dSPACE Training 2019
July - December
# Program

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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 15-16). 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 7) 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 23-27).

Our SYNECT Test Management training course (page 33) 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 Classic Platform

Since 2004, the AUTOSAR initiative (AUTomotive Open System ARchitecture, www.autosar.org) has developed and successfully established a standard for automotive software architectures, which is now called the AUTOSAR Classic Platform. The standard describes architecture and methodology of the development of deeply embedded ECUs for the implementation of control algorithms. The aims of the standard include the standardization of the development workflow and improvements in the reusability and exchangeability of software.

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).

Participants
- Systems engineers, software architects, and software developers
- Anyone involved in the development process for automotive 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 and the Classic Platform
- Methodology of the AUTOSAR Classic Platform
- 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)

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

Dates
- September 17, 2019 (Paderborn)
- November 26, 2019 (Paderborn)

Times
- 9:00 a.m. to 5:15 p.m.
Introduction to the AUTOSAR Adaptive Platform

The AUTOSAR initiative (AUTomotive Open System ARchitecture, www.autosar.org) started the development of the AUTOSAR Adaptive Platform with the aim to fulfill requirements of applications like highly-automated driving. These requirements include software updates over the air to integrate improved algorithms into vehicles as well as the support of computations that simultaneously require high computing power and have high safety requirements. The AUTOSAR adaptive platform is not intended to replace the classic platform; ECUs developed by both platforms should co-exist and communicate in the same vehicle.

This course introduces you to the main goals and contents of the AUTOSAR Adaptive Platform and compares them with their counterparts of the AUTOSAR Classic Platform. It will present details of the service-oriented architecture used by the AUTOSAR Adaptive Platform and will compare the communication patterns with that of the AUTOSAR Classic Platforms. Other issues to be discussed include the changed basic software, which is called platform software in the Adaptive Platform, some details of the implementation of the application software as well as some basics of the SOME/IP protocol.

Participants
- Systems engineers, integrators, software architects, and software developers
- Anyone involved in the development process for automotive software
- Recommended: Basic knowledge of the AUTOSAR Classic Platform and of object-oriented programming

Goals
- Get an overview of the AUTOSAR Adaptive Platform and its relation to the Classic Platform
- Understand the service-oriented communication paradigm and how to use it during the implementation of adaptive applications
- Learn about the architecture of adaptive machines including an overview of the platform software

Course Contents
- Introduction to AUTOSAR and the Adaptive Platform
- Service-oriented architecture and communication used by the AUTOSAR Adaptive Platform
- Methodology of the AUTOSAR Adaptive Platform
- Functional clusters of the platform software and their communication with the adaptive applications
- APIs used by the implementation of adaptive applications
- Basics of the SOME/IP protocol
- Communication of ECUs developed for the AUTOSAR Classic Platform and Adaptive Platform

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

Dates
September 18, 2019
November 27, 2019

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 AUTOSAR standard.

This training course focuses on modeling according to the AUTOSAR Classic Platform. 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 Classic Platform
- 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 Classic Platform
- 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 7).

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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**
- July 23-24, 2019 (Paderborn)
- September 24-25, 2019 (Paderborn)
- November 19-20, 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
- July 25, 2019 (Paderborn)
- September 26, 2019 (Paderborn)
- November 21, 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 corresponding training course dSPACE Real-Time Systems (SCALEXIO Platforms) (page 9).

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 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
October 1-2, 2019 (Paderborn)
November 5-6, 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 basic 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 corresponding training course for PHS-based platforms. Differences will be explained (page 8).

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

- 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 and interrupt handling in ConfigurationDesk
- Configuring periodic and asynchronous tasks
- ConfigurationDesk Bus Manager and ControlDesk Bus Navigator

Dates

July 16-17, 2019 (Paderborn)
September 10-11, 2019 (Paderborn)
October 29-30, 2019 (Project Center Stuttgart)
December 10-11, 2019 (Paderborn)

Times

9:00 a.m. to 5:15 p.m
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. Practical examples are used to illustrate the basics and a selection of advanced handling features in ConfigurationDesk, the configuration and implementation tool for dSPACE SCALEXIO hardware. 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 hardware
- ConfigurationDesk
- MATLAB/Simulink
- ControlDesk

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dSPACE SCALEXIO HIL System

Course Contents

- Introduction to SCALEXIO
- SCALEXIO system design and hardware components
- ConfigurationDesk – Introduction and basic concepts
- Configuring and customizing a dSPACE SCALEXIO HIL system
- Using ConfigurationDesk – Workflow: From ECU to model
- ConfigurationDesk – Advanced functionalities
- Examples of signal generation and capturing
- A selection from:
  - Introduction to multicore and multi-processing-unit simulation with SCALEXIO
  - Functional Mock-up Interface and other containers
  - SCALEXIO Bus Communication via RTI CAN Multi-Message Blockset
  - SCALEXIO Bus Communication using the Bus Manager
  - SCALEXIO failure simulation concept
  - Engine simulation
  - Workflow: Starting with Simulink

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

The number of participants is limited to eight persons.

Dates
July 10-11, 2019 (Paderborn)
October 8-9, 2019 (Paderborn)
November 12-13, 2019 (Paderborn)
December 3-4, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
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
- July 9, 2019 (Project Center Stuttgart)
- September 3, 2019 (Paderborn)
- October 15, 2019 (Project Center Munich)
- December 3, 2019 (Paderborn)

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
July 10, 2019 (Project Center Stuttgart)
September 4, 2019 (Paderborn)
October 16, 2019 (Project Center Munich)
December 4, 2019 (Paderborn)

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
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
- RTMaps: Integration in the dSPACE tool chain
  - dSPACE RTMaps Interface Blockset
  - Monitor and parameterize RTMaps components from ControlDesk using XIL API

### Dates
- August 28, 2019 (Paderborn)
- October 29, 2019 (Paderborn)

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

### 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).

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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
- 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
August 29, 2019 (Paderborn)
October 30, 2019 (Paderborn)

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

**Dates**
- On request

1-day training course
Fee per person: € 800 (plus tax)
20% discount for universities
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
- July 9, 2019 (Paderborn)
- September 3, 2019 (Project Center Stuttgart)
- October 8, 2019 (Paderborn)
- November 12, 2019 (Paderborn)
- December 10, 2019 (Project Center Munich)

Times
- 9:00 a.m. to 5:15 p.m.
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
July 10, 2019 (Paderborn)
September 4, 2019 (Project Center Stuttgart)
October 9, 2019 (Paderborn)
November 13, 2019 (Paderborn)
December 11, 2019 (Project Center Munich)

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, basic knowledge of the software component template of the AUTOSAR classic platform

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 the AUTOSAR classic platform

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
October 10, 2019 (Paderborn)

Times
9:00 a.m. to 5:15 p.m.
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
September 10-11, 2019 (Paderborn)
October 22-23, 2019 (Paderborn)
November 5-6, 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 or VEOS
- 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
July 2, 2019 (Paderborn)
August 27, 2019 (Paderborn)
October 22, 2019 (Paderborn)
November 19, 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
- July 3, 2019 (Paderborn)
- August 28, 2019 (Paderborn)
- October 23, 2019 (Paderborn)
- November 20, 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.

In addition to the simulation models the ASM Engine tool suite contains a parameterization tool (ModelDesk) and a validation tool (ASM Testbench). The tools are ready to use. With a prepared ControlDesk experiment, the simulation can be started directly on a dSPACE platform.

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

Goals
- Get an overview of the ASM engine simulation packages
- Introduction to the tool suite of dSPACE for engine simulation
- Introduction to the parameterization process of the ASM Engine models

Tools and Systems
- ASM Engine
- ModelDesk
- ControlDesk
- VEOS
- MATLAB/Simulink

Course Contents
- Introduction to the simulation package of ASM Engine
- Simulation of the model in ControlDesk
- Handling of engine variants with ModelDesk
- Parameterization of the model from the measurements
- Validation of the simulation behavior with the ASM Engine Testbench

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

Dates
July 4, 2019 (Paderborn)
August 29, 2019 (Paderborn)
October 24, 2019 (Paderborn)
November 28, 2019 (Paderborn)

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

This course provides further information about the ASM Engine. In addition to the contents of the ASM Engine Basic course, this course also covers the ASM Engine InCylinder models. The models simulate the in-cylinder pressure-based processes of the engine. In this way, the influence of variable valve control or injection shaping on combustion can be illustrated. Further topics of the training are the optimization of the parameters for the simulation of the processes in the combustion chamber, the integration of customer-specific models in ASM and the presentation of the modelling approaches.

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 ASM engine simulation packages
- Introduction to the tool suite of dSPACE for engine simulation
- Introduction to the parameterization process of the ASM Engine models

Tools and Systems
- ASM Engine
- ModelDesk
- ControlDesk
- VEOS
- MATLAB/Simulink

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

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
- July 2-3, 2019 (Paderborn)
- September 17-18, 2019 (Paderborn)
- November 26-27, 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
July 4, 2019 (Paderborn)
September 19, 2019 (Paderborn)
November 28, 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
- July 18, 2019 (Paderborn)
- September 12, 2019 (Paderborn)
- November 14, 2019 (Paderborn)
- December 5, 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.

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

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

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

Dates
October 17, 2019 (Project Center Munich)
December 17, 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
September 12, 2019 (Paderborn)
November 7, 2019 (Paderborn)

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

This training course covers the entire tool chain for SYNECT Workflow Management, 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 Workflow Management Starter, Remote Job Starter and Connectors will also be explained.

Participants
- Engineers who want to automate recurring processes for variants such as Continuous integration and Continuous testing
- Engineers who operate large XIL 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 Workflow Management
- Workflow Management Solution
  - WFM Runner
  - WFM Connectors
  - ConfigurationDesk/RTI
  - ControlDesk

Course Contents
- Objective and goals of workflow management
- Introduction to variants and versions
- Introduction to SYNECT and SYNECT Variant Management
- Introduction to the general principles of SYNECT Workflow Management
- Introduction to the WFM Starter
- Introduction to the WFM Remote Job Starter
- Introduction to the Workflow Management Python API
- Introduction to the WFM Connectors
  - MATLAB API
  - Simulink blockset
  - Variant handling in Simulink and MATLAB
- Working with ConfigurationDesk and ControlDesk by using Workflow Management

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 42), 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 Policy
Please note that we will charge you EUR 25.00 if you cancel your registration up to 14 days before the training course begins. If you cancel within 5-13 days prior to the training course, we will charge you 50% of the training fee. Last-minute cancellations, received within 1-4 days before the scheduled course date, and no-shows will result in full forfeiture of the course fee. Registrants unable to attend may send a substitute without paying any additional fee. Please inform us of the substitution as soon as possible.

In the event of unforeseen circumstances, including but not limited to inclement weather, trainer unavailability, lack of participation, etc., dSPACE may choose to reschedule or cancel a particular training course. In the case of cancellation, notification will be issued at least 5 days prior to the course start date. Should this occur, registered participants will be entitled to reschedule their training to another course date or receive a full refund of paid course fees.

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

- **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

- **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

- **By train**
For train schedules, please see 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

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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 Classic Platform**
This course introduces you to the main goals and contents of the AUTOSAR Classic Platform.

**Introduction to the AUTOSAR Adaptive Platform**
This course introduces you to the main goals and contents of the AUTOSAR Adaptive Platform and compares them with their counterparts on the AUTOSAR Classic Platform.

**System Modeling with SystemDesk**
This training course focuses on modeling according to the AUTOSAR Classic Platform.

**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)**
Learn how to use SCALEXIO for rapid control prototyping

**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
You will learn about the concept and the structure of ASM engine simulation models.

ASM Engine Advanced
Building on the contents of the ASM Engine Basic course, this course introduces you to the ASM Engine InCylinder models.

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.
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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

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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](http://www.dspace.de/go/training)