dSPACE Engineering Services

Dedicated assistance for all development phases

Highlights

- Globally available engineering and consulting services complementing dSPACE's product range
- Custom hardware and software adaptations
- Fast response
- Experienced team of engineers
- Local and global projects, from small projects to complete turn-key solutions

Key Benefits

dSPACE systems are easy to get up and running – however, if a project is more complex, if individual solutions are needed or if there is high time pressure, you can trust dSPACE's fast, competent and reliable engineering and consulting services. Experienced engineers support you with small-scale project aid as well as with complete turn-key solutions. And dSPACE engineers can also help you on-site – even as residents. dSPACE's engineering services enable you to quickly work independently with our tools and to acquire the necessary product know-how from dSPACE's specialists. For global projects, dSPACE's internationally networked team of specialists as well as our central project coordination guarantee smooth and rapid project progress towards successful project completion. dSPACE engineering services are provided worldwide by the dSPACE group companies: dSPACE GmbH, represented by offices in Paderborn and three project centers throughout Germany; and the local dSPACE companies in Japan, the USA, the U.K., France, and China. dSPACE engineering and consulting services are available for every phase of development, so that you can concentrate fully on your actual tasks. Moreover, dSPACE specialists provide standard training courses as well as customer-specific courses, also on site if requested.

Typical Services (Examples)	Description
Tool introduction	■ dSPACE Engineering Services help you collect all the information needed for making your decision so as to ensure the long-term viability of your system. For example, dSPACE offers feasibility studies, the development of application scenarios, benchmarking, pilot projects, and specific training and coaching.
Turn-key solutions	■ dSPACE Engineering Services offer complete ready-to-use solutions even for complex application scenarios. If required, you can receive assistance throughout the entire dSPACE tool chain, including requirements analysis, specification to implementation, system delivery, and on-site commissioning and more.
Customized solutions	■ dSPACE Engineering Services can help you with customized solutions (e.g., I/O interfaces, I/O drivers) which extend the standard range of dSPACE products.
Resident engineering	■ If your projects require a more intense, long-term support on site, a resident engineer from dSPACE can help you permanently at your location.
Maintenance services and life cycle support	■ To ensure that your system works properly even if requirements change, dSPACE services go far beyond system delivery. Services include, for example, software adaptations, interface extensions, hardware modification and expansion, and model adaptation.

Overview of Engineering Services

System Architecture

Services (Examples)	Details (Examples)
Integrating SystemDesk into customer-specific development processes	■ Custom integration with basic software configuration tools ■ Custom integration with TargetLink and other behavior modeling tools ■ Adapting SystemDesk to customer-specific data management solutions
Migrating customer-specific architectures	■ Importing legacy system and software information from non-AUTOSAR formats ■ Integrating non-AUTOSAR code
AUTOSAR support	■ Support for introducing the AUTOSAR-compliant development of software architectures
Model analysis and advice	■ Help in analyzing the efficiency, safety, and reusability of your models and modeling style ■ Assistance in creating and optimizing company-specific guidelines and in applying industry-proven standards
Tool automation	■ Developing custom scripts (e.g., mapping of architecture elements based on naming conventions, connection of software components based on customer rules) ■ Integrating virtual electronic control unit (V-ECU) generation for AUTOSAR and non-AUTOSAR code into a continuous integration tool chain

Rapid Prototyping and Data Logging

Service (Examples)	Details (Examples)
Custom I/O solutions	■ Custom I/O interfaces (e.g. customized FPGA-based I/O for SCALEXIO- and PHS-based FPGA boards, MicroLabBox or MicroAutoBox II) ■ Custom Real-Time-Interface (RTI) I/O blocksets or custom I/O functions for ConfigurationDesk ■ Modifying and designing signal conditioning and power stage modules for RapidPro hardware ■ Integrating third-party hardware and software ■ Developing and integrating customer-specific I/O and camera interfaces for MicroAutoBox Embedded PC and MicroAutoBox Embedded SPU ■ Developing customer-specific components for RTMaps
Turn-key prototyping systems (from selective services to complete turn-key systems)	■ Concept design ■ System configuration ■ Signal list / wiring harness specification and assembly ■ I/O model and system tests ■ On-site commissioning ■ Hands-on training
ECU interface solutions	■ Development of ECU-specific plug-on devices and connector adapters for the dSPACE bypass interface DCI-GSI2 ■ Support for setting up HEX-code-based external and on-target bypassing projects with the ECU Interface Manager ■ ECU-specific configuration of dSPACE bypass services and integration into ECU source code ■ Development and customer-specific adaptation of ECU flash programming tools
Tool introduction and training	■ Support during evaluations and pilot projects ■ Hands-on, customer-specific training
Adaption to customized sensor systems	■ Option to adjust AUTERA, the in-vehicle prototyping and data logging system for applications for autonomous driving, to various sensor systems

ECU Autocoding

Service (Examples)	Details (Examples)
Tool introduction	■ Hands-on support during introduction of TargetLink ■ Support during evaluations and pilot projects ■ Custom TargetLink training
Integrating TargetLink into the customer's development processes	■ Defining interfaces to other tools used in the project ■ Defining project configurations (project template / TargetLink Data Dictionary) ■ Connecting to existing data bases, import/export of variable files (e.g., .xls, .m) ■ Linking the model and TargetLink Data Dictionary ■ Creating customer-specific utilities and scripts ■ Adapting documention generation or A2L file generation ■ Custom block libraries and/or I/O blocksets ■ Helping users of on-target bypassing meet production ECU constraints using TargetLink features ■ Helping users to verify TargetLink code on dSPACE real-time systems
Model analysis and advice	■ Help in analyzing your models and modeling style with regard to efficiency, safety, and reusability ■ Assistance in creating and optimizing company-specific guidelines and in applying industry-proven standards
AUTOSAR integration	■ Support for developing and integrating AUTOSAR-compliant software components
ECU integration	■ Support for integrating the generated code in the ECU's software environment
Tool chain development and maintenance	■ Specification and development of complete tool chains around TargetLink ■ Parameter value and variant management ■ Integration of customer specific or 3rd party tools (TargetLink Ecosystem) ■ Maintaining tool chains ■ Migration to new versions
Consulting	■ Coordinating model, code, and data exchange between ECU suppliers and OEMs as well as between function and software developers ■ Developing safety-relevant applications ■ Developing software according to ISO 26262 ■ Clarifying responsibilities, intellectual property, etc. ■ Supporting process development and implementation according to relevant standards ■ Analyzing existing workflows and developing customized answers to new challenges

HIL Testing

Service (Examples)	Details (Examples)
HIL systems (from selective services to complete turn-key systems)	■ Concept design, hardware planning, project management ■ Signal list / wiring harness specification ■ Developing custom hardware (e.g., lambda probe simulation, ECU mount, gearbox mount, valve signal detection unit, 1-D and 3-D motion platforms, steering test benches, FPGA-based solutions, hardware for electric load simulation) ■ Developing custom software (e.g., Simulink® and ConfigurationDesk models) ■ Open- and closed-loop HIL system tests ■ HIL systems for applications such as testing complete hybrid powertrains, battery management, advanced driver assistance systems, etc. ■ ADAS ECU/sensor testing, i.e., concept engineering for raw data input into a customer-specific ADAS ECU/sensor (camera, lidar[1)], radar[1)]), development of adapter hardware for ECU interfaces of customer-specific ECUs, and ECU-specific adapter firmware and protocol software for the ESI unit ■ Implementing sensor and actuator models and protocols ■ Custom tools to manage the HIL system, e.g., for variant handling ■ Custom FPGA applications (e.g., e-drive models, special I/O functions) based on XSG library ■ On-site commissioning ■ Hands-on training ■ Resident engineering (see also "Test Management and Automation", p. 4)
Simulation models	■ See table "Modeling" (below)
Test management and automation	■ See table "Test Management and Automation" (p. 4)
Consulting	■ Integrating HIL testing in the ECU development process and tool environment ■ Optimizing HIL testing activities by means of variant and workflow management ■ Partitioning between components, subsystems, and full-vehicle HIL simulators ■ Exchanging models and data between OEM and supplier ■ Consulting on HIL configuration management

[1)] *Under development*

Modeling

Service (Examples)	Details (Examples)
Model parameterization/calibration and validation	■ Parameterizing and validating Automotive Simulation Models (ASM) ■ Parameterizing third-party models ■ Adapting models and model parameters for closed-loop HIL tests ■ Validating models against measurement data
Model integration	■ Integrating ASM models, customer models, and third-party models into a HIL, MIL, or SIL environment ■ Integrating special maneuvers, roads, vehicles, etc. in the ASM Vehicle Dynamics and ASM Traffic simulation environment ■ Combining the above models, for example, to create an entire virtual vehicle ■ Handling variants of models in a superset model
Model development and adaptation	■ Developing and adapting model components, e.g., for ASM Engine (CNG engine, special injection systems, truck components, etc.), ASM Vehicle Dynamics (vehicle configurations such as articulated bus or wheel loader, active front steering, etc.), or drivetrain applications (electric vehicles, hybrid-electric drivetrains, special differentials, etc.) ■ Developing custom import and export filters for parameterizations, road descriptions, etc. ■ Developing and adapting model components for customer models
Further support	■ Closed-loop HIL, MIL, and SIL tests ■ Integrating ASMs into your development process ■ On-site support and resident engineers for modeling tasks ■ Developing custom pre- and postprocessing tools ■ Special training classes for ASM users

Test Management and Automation

Service (Examples)	Details (Examples)
AutomationDesk jump start	■ Creating concepts for test scenarios and test cases ■ Implementing examples ■ Hands-on training
AutomationDesk customization and test automation engineering	■ Integrating AutomationDesk into your development and test process ■ Tool connections, e.g., Microsoft® Excel®, Vector CANoe, Vector CANstress, and other third-party tools ■ Developing test automation frameworks according to your requirements (e.g., project and library structure, test development process) ■ Developing import routines for third-party test formats ■ Implementing tests and test examples ■ Extending AutomationDesk with custom test steps and test libraries ■ Adapting automatic reports to your requirements ■ On-site services for tool support; resident engineers covering the whole test process
Test management and process support	■ Setting up test processes and establishing full traceability from requirements to test results ■ Setting up a SYNECT-based environment for the central management of all test data ■ Integrating requirements management, test management and test automation ■ Project-specific training for your engineers ■ Consulting on test modeling in AutomationDesk for efficient use in SYNECT Test Management including 24/7 test operations ■ Implementing continuous integration and continuous testing workflows including automated test system preparation and configuration ■ Introducing SIL testing while using the same tools and workflows for SIL and HIL testing ■ Automating recurring processes such as starting and configuring all required tools (e.g. Matlab, ControlDesk, ModelDesk) and preparing the simulator, and loading the correct software version to the ECU ■ Integrating SYNECT into an ALM Tool e.g. IBM CLM (Rational DOORS NG, Rational Quality Manager, Rational Team Concert), Siemens Polarion, HP Quality Center, Microsoft TFS, PTC Integrity

Virtual Validation

Service (Examples)	Details (Examples)
Tool introduction (VEOS)	■ Customer-specific training, consulting and support ■ Support during evaluations and pilot projects
Integration of virtual validation into customer-specific development processes	■ Configuring and building virtual electronic control units based on Simulink® models or C-code ■ Connecting several virtual electronic control units to form complex simulation systems ■ Supporting the integration of the virtual electronic control units generated according to the AUTOSAR Classic Platform and Adaptive Platform ■ Designing, implementing and maintaining tool chain ■ Configuring and creating co-simulation systems ■ Supporting coordination between OEMs and suppliers
Customer-specific tool chains and integration	■ Developing customer-specific scripts (e.g., data exchange between several tools, creating and testing simulation systems and virtual electronic control units) ■ Tool connections, e.g., VEOS, TargetLink, SystemDesk, ControlDesk, or Simulink®, or other third-party tools ■ Developing Continuous Integration (CI) systems with incremental virtual artifact generation and validation ■ Developing virtual sensor simulation tool chains for highly automated / autonomous driving scenarios
Cluster/cloud simulation	■ Evaluation of third-party PC-based cluster simulation software products and their suitability for customer-specific workflow processes ■ Integration and configuration of dSPACE products for PC cluster/cloud simulation ■ Conceptualization and implementation of a customer-specific tool chain for the simulation workflow process

Scenario-based Testing

Service (Examples)	Details (Examples)
Scenario-based test execution	■ Setting up a complete test execution workflow according to the Pegasus approach ■ Enabling automated execution of traffic scenarios in many variations for ADAS/AD validation ■ Conceptualizing a tool-based solution that fits into existing processes ■ Integrating the required artifacts, especially scenarios and the algorithm under test ■ Establishing SIL based test execution in the cloud

Data Management

Service (Examples)	Details (Examples)
Tool introduction (SYNECT)	■ Customer-specific training, consulting and support ■ Support during evaluations and pilot projects
Consulting and tool chain integration	■ Integrating requirements management, test management and test execution ■ Optimizing testing activities through efficient variant handling ■ Integrating parameter management from simulation to calibration ■ Optimizing parameter management through efficient variant handling ■ Customizing SYNECT to match customer data ■ Integrating SYNECT data management with in-house tools ■ Consulting on test modeling in AutomationDesk for efficient use in SYNECT Test Management including 24/7 test operations ■ Consulting on model life cycle management and the use of SYNECT Model Management ■ Customizing model import and export ■ Setup of environment and workflows for component-based development, automated integration, and realization of continuous delivery scenarios

Electrical and Mechatronic Test Benches

Service (Examples)	Details (Examples)
Mechatronic test benches	■ Customized turnkey benches for steering-, braking-systems and ECUs with integrated sensors including mechanics, sensors and electric motors ■ Scalable systems from small rotary test benches (e.g., integrated in 19" cabinet) to large test benches including high performance linear motors ■ Advanced control engineering ■ Open- and closed-loop system tests
Electrical test benches	■ Customized turnkey grid emulators to test electric vehicle supply equipment (EVSE) and on board chargers (OBC) ■ Turnkey low voltage and high voltage power hardware-in-the-loop motor emulators ■ Scalable systems from small low voltage systems (integrated in 19" cabinet) to large high voltage systems (separate power electronic cabinets, cooling infrastructure, ECU interface boxes and supply concept) ■ Open- and closed-loop system tests
Pre-sales service	■ Consulting
Implementation	■ Project management ■ Hardware planning ■ Customized design and construction from a single source ■ Customized extensions, such as environment simulation using an integrated climate chamber ■ Integration customer's real components or simulation models into the test system
On-site service	■ On-site installation service ■ On-site commissioning ■ Hands-on training ■ Maintenance
Simulation models	■ See table "Modeling" (p. 3)

Support: An Integral Part of the Product

dSPACE offers high-quality technical support. When you call us or use the support e-mail address or the form on our website, your request is immediately forwarded to the right support, application, or development engineer.

■ www.dspace.com/go/support

Custom Training Courses

Our specialists will provide a wealth of knowledge and experience to get your project moving: in our regular, standard training courses, in special courses tailor-made for you, and if you want, on site. The instructors are experienced dSPACE engineers.

■ www.dspace.com/go/trainings