfigurationDesk Bus Manager and ControlDesk Bus Navigator

Dates
April 2-3, 2019 (Paderborn)
May 7-8, 2019 (Paderborn)
July 16-17, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m

2-day training course
Fee per person: € 1100 (plus tax)
20% discount for universities

The number of participants is limited to six persons.
dSPACE SCALEXIO HIL System

Hardware-in-the-loop (HIL) simulation makes it possible to test new ECUs and software in a largely virtual environment throughout the entire development cycle, without real vehicles or prototypes. The idea is to connect real ECU prototypes to real-time models of the vehicle and its mechanical, electrical, hydraulic and electronic components. This allows systematic and fully automated testing of the ECU and the entire electronic vehicle system. This course uses the dSPACE SCALEXIO technology to demonstrate which hardware components you need to integrate in order to customize and extend a simulator so that it matches your requirements. Step by step, you will learn the idea behind HIL simulations and the potential they offer.

Please note: ControlDesk and AutomationDesk are not covered by this course. If you want to learn about the extensive and powerful method of automated testing in combination with ECU diagnostics, fault simulation, and report generation, we recommend to book this course in conjunction with the AutomationDesk courses.

Participants
- Engineers who want to use a SCALEXIO system.
- Engineers who want to customize an off-the-shelf SCALEXIO system to their own requirements.
- Required: Experience in using ControlDesk and MATLAB®/Simulink®

Goals
- Become familiar with the SCALEXIO philosophy
- Learn about the requirements and the capabilities of HIL
- Plan, set up and expand a SCALEXIO system
- Use ConfigurationDesk to describe the connected devices (ECUs, loads), assign I/O functions and hardware, and connect the I/O to the model
- Integrate ECUs and simulate failures for diagnostic purposes

Tools and Systems
- SCALEXIO
- ConfigurationDesk
- MATLAB/Simulink
- ControlDesk

Course Contents
- Structure of a SCALEXIO test system
- SCALEXIO hardware components
- Planning and setting up an HIL project
- Configuring and customizing a dSPACE SCALEXIO system
- Using ConfigurationDesk to set up the simulator
- Failure simulation
- Engine simulation
- Examples of signal generation and acquisition
- Introduction to multicore and multi-processing-unit simulation with SCALEXIO

Dates
- February 26-27, 2019 (Paderborn)
- July 10-11, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m

2-day training course
Fee per person: € 1100 (plus tax)
20% discount for universities

The number of participants is limited to six persons.
ControlDesk Basic

Book a 1-day training course to learn the basics of using ControlDesk. Gain experience in handling ControlDesk projects and practice data acquisition with ControlDesk.

**Participants**
- Engineers new to ControlDesk
- Engineers who want to switch from ControlDesk 3.x or 4.x to a more recent version of ControlDesk 5.x or the new 64-bit ControlDesk 6.x

**Goals**
- Set up systems with ControlDesk
- Manage projects and experiments
- Build and use virtual instrument panels
- Apply basic features of data acquisition

**Tools and Systems**
- ControlDesk

**Course Contents**
- Introduction to ControlDesk
- ControlDesk platform management
- ControlDesk project and experiment management
- ControlDesk instrumentation
- Basics on measurement and recording

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with ControlDesk Advanced, the overall fee per person is € 1100 (plus tax).

**Dates**
- January 22, 2019 (Paderborn)
- March 19, 2019 (Project Center Munich)
- May 14, 2019 (Paderborn)
- July 9, 2019 (Project Center Stuttgart)

**Times**
- 9:00 a.m. to 5:15 p.m.
ControlDesk Advanced

This course covers the advanced work steps in ControlDesk. It is ideal for acquiring comprehensive information about ControlDesk’s advanced features, such as ControlDesk Signal Editor or the Bus Navigator.

Participants
- Engineers interested in increasing their knowledge of ControlDesk’s advanced features

Goals
- Apply the advanced measurement concept
- Automate ControlDesk
- Use the ControlDesk Bus Navigator
- Use the ControlDesk Signal Editor

Tools and Systems
- ControlDesk
- Bus Navigator
- Signal Editor

Course Contents
- Data set handling
- Bus Navigator
- Calculated variables
- Advanced measurement and recording
- Signal Editor
- Introduction to ControlDesk’s automation capabilities and event handling

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with ControlDesk Basic, the overall fee per person is € 1100 (plus tax).

Dates
- January 23, 2019 (Paderborn)
- March 20, 2019 (Project Center Munich)
- May 15, 2019 (Paderborn)
- July 10, 2019 (Project Center Stuttgart)

Times
- 9:00 a.m. to 5:15 p.m.
Workshop: ControlDesk Automation

An object model in ControlDesk – Basic Version lets you access many of its functions through automation scripts. The application programming interface is accessible from .NET programming languages (e.g., Visual Basic and C#) and COM/DCOM-based programming languages (e.g., Python and C++).

With scripts, you can perform your complex workflows in no time, such as creating a project and experiment with your custom settings. The API also lets you implement individual functionality to ensure that ControlDesk integrates perfectly into your existing development process.

Participants
- Engineers interested in the automation interface of ControlDesk

Goals
- Learn about the tool automation concept
- Use different languages for ControlDesk tool automation

Tools and Systems
- ControlDesk
- Python programming

Course Contents
- Introduction to ControlDesk tool automation
- Experiment handling (projects, experiments, instrumentation, platforms)
- Registering and configuring platforms and devices
- Running online calibration
- Measurement and recording
- Accessing variables
- Events and context menu extensions

This is just a selection of possible topics. The workshop can be adapted to the needs of the participants.

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with ControlDesk Basic, the overall fee per person is € 1100 (plus tax).

Dates
On request
RTMaps Basic: Developing Multisensor Applications

Multisensor applications play an essential role in many areas such as advanced driver assistance systems, autonomous driving, multimodal human-machine interfaces, robotics, and aerospace. Developing these kinds of applications in the lab or in the vehicle typically requires capturing, synchronizing, and processing data in real time. This data is obtained from various sensors such as cameras, laser scanners, radars, and GNSS receivers. The application development also requires interfacing with communication networks, such as CAN or Ethernet. Moreover, it is essential to be able to record, visualize, and play back time-correlated data during the test and development phase. RTMaps (Real-Time Multisensor applications) from Intempora (www.intempora.com) is designed specifically for these use cases. The tool provides a modular development and run-time environment for x86- and ARM-based platforms supporting operating systems such as Microsoft Windows® and Linux.

Participants
■ Engineers working on the prototyping of multisensor applications, such as sensor data preprocessing, data fusion, and data logging with autonomous driving

Goals
■ Acquire and process sensor data
■ Record and play back data

Tools and Systems
■ RTMaps

Course Contents
■ Graphical user interface
■ Recording and replay
■ Macro components
■ Reading strategies
■ Data fusion
■ Scripting RTMaps
■ Embedded use
■ Triggered recording
■ Post-processing
■ Synchronized data processing on multiple distributed platforms

Participants
■ Engineers working on the prototyping of multisensor applications, such as sensor data preprocessing, data fusion, and data logging with autonomous driving

Goals
■ Acquire and process sensor data
■ Record and play back data

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with RTMaps Advanced, the overall fee per person is € 1100 (plus tax).

Dates
March 6, 2019 (Paderborn)
June 5, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
When using RTMaps, you can graphically design and execute your algorithms for sensor data processing (perception), sensor fusion, and applications on a PC or embedded device. In addition, RTMaps lets you precisely time-stamp and record sensor and bus data. In this training course you will learn how to integrate C++, Python, and Simulink code in RTMaps and how to configure recorders for data logging. In addition, integration options in the dSPACE tool chain will be presented, for example how to use RTMaps in combination with dSPACE MicroAutoBox. Finally, you will learn how to develop and run applications on embedded platforms.

Participants
- Engineers working on the prototyping of multisensor applications, such as sensor data preprocessing, data fusion, and data logging for autonomous driving

Course Contents
- Integrate your own code with the RTMaps Software Development Kit
  - Python
  - C++
- Integrate Simulink
  - Using Simulink Coder
  - Using TargetLink
- RTMaps: Integration in the dSPACE tool chain
  - dSPACE RTMaps Interface Blockset
  - Monitor and parameterize RTMaps components from ControlDesk using XIL API
- Use RTMaps on embedded X86 and ARM platforms
- Data logging with RTMaps

Goals
- Integrate your own algorithms using Python, C++, or Simulink®
- Learn advanced features
- Use embedded devices with RTMaps

Tools and Systems
- RTMaps

1-day training course
This training class can only be booked in combination with RTMaps Basic.
The fee is then € 1100 (plus tax) per person.
20% discount for universities

Dates
- March 7, 2019 (Paderborn)
- June 6, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
RapidPro

Integrating automotive sensors and actuators is a key task in rapid prototyping performed for electronic control unit functions. dSPACE’s RapidPro hardware provides unprecedented flexibility in adapting sensor and actuator signals to prototyping platforms (dSPACE MicroAutoBox/AutoBox/MicroLabBox).

The RapidPro training gives you a step-by-step introduction to using the RapidPro software and hardware together with a dSPACE prototyping system. You will learn how to configure the RapidPro system with the ConfigurationDesk configuration software and to implement the required I/O with the RapidPro Control Unit Blockset if you work with a RapidPro Control Unit. If you are not familiar with the dSPACE prototyping systems or with the ControlDesk and Real-Time Interface software, it is recommended to request this course in combination with the dSPACE Real-Time Systems course.

Participants
- Engineers working with rapid prototyping
- Engineers who want to use the dSPACE prototyping systems and the RapidPro hardware and software
- Required: Previous experience with MATLAB® and Simulink®, as well as ControlDesk and Real-Time Interface

Goals
- Set up RapidPro signal conditioning and power stages
- Configure the RapidPro Units with ConfigurationDesk
- Learn about the structure and features of the RapidPro system
- Implement the I/O of a RapidPro Control Unit with the corresponding Real-Time Interface

Tools and Systems
- dSPACE prototyping systems
- Real-Time Interface
- ControlDesk
- RTI RPCU Blockset
- ConfigurationDesk
- MATLAB/Simulink

Course Contents
- Introduction to the RapidPro hardware
- Introduction to ConfigurationDesk
- Monitoring and diagnostics of a RapidPro System
- Introduction to the RapidPro RTI blocksets

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
On request
TargetLink Basic

This basic training course covers all the steps of code generation for production ECUs with TargetLink. TargetLink generates production-quality C code for fixed-point and floating-point controllers directly from Simulink®/Stateflow® models. The entire work process of transforming a Simulink/Stateflow diagram into an ECU executable is shown, as well as code integration details and TargetLink configuration options.

Participants
- Control strategy engineers, systems engineers, function and software developers
- Recommended: Previous experience with ANSI-C programming, especially for production ECUs
- Required: Previous experience with MATLAB® and Simulink

Goals
- Get an overview of TargetLink
- Transfer a Simulink subsystem to a target ECU
- Understand code generation options
- Customize TargetLink to your company environment

Tools and Systems
- TargetLink Base Suite with simulation and optimization modules

Course Contents
- TargetLink blockset
- Scaling a model
- Implementation options
- Code generation
- Code integration issues
- Simulation and code verification
- Document generation

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with TargetLink Advanced, the overall fee per person is € 1100 (plus tax).

Dates
- February 5, 2019 (Paderborn)
- March 26, 2019 (Project Center Stuttgart)
- May 7, 2019 (Paderborn)
- June 4, 2019 (Project Center Munich)
- July 9, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
TargetLink Advanced

TargetLink offers a lot of features for advanced users. One of them is the TargetLink Data Dictionary for model-independent data management. In addition, a freely installable blockset allows models to be exchanged even without a TargetLink license.

Participants
- Control strategy engineers, systems engineers, function and software developers
- Required: Experience with MATLAB® and Simulink®, as well as TargetLink

Goals
- Use the TargetLink features and optimization options for production code generation
- Integrate TargetLink into your company environment

Tools and System
- TargetLink Base Suite
- TargetLink Data Dictionary

Course Contents
- The TargetLink Data Dictionary
- TargetLink API
- Modeling variants
- Integration of custom code
- Model referencing

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with TargetLink Basic, the overall fee per person is € 1100 (plus tax).

Dates
- February 6, 2019 (Paderborn)
- March 27, 2019 (Project Center Stuttgart)
- May 8, 2019 (Paderborn)
- June 5, 2019 (Project Center Munich)
- July 10, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
TargetLink AUTOSAR Support

In the AUTOSAR terminology TargetLink is a behavior modeling tool. This training course covers the workflow for generating AUTOSAR compliant code with TargetLink. This includes importing files generated by AUTOSAR authoring tools and using blocks of the TargetLink AUTOSAR blockset. After code generation the behavior of the generated code is validated with simulations. Finally, TargetLink exports AUTOSAR files describing the generated code for the import into other tools.

Participants
- Systems engineers, software architects, and software developers
- Required: Previous experience with TargetLink and the TargetLink Data Dictionary

Goals
- Import, export and modify the AUTOSAR information in the TargetLink Data Dictionary
- Design models with the TargetLink AUTOSAR blockset
- Validate the behavior of AUTOSAR models by simulation
- Learn the role of TargetLink in the workflow according to AUTOSAR

Tools and System
- TargetLink AUTOSAR blockset
- AUTOSAR fragment from the TargetLink Data Dictionary

Course Contents
- Importing and exporting AUTOSAR data
- Modifying AUTOSAR information in the TargetLink Data Dictionary
- How to use the TargetLink AUTOSAR blockset
- Simulating AUTOSAR models
- Interaction between TargetLink and SystemDesk
- Brief explanation of AUTOSAR concepts needed for understanding modeling in TargetLink

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
February 7, 2019 (Paderborn)
May 9, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
AutomationDesk

The course covers the access to HIL platforms as well as a wide variety of tools, e.g. the Failure Insertion Unit, calibration and diagnostic tools, MATLAB®, and ControlDesk. The trainer will show you how to work with custom libraries filled with self-defined generic test steps and complete tests. You can gain hands-on experience in using pre-defined frameworks for your test implementation.

Participants
- Engineers interested in increasing the productivity of their test environments by means of automation
- Recommended: Previous experience with ControlDesk

Goals
- Set up automatic tests efficiently
- Develop reusable tests based on library blocks
- Develop tests efficiently using debugging
- Generate meaningful test reports
- Capture and manipulate real-time signals
- Perform automatic signal evaluation and post-processing
- Structure tests with the AutomationDesk libraries

Tools and Systems
- AutomationDesk
- ControlDesk

Course Contents
- Motivation for Automated Testing
- Introduction to AutomationDesk
- Test Execution and Test Results
- Create Tests with the Sequence Builder
- Framework Builder Library and Test Builder Library
- Access to dSPACE Hardware (XIL API)
- Signal Evaluation
- Signal-Based Testing
- AutomationDesk Built-In Libraries

2-day training course
Fee per person: € 1100 (plus tax)
20% discount for universities

Dates
- January 29-30, 2019 (Paderborn)
- April 9-10, 2019 (Paderborn)
- May 15-16, 2019 (Paderborn)
- June 12-13, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
Real-Time Testing

Real-time hardware can be accessed via an interpreter running on the processor board. Since the interpreter is executed at the same rate as the real-time application, it can be used to perform real-time tests. This training course provides an introduction to programming real-time tests based on the Python programming language. Course participants will discuss standard applications and implement them in practical examples.

Participants
- Engineers familiar with Python programming and real-time applications

Goals
- Use Python to describe real-time tests
- Set up a workflow for real-time testing
- Understand the structure of real-time tests
- Create standard implementations and understand their temporal behavior

Tools and Systems
- ControlDesk
- Real-time hardware

Course Contents
- The necessity of real-time tests
- Workflow of real-time testing (from script to executable real-time test, test management)
- Introduction to special Python programming elements for real-time testing
- Structure of real-time tests (initialization phase, time synchronous execution)
- Accessing model variables from real-time tests
- Test modularization
- Relation between Python scripts on the PC and on the real-time platform
- Libraries for test automation by real-time testing (e.g., for variable access, and data exchange between independent tests)

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
On request

Times
9:00 a.m. to 5:15 p.m.
ASM Vehicle Dynamics Basic

The ASM Vehicle Dynamics Simulation Package is an open Simulink® model for real-time simulation of vehicle dynamics behavior in a variety of environments. The model is typically used on dSPACE hardware-in-the-loop systems for testing electronic control units (ECUs) or during the design phase of controller algorithms for early validation using offline simulation. The complete and independent model supports all relevant phases of the model-based development process. All Simulink blocks in the model are visible, so it is easy to add or replace components with custom models to adapt the vehicle’s properties perfectly to individual projects. Roads and driving maneuvers can be created easily and intuitively using graphical tools with preview and clear visualization. You will learn about the concept and the structure of the ASM Vehicle Dynamics Model. The course will also cover the options for parameterizing the vehicle as well as the road generator and maneuver editor.

Goals
- Get an overview of the ASM Vehicle Dynamics Simulation Package
- Use the ASM Vehicle Dynamics Model offline and on a dSPACE platform
- Use ModelDesk for model parameterization and road and maneuver creation
- Parameterize the model
- Visualize and measure signals in ModelDesk

Tools and Systems
- ASM Vehicle Dynamics Simulation Package including ModelDesk and MotionDesk
- MATLAB/Simulink

Course Contents
- Introduction to the ASM Vehicle Dynamics Simulation Package
- Using the model for offline simulation
- Using the model for online simulation with dSPACE processing hardware
- Generating roads and maneuvers using ModelDesk
- Basics on parameterizing the model using ModelDesk
- Basics on working with MotionDesk to animate the vehicle and its environment

Participants
- Engineers in charge of the HIL testing of ECUs for vehicle dynamics
- Engineers who validate controller algorithm designs by doing offline simulation
- Required: Previous experience with MATLAB® and Simulink®

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
February 12, 2019 (Paderborn)
April 2, 2019 (Paderborn)
July 2, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
ASM Traffic

The ASM Traffic Simulation Package is an add-on for the ASM Vehicle Dynamics Simulation Package. ASM Traffic is typically used for developing and testing ECUs for driver assistance systems. It lets the user define and simulate the movement of fellow vehicles. Moreover, the traffic model simulates different sensors (lane detection sensors, 3-D radar sensors, etc.) that are able to detect fellow vehicles or predefined traffic objects, such as traffic signs. The main focus of this training course is to cover the complete ASM Traffic tool chain, including the ASM Traffic Simulink® model, ModelDesk, MotionDesk and ControlDesk.

You will learn how to define road networks and create traffic scenarios with several fellow vehicles.

Goals

- Get an overview of the ASM Traffic Simulation Package
- Understand how to handle the ASM Traffic tool chain
- Use the ASM traffic model for simulation in Simulink and on a dSPACE platform
- Use ModelDesk for sensor parameterization
- Use ModelDesk to create road networks and traffic scenarios

Tools and Systems

- ASM Traffic Simulation Package including ModelDesk and MotionDesk
- MATLAB/Simulink
- ASM Traffic Basic

Course Contents

- Introduction to the ASM Traffic Simulation Package
- Generating road networks with ModelDesk
- Using the model for simulation on dSPACE processing hardware or VEOS
- Generating traffic scenarios by defining the movement of traffic fellows and their behavior
- Parameterizing and adapting the traffic sensors of the ASM Traffic environment

Participants

- Engineers working on HIL testing of ECUs for driver assistance systems
- Engineers who validate controller algorithm designs by means of offline simulation
- Required: Previous experience with MATLAB® and Simulink
- Required: Previous experience with ASM Vehicle Dynamics and ModelDesk

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
February 13, 2019 (Paderborn)
April 3, 2019 (Paderborn)
July 3, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
ASM Engine Basic

For engine applications, dSPACE offers a diesel and a gasoline engine simulation package. Both are open Simulink® models for the real-time simulation of engines. They are fully integrated into the dSPACE tool chain and are typically used for hardware-in-the-loop (HIL) testing of electronic control units (ECUs). They are complete and independent engine models that support all the relevant phases of the model-based development process, from early controller design to testing in the laboratory.

Since the Automotive Simulations Models (ASM) are open Simulink models, users can simply add components or replace them with custom models to meet specific project requirements. The ASM engine tool suite contains a parameterization tool (ModelDesk), a validation tool (ASM Testbench), and an instrumentation tool (ControlDesk) in addition to the simulation model. For example, ModelDesk’s intuitive graphical user interface makes it easy to parameterize the model. And it can simply be operated using a cockpit within ControlDesk.

Goals
- Get an overview of the ASM engine simulation packages
- Use the ASM engine model offline and on a dSPACE system
- Parameterize the model

Tools and Systems
- ASM Diesel Engine Simulation Package
- ASM Gasoline Engine Simulation Package
- MATLAB/Simulink
- ModelDesk

Course Contents
- Introduction to the ASM engine simulation packages
- Using the model for offline simulation (PC)
- Using the model for online simulation in ControlDesk on dSPACE hardware or VEOS
- Parameterization of the model combustion engine and the vehicle

Participants
- Engineers in charge of the HIL testing of ECUs in the area of engine applications
- Engineers who validate controller algorithm designs using simulation
- Required: Experience with MATLAB® and Simulink

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
- February 14, 2019 (Paderborn)
- April 4, 2019 (Paderborn)
- July 4, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
ASM Engine InCylinder

This course is an advanced training for ASM Engine Basic and additionally covers the ASM engine in-cylinder models. The models simulate the in-cylinder pressure-based processes of the engine. This way, the influence of variable valve control or injection shaping on the combustion can be displayed. The engine in-cylinder models are open Simulink® models for developing and testing electronic control units (ECUs) that support engine management based on in-cylinder pressure. Like all ASM products, they are fully integrated in the dSPACE tool chain and support all the relevant phases of the model-based development process, from early controller design to testing in the laboratory. In addition to the topics of the ASM Engine Basic training, this course will explain basics of in-cylinder pressure-based engine simulation. Other items covered by this training are the optimization of parameters and the inclusion of custom models in ASM.

Participants
- Engineers in charge of the HIL testing of ECUs based on in-cylinder pressure
- Engineers who validate controller algorithm designs by doing simulation
- Required: Previous experience with MATLAB® and Simulink

Goals
- Get an overview of the engine in-cylinder simulation packages
- Use the engine in-cylinder model offline and on a dSPACE system
- Parameterize the model
- Optimize parameters

Tools and Systems
- ASM Diesel Engine InCylinder Simulation Package
- ASM Gasoline Engine InCylinder Simulation Package
- MATLAB/Simulink
- ModelDesk

Course Contents
- Introduction to the engine in-cylinder simulation packages
- Using the model for offline simulation
- Using the model for online simulation in ControlDesk on dSPACE hardware or VEOS
- Parameterizing the model
- Optimizing model parameters
- Learning about the modeling approaches of the internal combustion engine and the vehicle
- Integration of custom models into ASM

2-day training course
Fee per person: € 1100 (plus tax)
20% discount for universities

Dates
On request

Times
9:00 a.m. to 5:15 p.m.
ASM Battery

The ASM battery simulation model is one of the ASM Electric Components and an open Simulink® model for real-time simulation. The model is typically used on dSPACE Simulator for hardware-in-the-loop testing of electronic control units (ECUs). It is also used during the design phase of controller algorithms for early validation by offline simulation. The complete and independent model supports all relevant phases of the model-based development process. All Simulink blocks in the model are visible, so it is easy to add or replace components with custom models to adapt the properties perfectly to individual projects. You will learn about the concept and the structure of ASM Battery. The course will also cover the options for parameterizing a battery.

Participants
- Engineers in charge of the HIL testing of ECUs, e.g., for battery management systems
- Engineers who validate controller algorithm designs by simulation
- Required: Previous experience with MATLAB® and Simulink

Goals
- Get an overview of the ASM Electric Components
- Learn about ASM Battery in detail
- Use ASM Battery offline and online on a dSPACE system
- Use ModelDesk for model parameterization
- Parameterize the model
- Visualize and measure signals in ModelDesk

Tools and Systems
- ASM Electric Components including ASM Battery, ModelDesk, MATLAB/Simulink

Course Contents
- Introduction to ASM Battery
- Offline simulation with the model
- Online simulation with the model on dSPACE processing hardware
- Basics on parameterizing the model with ModelDesk

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
On request

Times
9:00 a.m. to 5:15 p.m.
FPGA Basic  
(based on the Xilinx® System Generator)

dSPACE provides various real-time components with FPGAs that can be freely programmed by using either hand code (HDL) or a block-oriented environment. This training course focuses on the block-oriented approach. Xilinx® System Generator (XSG) is integrated directly in MATLAB®/Simulink® so that the procedure for modeling FPGA implementations is similar to the process for modeling commonly used microprocessors. The training uses a SCALEXIO real-time system. 

This training course will equip you with the basic skills you need for successfully embedding applications on dSPACE FPGA hardware: set up a FPGA model, exchange parameters between the processor and FPGA, check the timing behavior and the FPGA's resource consumption, perform an FPGA build process, embed the FPGA build result, and download/program the FPGA on the real-time system. You will also receive a brief overview and functional description of the Xilinx (XSG) third-party elements, which contain basic elements only.

The dSPACE XSG Utils Library provides more complex functions that enable you to model your design comfortably and quickly. Tasks such as integrating a 3-D look-up table or a 3-phase PWM generator on the FPGA can be completed with just a few clicks. Moreover, the library provides scope functionality, thereby enabling you to monitor the FPGA signals at the FPGA clock rate (e.g., 8 ns) in ControlDesk during online simulation. All library components are implemented as open XSG-based models and all main components can be tuned online. You will learn the skills for using the library and the dSPACE modeling structure.

The course provides the basics required for embedding a real-time FPGA application, parameterizing the plant models, monitoring the current status, and accessing the onboard I/O.

**Participants**
- Engineers working on a freely programmable dSPACE FPGA
- Required: Previous experience with MATLAB/Simulink

**Goals**
- Building and embedding FPGA applications
- Interfacing and configuring FPGA applications
- Accessing the onboard I/O
- Using the XSG Utils library to enhance the FPGA design

**Tools and Systems**
- XSG Utils models
- MATLAB/Simulink
- Xilinx® System Generator (XSG)
- SCALEXIO real-time system

**Course Contents**
- Implementation of applications on a dSPACE FPGA Board
- dSPACE XSG Utils Library
- Parameterization of FPGA components during run time

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2-day training course  
Fee per person: € 1100 (plus tax)  
20% discount for universities

When booked in combination with FPGA Electric Drives the overall fee per person is € 1450 (plus tax).

**Dates**  
April 9-10, 2019 (Paderborn)  
July 2-3, 2019 (Paderborn)

**Times**  
9:00 a.m. to 5:15 p.m.
FPGA Electric Drives
(based on the Xilinx® System Generator)

dSPACE provides various real-time components with FPGAs that can be freely programmed by using either hand code (HDL) or a block-oriented environment. This training course focuses on the block-oriented approach. Xilinx® System Generator (XSG) is integrated directly in MATLAB®/Simulink® so that the procedure for modeling FPGA implementations for electric drives is similar to the process for modeling commonly used microprocessors. The training course will equip you with the skills required for working with the dSPACE XSG Electric Components Library to embed electric drive applications on FPGA-based real-time hardware:

- Integrate inverter, motor, sensor, and mechanical models directly on the FPGA
- Run these models in open or closed loop control
- Modify the components’ parameterization during run time

Because the training exercises contain elements from the dSPACE XSG Utils Library, you must already be familiar with this library (requirement: FPGA Basic Training, p. 26).

Participants
- Engineers involved in HIL testing ECUs for electric drive applications
- Requirement: Previous experience with MATLAB/Simulink
- Requirement: Previous experience with the XSG Utils Library
- Requirement: Previous experience with ControlDesk
- Requirement: Previous experience with ConfigurationDesk

Goals
- Interfacing and configuring FPGA applications
- Accessing the onboard I/O
- Using the XSG Electric Components library to embed electric motor simulation on the FPGA

Tools and Systems
- XSG Electric Components library
- MATLAB/Simulink
- XILINX® System Generator (XSG)
- SCALEXIO real-time system

Course Contents
- Overview of the XSG Electric Components Library
- Parameterization of FPGA components during run time

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

When booked in combination with FPGA Basic the overall fee per person is € 1380 (plus tax).

Dates
April 11, 2019 (Paderborn)
July 4, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
Bus Manager (for SCALEXIO and VEOS Platforms)

This 1-day training course introduces you to the new dSPACE Bus Manager.
The Bus Manager is the central tool for configuring LIN, CAN, and CAN FD communication for the SCALEXIO real-time systems and PC-based VEOS simulation systems.

Participants
- Engineers who want to configure bus communication with the Bus Manager
- Engineers working in the field of rapid control prototyping, hardware-in-the-loop simulation, virtual validation, or testing with CAN or LIN communication
- Engineers who want to use bus simulation without environment models or environments consisting of Functional Mock-up Units (FMUs)
- Engineers who are new to dSPACE or who plan to purchase or use dSPACE SCALEXIO or VEOS systems and want to use bus communication in the near future
- Recommended: Previous experience with dSPACE ConfigurationDesk

Goals
- Set up bus configurations using Bus Manager and its bus features, e.g., counters or frame access
- Connect a behavior model to your bus configuration using ConfigurationDesk and the Bus Manager
- Build real-time applications and/or reusable bus simulation containers
- Automate workflows using the tool automation API
- Access bus network data with monitoring/logging in dSPACE ControlDesk

Tools and Systems
- dSPACE SCALEXIO/VEOS platform
- dSPACE ConfigurationDesk
- Bus Manager
- dSPACE ControlDesk (including Bus Navigator)
- MATLAB®/Simulink®

Course Contents
- Introduction to the Bus Manager in ConfigurationDesk and Bus Manager (stand-alone)
- Workflow: Creating a simple restbus simulation on a SCALEXIO platform
- Bus instrumentation in ControlDesk
- Working with Bus Manager features
- Working with behavior models and test access
- Updating a bus configuration with new communication matrices
- Working with bus simulation containers and VEOS
- Tool automation

1-day training course
- Fee per person: € 800 (plus tax)
- 20% discount for universities

Dates
- March 28, 2019 (Paderborn)
- June 4, 2019 (Paderborn)
- July 18, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
RTI CAN MultiMessage Blockset

The RTI CAN MultiMessage Blockset is a powerful tool for handling the complex CAN setups which typically occur in testing environments for ECUs. It is a time-saving and cost-efficient solution for managing complex CAN setups in Simulink® and from ControlDesk and AutomationDesk, with as little manual editing effort as possible.

In this training course, you will learn how to use the RTI CAN MultiMessage Blockset and manage large CAN message bundles (> 200 messages) from one Simulink block.

**Participants**
- Engineers working with complex CAN setups
- Recommended: Previous experience with ControlDesk and MATLAB®/Simulink
- Required: Previous experience with CAN

**Goals**
- Run restbus simulation
- Handle the special CAN testing features
- Use a software gateway and a manipulation gateway
- Integrate CAN communication into the Simulink model

**Tools and Systems**
- RTI CAN MultiMessage Blockset
- Simulink and Simulink Coder
- ControlDesk with the Bus Navigator

**Course Contents**
- Configuring the RTI CAN MultiMessage Blockset
- Signal- and message-related manipulation options
- Parameterization based on a DBC file
- Instrumentation with the ControlDesk Bus Navigator
- User-specific solutions:
  - Custom code
  - Checksums
  - Variant handling

**Dates**
- On request

**Times**
- 9:00 a.m. to 5:00 p.m.

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities
dSPACE FlexRay Configuration Package

The dSPACE FlexRay Configuration Package is used to integrate dSPACE hardware as simulation nodes or monitoring nodes in a FlexRay network. Nodes are configured with the dSPACE FlexRay Configuration Tool according to a communication matrix containing scheduling information for signals and frames transmitted via the FlexRay bus. The communication information is linked to a MATLAB®/Simulink® model by the RTI FlexRay Configuration Blockset. The resulting FlexRay application can be executed on a dSPACE system. The package is an extensive solution for using FlexRay on dSPACE real-time platforms.

In this training course, you will learn how to configure a dSPACE system as a simulation node in a FlexRay network and create application-specific Simulink models. Additional special features such as failure simulation and implementing CRC algorithms are also covered.

Goals
- Simulate one or more nodes in a FlexRay network
- Perform restbus simulation

Tools and Systems
- dSPACE FlexRay Configuration Package
- Real-Time Interface (RTI), ConfigurationDesk
- ControlDesk with Bus Navigator

Course Contents
- Basic principles of FlexRay
- Overview of FlexRay hardware and software
- Workflow of the dSPACE FlexRay Configuration Package
- dSPACE FlexRay Configuration Tool
- RTI FlexRay Configuration Blockset
- Introduction to the ControlDesk
- Bus Navigator for FlexRay
- Overview of failure simulation methods
- Using CRC algorithms

Participants
- Function developers and engineers who want to use FlexRay on an RCP or HIL system
- Control strategy systems engineers
- Required: Experience in using dSPACE products (ControlDesk, Real-Time Interface or ConfigurationDesk) and MATLAB/Simulink
- Recommended: Previous experience with FlexRay

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
March 21, 2019 (Project Center Munich)
June 6, 2019 (Project Center Munich)

Times
9:00 a.m. to 5:30 p.m.
SYNECT Test Management

The process of developing control units produces a large amount of data on models, parameters, test specifications, test results and variants. SYNECT is a tool for the management of this data. This training course explains how to process test data with SYNECT Test Management, including all the steps from handling requirements, test cases and execution plans to executing tests and evaluating the test results. It also covers SYNECT’s variant model and variant-dependent test execution.

Participants
- ECU testers
- Software developers

Goals
- Get an overview of SYNECT
- Handle requirements and test cases
- Execute tests manually or with the AutomationDesk interface
- Evaluate the test results
- Use SYNECT version management
- Define variants and variant-dependent tests
- Adapt SYNECT to specific needs

Tools and Systems
- SYNECT Base
- SYNECT Test Management
- SYNECT Variant Management

Course Contents
- Introduction to SYNECT
- The SYNECT workflow and data model
- SYNECT Test Management
- The SYNECT variant model
- Customizing SYNECT

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
March 13, 2019 (Paderborn)
June 18, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
Workflow Management (WFM)

This training course covers the entire tool chain for variant-based workflow management (VBWM), from configuring to executing automated processes. The sections on SYNECT will describe all the tool’s features so that you can use them effectively to automate workflows. The individual tools VBWM Starter, VBWM MultiStarter and VBWM Modeling Connector will also be explained.

Participants
- Engineers who want to automate recurring processes for variants
- Engineers who operate large HIL farms and have to configure them for reproducibility
- Engineers who want to optimize the complexity of variants and versions in their tool chain
- Prerequisites: Basic knowledge of the dSPACE tool chain (dSPACE Real-Time Systems or SCALEXIO Training)

Goals
- Set up a SYNECT project as the basis for workflow automation
- Create a variant model in SYNECT
- Automate an example workflow in Python
- Automate a HIL Operator workflow with ControlDesk
- Create a MATLAB®/Simulink® project
- Automate variant switching in Simulink
- Automate the ConfigurationDesk/RTI build process

Tools and Systems
- SYNECT
  - SYNECT Base
  - SYNECT Variant Management
  - SYNECT VBWM Configurator
- VBWM
  - Starter
  - Multi-Starter
  - Modeling Connector
  - ConfigurationDesk/RTI
  - ControlDesk

Course Contents
- Objective and goals of variant-based workflow management
- Introduction to variants and versions
- Introduction to SYNECT and SYNECT Variant Management
- Introduction to the general principles of VBWM
- Introduction to VBWM SYNECT Configurator and Resource Management
- Introduction to the VBWM Starter
- Introduction to the VBWM MultiStarter
- Introduction to the command-line interface (CLI) of VBWM
- Introduction to the Modeling Connector of VBWM
- MATLAB API
- Simulink blockset
- Variant handling in Simulink and MATLAB
- Working with ConfigurationDesk and ControlDesk by using VBWM

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities

Dates
On request

Times
9:00 a.m. to 5:30 p.m.
What We Offer

Learning by Doing
Our training rooms are equipped with one dSPACE system for every two participants. The number of participants is limited to twelve. When a course is booked to capacity, we use two trainers to guarantee that each participant gets optimal support. The number of participants for the dSPACE SCALEXIO training course is limited to six.

Ask the Expert
The instructors are experienced dSPACE application engineers.

Language
The courses are held in English or German, depending on the nationality of the participants.

Included
The fee includes course material (in English), a certificate for successful participation, lunch, coffee and refreshments.

Customer-Specific Training
We offer on-site training and individual training on demand. A minimum of four participants is required. For special schedules, please contact us via phone or e-mail.

Dress Code
We recommend casual clothing.
Registration and Location

How to Register
Please register at least 14 days before the training course begins.
Fill in the registration form (page 40), and fax or mail it to us. If you want to register more than one participant, please use a copy for each additional person.

You can also register online at www.dspace.de/go/training

Fees and Schedule
The fee for a 1-day training course is € 800 (plus tax). If you book a 2-day training course or two directly consecutive courses (e.g., the TargetLink Basic and TargetLink Advanced courses) the fee is € 1100 (plus tax). If you book three directly consecutive courses, the fee is € 1450 (plus tax). These fees for combinations apply only to scheduled dates published in this brochure.

Please pay the participation fee after receiving your confirmation of registration and the invoice. With the confirmation you will also receive a map showing how to reach us and information about accommodations.
Accommodation
Please use the hotel list which you receive with your confirmation to reserve a room yourself. The participation fee does not include accommodation and travel.

Cancellation
Please note that we will charge you €25 if you cancel your registration 14 days before the training course begins. If you cancel after that date, we will charge you 50% of the training fee.

Switching Participants
It is possible to switch participants without paying any additional fee. Please inform us of the change.

How to Reach Us

- **By plane to Paderborn**
  The Paderborn-Lippstadt Airport is just 20 minutes away from dSPACE by car. For more information, please see [www.flughafen-paderborn-lippstadt.de](http://www.flughafen-paderborn-lippstadt.de)

- **By plane to Stuttgart**
  Stuttgart Airport is just 30 minutes away from the dSPACE project center by car. For more information, please see [www.stuttgart-airport.com](http://www.stuttgart-airport.com)

- **By plane to Munich**
  Munich Airport is just 30 minutes away from the dSPACE project center by car. For more information, please see [www.munich-airport.de](http://www.munich-airport.de)

- **By train**
  For train schedules, please see [www.bahn.de](http://www.bahn.de)

- **By car**
  If you come by car, please use the map in the company section of our Web site [www.dspace.com](http://www.dspace.com)

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Overview – Training Courses

dSPACE offers hands-on experience and practical exercises based on a well-founded theoretical background. The needs of our users, the positive feedback from our participants, and our new product releases are all reasons why we are always introducing more courses.

**Introduction to the AUTOSAR Standard**
Introduction to the main goals and contents of the AUTOSAR standard

**System Modeling with SystemDesk**
Modeling software and system architectures according to AUTOSAR R4.x

**Virtual Validation**
Using virtual ECUs and PC-based simulation for early validation of ECU software

**dSPACE Real-Time Systems (PHS Hardware, MicroAutoBox, MicroLabBox)**
Single-processor systems in detail

**dSPACE Real-Time Systems (SCALEXIO Platforms)**
Workflow for SCALEXIO simulation systems

**dSPACE SCALEXIO HIL System**
Introduction to SCALEXIO for hardware-in-the-loop simulation

**ControlDesk Basic**
Introduction to ControlDesk's instrumentation and management features

**ControlDesk Advanced**
Introduction to more features such as ControlDesk Automation and the Bus Navigator

**RTMaps Basic: Developing Multisensor Applications**
Introduction to RTMaps

**RTMaps Advanced**
Integration of your own algorithms and using embedded devices

**RapidPro**
Introduction to the RapidPro System

**TargetLink Basic**
The workflow from a Simulink® model to code generation with TargetLink

**TargetLink Advanced**
More features to customize and validate the code generation

**TargetLink AUTOSAR Support**
Generation of AUTOSAR-compliant code

**AutomationDesk**
Test automation and test management based on AutomationDesk

**Real-Time Testing**
Introduction to programming real-time tests based on the Python programming language

**ASM Vehicle Dynamics Basic**
Real-time simulation of vehicle dynamics behavior within a development environment
ASM Traffic
Add-on to the ASM Vehicle Dynamics Package

ASM Engine Basic
Real-time simulation of diesel and gasoline engines

ASM Engine InCylinder
Real-time simulation of an in-cylinder-pressure-based engine

ASM Battery
Concept and the structure of the ASM Battery model

FPGA Basic (based on the Xilinx® System Generator)
Basic skills for successfully embedding applications on dSPACE FPGA hardware

FPGA Electric Drives (based on the Xilinx® System Generator)
Simulating electric drives and power electronics, position sensor virtualization and interface functions

Bus Manager (for SCALEXIO and VEOS Platforms)
Central tool for configuring LIN, CAN, and CAN FD communication for the SCALEXIO real-time systems and PC-based VEOS simulation systems

RTI CAN MultiMessage Blockset
Handling complex CAN setups in hardware-in-the-loop applications

dSPACE FlexRay Configuration Package
Simulating one or more nodes in FlexRay networks

SYNECT Test Management
Processing test data with SYNECT Test Management, including all the steps from handling requirements, test cases and execution plans to executing tests and evaluating the test results

Workflow Management
This training course covers the entire tool chain for variant-based workflow management (VBWM), from configuring to executing automated processes.

Overview – Workshops

Workshop: ControlDesk Automation
Learn about the tool automation concept and use different languages for ControlDesk tool automation.
<table>
<thead>
<tr>
<th></th>
<th>Paderborn</th>
<th>Project Center Stuttgart</th>
<th>Project Center Munich</th>
<th></th>
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<td>ControlDesk Basic</td>
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<td>22</td>
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<td>23</td>
<td>ControlDesk Advanced</td>
<td>–</td>
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<td>23</td>
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dSPACE Training 2019 – Registration Form

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I hereby am registered for the above training course. I am fully aware of the conditions of participation. Date/Signature

**Invoice address, if different:**

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**Note (Please add any extra information such as special dietary requirements here.)**

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**Please send or fax** dSPACE Training 2019, Training Department
Fax: +49 5251 16198-0, Online registration: www.dspace.de/go/training