

# 2023

## DynaFusion Training Catalog



## Training Courses

dSPACE Real Time Systems (PHS Hardware MicroLabBox, MicroAutoBox) ....	3
dSPACE Real-Time Systems (SCALEXIO Platforms) .....	5
ControlDesk Basic.....	7
ControlDesk Advanced.....	8
TargetLink Basic.....	10
TargetLink Advanced.....	12
RTI CAN MultiMessage Blockset.....	13
AutomationDesk.....	15
dSPACE SCALEXIO HIL System.....	17

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

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

## 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: Experience with MATLAB® and Simulink®

## Goals

- Set up dSPACE real-time hardware and corresponding 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.
- Learn advanced features.

## Tools and Systems

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

## **Course Contents (dSPACE Real-Time Systems PHS Hardware, MicroLabBox, MicroAutoBox)**

### **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

# 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.

## 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 (dSPACE Real-Time Systems SCALEXIO Platforms)

### 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
- Control Desk 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

# ControlDesk Basic

This 1-day training course is to familiarize you with ControlDesk. Gain experience in handling experiments and visualizing model variables on instrument panels. Learn about data acquisition with ControlDesk and how to handle different data sets.

## Participants

- Engineers new to ControlDesk
- Engineers who want to switch from ControlDesk 3.x to ControlDesk 4.x and higher

## 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 (ControlDesk Basic)

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

# ControlDesk Advanced

This 1-day training course covers the advanced steps in ControlDesk. It is ideal for acquiring all-around 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.
- **Necessary:** Experience with MATLAB and Simulink, as well as ControlDesk Basic course offered by DynaFusion

## Goals

- Learn about the advanced measurement concept.
- Automate ControlDesk.
- Use ControlDesk Bus Navigator
- Use ControlDesk Signal Editor

## Tools and Systems

- ControlDesk
- Bus Navigator
- Signal Editor



**Course Contents (ControlDesk Advanced)**

- Data set handling
- Bus Navigator
- Advanced measurement and recording
- Signal Editor
- Introduction to ControlDesk Automation and Event Handling

# TargetLink Basic

This 1-day basic training course covers all the steps of code generation for production ECUs with TargetLink. TargetLink automatically 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, system engineers, function and software developers
- Recommended: Experience with ANSI-C programming, especially for production ECUs
- **Required:** Experience with MATLAB and Simulink

## Goals

- Get an overview of TargetLink
- Transfer a Simulink/Stateflow 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 Basic)**

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

# TargetLink Advanced

This 1-day training course of TargetLink offers a lot of features for advanced users. One of them is 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, system engineers, function and software developers
- **Required:** Experience with MATLAB and Simulink, as well as TargetLink Basic course offered by DynaFusion

## 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 (TargetLink Advanced)

- The TargetLink Data Dictionary
- Testing the code coverage of the application
- Modeling variants
- Integration of custom code
- Model referencing

# RTI CAN MultiMessage Blockset

RTI CAN MultiMessage Blockset can especially be used for handling the complex CAN setups which typically occur in testing environments for electronic control units. It is a time 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 1-day 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:** Experience with ControlDesk and MATLAB/Simulink
- **Required:** 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
- Real-Time Workshop
- ControlDesk

## Course Contents RTI (CAN MultiMessage Blockset)

- 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

# 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 predefined frameworks for your test implementation.

## Participants

- Engineers interested in increasing the productivity of their test environments by means of automation
- **Recommended:** Experience with ControlDesk

## Goals

- Set up automatic tests efficiently
- Develop reusable tests based on library blocks
- Develop tests efficiently using debugging and offline execution
- 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 (AutomationDesk)

- 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



# 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 I/O to the model
- Integrate ECUs and simulate failures for diagnostic purposes

## Tools and Systems

- dSPACE SCALEXIO system
- ConfigurationDesk
- MATLAB/Simulink
- ControlDesk

## Course Contents (dSPACE SCALEXIO HIL System)

- 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

The training courses mentioned in this Catalog are offered exclusively to dSPACE Users. The training location is DynaFusion - Bangalore, India. Course content is subject to change without notice, therefore please check with us before enrolling for the training. If you require information on trainings which are not covered in this document and also our onsite training programs, please contact us at:

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