SOFTING AUTOMOTIVE

Diagnostics | Measurement | Testing

PRODUCT CATALOG 2015

CONTACT

Softing Automotive
Richard-Reitzner-Allee 6, 85540 Haar – Germany
Phone +49-89-45656-420
Fax +49-89-45656-499
E-mail info.automotive@softing.com
Internet www.automotive.softing.com

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Managing Directors: Dr. Peter Biermann,
Ewald Hartmann, Dr. Wolfgang Trier
Registered office: Haar near Munich
Commercial register entry:
Munich Local Court (Amtsgericht), HRB 184930

Dear Readers, Customers and Partners

In our 2015 product catalog we provide you with an up-to-date overview of the Softing Automotive range. Alongside innovative, high-performing hardware and software products, we also offer individual system solutions, customized application support, comprehensive training packages, and, if required, resident engineering at the relevant customer site.

Our top priority in terms of our product and solution portfolio is to guarantee our customers the maximum benefit with premium quality at all times as well as the best protection of investments available. With our core areas of expertise, diagnostics, measuring and testing, we provide customized solutions for automotive electronics as well as closely related markets such as mobile working machinery.

Softing is an well established partner for the entire life cycle of electronic ECUs and systems. As such, we cover the entire functional chain of our customers – from development through manufacturing to after sales and service. Our active participation in finalizing standards that are well established on the market (such as ASAM and ISO) and the fact that we implement these standards represent important value added for our customers. The used standards not only protect our customers‘ investments but also ensure that processes run smoothly when Softing‘s flexible and standard-compliant components are used.

Our product portfolio offers the very best combination and add-on possibilities for your individual tasks. As a reliable technology and solution partner, we open up a world of new potential to you in diagnostics, measuring and testing.

My team and I would be happy to answer any questions you may have. We look forward to engaging in successful and pioneering projects with you!

Yours
Dr. Peter Biermann
Managing Director, Softing Automotive Electronics GmbH

Haar near Munich, November 2014

SOFTING AUTOMOTIVE

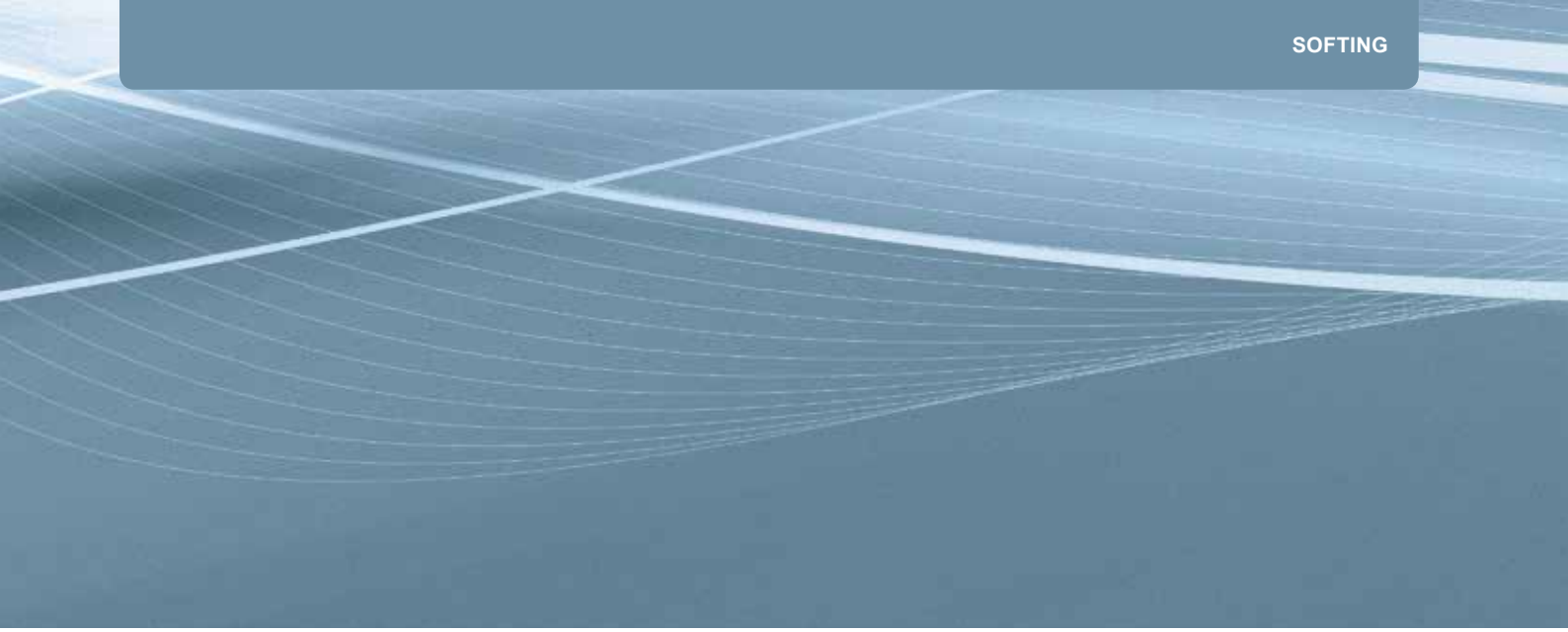
What we stand for

With its core areas of expertise, diagnostics, measurement and testing, Softing is all about key technologies in automotive electronics for passeneger cars and commercial vehicles as well as in the (closely related) markets for non-road mobile equipment. With over 80,000 installations, Softing is a trendsetter in the market. Leading manufacturers of cars, motorcycles, commercial vehicles and their suppliers all implement tried and tested tools and solutions from Softing.

The internationally well established standards implemented by Softing for APIs, data descriptions, protocols and bus systems guarantee our customers the long-term safeguarding of their projects thanks to the reusability of data with consistently high quality. Softing implements market-relevant, international automotive standards, such as ISO 22900 (MVCI), ISO 22901 (ODX) and ISO 13209 (OTX). Softing is an active member of numerous committees and associations (incl. ASAM, ISO, SAE) and plays a leading role in defining industry standards. Our aim is to provide our customers with the appropriate products and solutions for their particular tasks.

Tailored to suit the individual infrastructure in each case, our solutions offer all important certified key technologies to obtain valid and high-quality diagnostics, test and measuring results – even under extreme conditions.

Whether a standard solution, hardware interface, project development or on-site engineering – we support our customers in all phases of the value chain.



Decades of experience in automotive electronics

From the outset, Softing has always consistently implemented the knowledge gained both from customer projects and from the company's active participation in standardization committees in its products. In the process, the company supports its customers with

- intensive advisory services and process consulting
- the international roll-out of products and solutions
- training sessions and on-site services
- support and further development

Softing's dependability as a partner and the reliability of its products are demonstrated by the fact that we do not only market our own solutions. Our products have always been integrated in partner solutions, whether engineering tools, measuring and calibration systems, test benches, HiL testers or repair-shop testers.

TESTERS

Major OEMs and international tier 1 suppliers rely on Softing's test systems – for a good reason. A well-established team ensures that reliable software is exactly tuned to user expectations and that suppliers worldwide are provided with the right version in each case.

VEHICLE COMMUNICATION INTERFACES (VCI)

Softing VCIs always set the standard and are used by various OEMs and suppliers in large numbers. Naturally, only the latest technologies are used, for example for wired and wireless communication. We are also experts in handling repairs and exchanges so that customers are always able to work whatever the circumstances are.

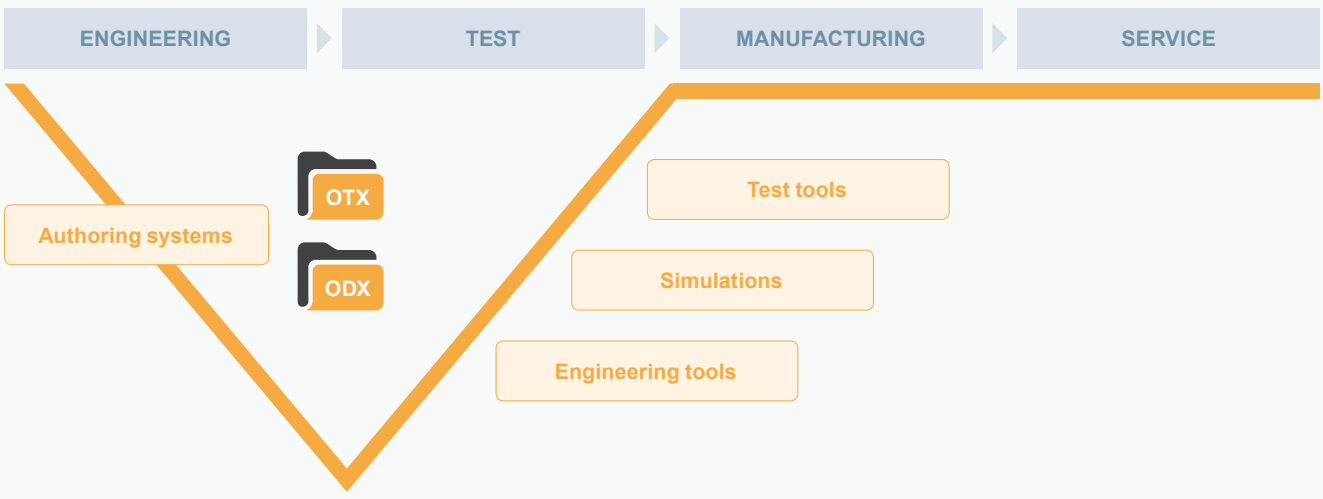
TECHNOLOGIES

The leader in key technologies

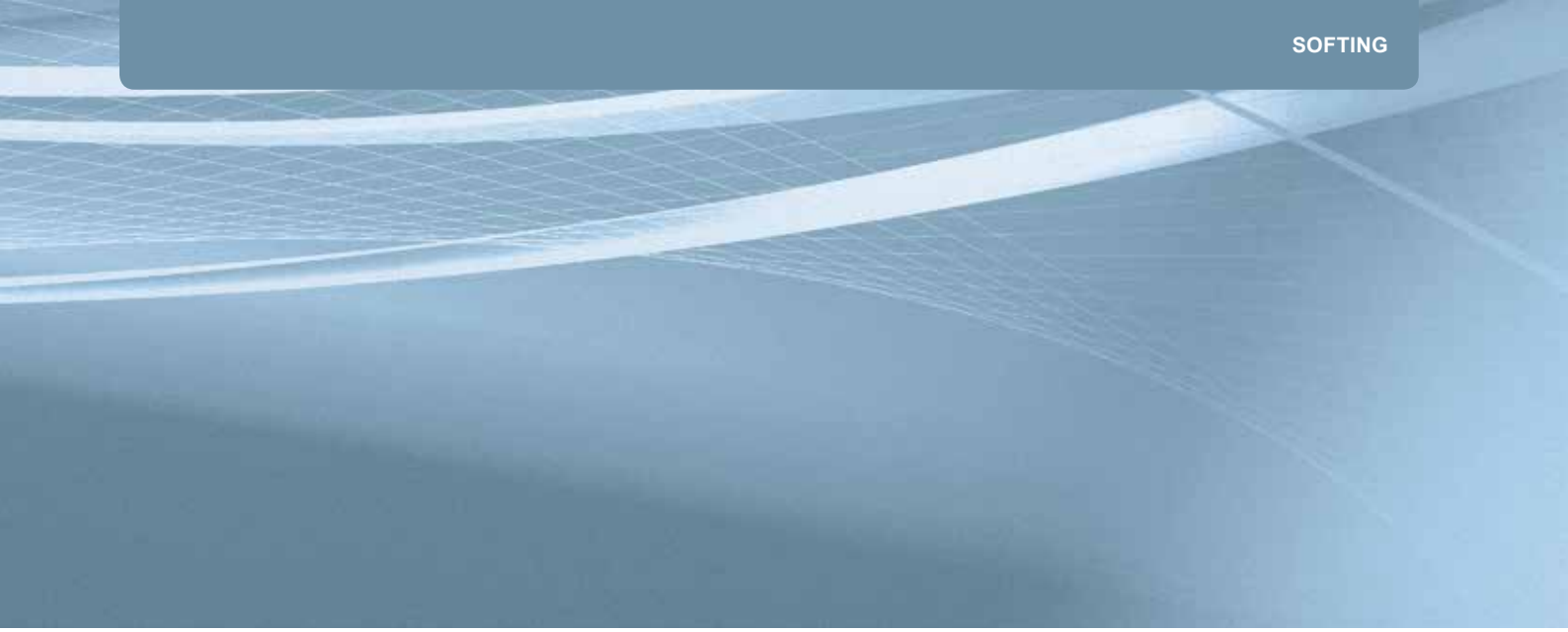
As a clear source of inspiration, Softing does not just follow new technological developments. The company's aspirations are far more directed at proactively developing trends and technologies in its core areas of expertise (diagnostics, measuring, testing). Alongside trusting collaboration with the sector´s innovation drivers, our active participation in all important associations and standardization committees is extremly helpful. This means that we incorporate standards at an early stage of product development and implement them in the specification phase. An advantage in terms of time, cost and expertise that we are more than happy to pass on to our customers.

EXTENDED V-MODEL

For decades now, engineering has – more or less – been based on the V-Model.In the V-Model, diagnostic functions are mainly required in manufacturing and after-sales. After all, today's vehicles could neither be produced nor repaired without diagnostics. This is why Softing has extended the original V-Model and introduced the extended V-Model. Within the extended V-Model, Softing provides consistent tool suites which are used in ECU development, system tests, vehicle integration, road tests as well as tests in manufacturing and in repair shops. Wherever possible, the solutions are based on standard systems which are implemented in all tools: a key advantage for customers because the coordinated behavior of tools and functions ensures maximum reliability in use. Furthermore, the reusability of description formats and configurations leads to significant savings in terms of time and money in all phases of the V-Model and has a positive effect on the term of processes and project phases.



▲ *Fig.: Extended V-Model by Softing*



AREAS OF APPLICATION

Regardless of whether it is diagnostics, measuring or testing – within the extended V-Model, Softing addresses the most important areas of application:

- Fault memory operations and diagnostic communication with OBD systems
- Measuring data acquisition, over bus messages, sensors
- ECU programming
- Variant coding
- Simulation of ECUs and their environment
- Execution of ECU functions
- The areas of application are supported by different tools, each perfectly tailored to the particular case.

PROGRAMMING INTERFACES

Often, the areas of application described are also required in tools and test systems that originally had a completely different focus. We ensure access to Softing expertise in these cases by providing relevant functions via API. In addition to the programming languages C#.Net WPF, C++ and JAVA, we support NI LabView VIs for test systems and OPC for the integration of diagnostic functions in manufacturing environments. Furthermore, we also specialize in implementing decentral solutions using remote access.

EXCHANGE FORMATS

Regardless of whether a customer implements the entire Softing tool suite or uses a subset, the reusability of configurations and results is always the basis of fruitful collaboration and predictable project costs. Softing thus consistently relies on standardized data formats, whether for describing ECUs and test sequences (ODX/OTX) or for storing measurement data (MDF).

PROTOCOLS

The basis of most ECU functions is communication. Any communication needs a set of rules (syntax, sematics). The rules for diagnostic communication are specified in diagnostic protocols. It is irrelevant whether an exchange is taking place between ECUs or between a tester and an ECU. Or whether it uses CAN, K-Line, LIN or modern high-performance buses such as MOST, FlexRay or Ethernet. Just as it is of no relevance whether low-level protocols or high-level protocols (such as UDS or J1939) are used. Because Softing's technologies precisely implement, analyze and test the corresponding protocols. Incidentally: Communication between systems, for example between mainframes and test systems, is also one of Softing's domains.

Diagnostics

ODX, OTX, UDS and other standards in use

Today complex electronic systems are making vehicles more and more powerful, safe and environmentally-friendly all the time. To accommodate the growing complexity of ECUs and their complex communication levels, a detailed insight into control functions is absolutely essential. The direct access to ECUs and the precise evaluation thereof, even when installed, is thus one of the central tasks of diagnostic processes in engineering, testing, manufacturing and after-sales service.

RANGE OF FEATURES

Softing provides an extensive portfolio of applications used for developing diagnostic processes and executing diagnostics. Typical areas of application are accessing fault memories, flash programming, evaluating measurement data, parameterizations, the control of system components and the actual "diagnostics" itself.

Whether it is a question of implementing ODX/MVCI processes, migration strategies for legacy data, the use of high-performance VCIs, the creation

Measurement

Reliable measurements under the most difficult conditions

Legal regulations, greater demands in terms of safety and convenience as well as a general rise in cost pressure are constantly increasing the complexity of modern vehicles. This trend is driving development engineers to the limits of what is technically feasible – for example in the reduction of fuel consumption and emissions, the development of ADAS (Advanced driver assistance systems) and exploration in future-oriented propulsion technology. The function scope of vehicles, the number of different vehicle variants and the complexity of technology are increasing all the time. This in turn sees a rise in the number of tests of electronic and mechanical components which have to be verified and validated.

RANGE OF FEATURES

Softing supports these tasks with vehicle-independent measurement data acquisiition and data logging. These ensure the greatest possible objectivity and reliability when collecting and processing ECU data and physical variables.

Testing

Turnkey solutions for diagnostic and function tests

From the control of common automotive test solutions through manually configurable test environments to specialized automation solutions and simulations – Softing reliably covers all test requirements and offers comprehensive software, test solutions, electronic testware and scalable test systems that can be flexibly and modularly tuned to individual test requirements.

RANGE OF FEATURES

Solutions for executing systematic, structured, reproducible verification and test processes and their documentation. Turnkey solutions for diagnostic and function test (including ECUs and hardware setup as well as training sessions).

of authoring systems or the provision of complete manufacturing or service systems: Together with our clients, we define customized solutions that are tailor-made to suit their particular project requirements.

- Authoring system
- Universal development tester
- Test automation
- Simulation of diagnostics and residual bus simulation

PRODUCTS	
DTS Monaco	Universal engineering tester for diagnostic and control functions of vehicle ECUs with OTX Runtime.
DTS Venice	Powerful ODX 2.2 and 2.0.1 authoring system for diagnostic experts and developers of vehicle ECUs.
OTX Studio	Tool for creating, implementing and debugging diagnostic and test sequences.
DTS COS	Communication server for vehicle diagnostics based on the latest ASAM MCD-3D 3.0 standard.
DTS Automation	Simple access to diagnostic communication for manufacturing and test bench applications.
Softing TDX	Solution for diagnostics and flash programming in the repair shop and in road tests.

Softing's hardware and software products focus on the following topics:

- Signal conditioning
- Measurement data acquisition
- Bus link
- Data processing

PRODUCTS	
SMT	Measurement system that can be used modularly and stand-alone with an extensive range of signal conditioning and interface modules.
PEA	Software for creating, visualizing, processing and recording measurement and communication data.
µ Series	Compact and extremely sturdy CAN measurement modules for use in physically challenging environments.
DTS Monaco	Measurement using diagnostic communication and bus monitoring.

- Software for testing
- Simulation of diagnostics and residual bus simulation
- Automated Tests
- Test solutions (hardware)

PRODUCTS	
ECU-TEST	Test automation solution for all diagnostic use cases. DTS-COS and EDIABAS integration are available by default as diagnostic solutions.
TestCUBE$_2$	Diagnostic simulation and residual bus simulation in one device – the perfect counterpart for the preparation of workshop tests and test system regression tests.
DTS Monaco	Universal engineering tester for diagnostic and control functions of vehicle ECUs with OTX Runtime.
CanEasy	Analysis and test environment: simulating complex bus systems, analyzing communication in a number of different ways.

DIAGNOSTICS

A large number of today's innovations are based on software developments, and vehicles are no exception. Software innovations improve vehicle performance and increase both the safety and sustainability of mobility. The number of ECUs and the associated networking are continually increasing in the process. The associated growing complexity must be mastered over a vehicle's entire lifetime. In addition to actual control functions, diagnostics is increasingly a focal point in development. Although diagnostics was originally only intended for checking that legal emissions standards were being adhered to, it now takes its place before engineering in the entire value chain.

In the past, vehicle manufacturers spent a lot of time and money developing their own proprietary systems for ECU communication, systems that worked with non-compatible formats for data description. This made it virtually impossible for suppliers to use the same software when working with different manufacturers. When no appropriate standards are available, costs are immense and manufacturers can become dependent on specific suppliers. This is why vehicle manufacturers and software suppliers got together to specify and implement a whole range of international standards.

The most significant standards for diagnostics are:

- Unified Diagnostic Services (UDS) as a diagnostic protocol compliant with ISO 14229
- Communication system (D-Server) compliant with ISO 22900 and 22901

The interfaces of the D-Server are also completely standardized. The data interface defines Open Diagnostic Data Exchange (ODX) as a data model and universal exchange format. Furthermore, the application interface (D-Server API) allows symbolic access to ECU and vehicle information. Using the bus system interface (D-PDU API), it is possible to use different bus protocols and vehicle communication interfaces (VCIs) from various manufacturers.

The Standard Open Test Sequence Exchange (OTX) makes it possible for users to write diagnostic sequences technically in XML and also enables access to diagnostic functions, flashing and user interaction to name but a few of the advantages. Unlike Java jobs in ODX, sequences can be reused long term once created.

Diagnostic Tool Set 8

System overview

AREAS OF APPLICATION

- All possible applications of diagnostics in engineering, testing, manufacturing and after-sales service
- Manufacturers of cars, trucks, buses, motorcycles, mobile working machinery
- Tier1 system suppliers
- ECU suppliers

BENEFITS

- Significant cost reduction in comparison to proprietary developments
- Highly effective: Diagnostics only has to be implemented once in the value chain
- Future-proof (based on current standards)
- High quality (data verification, identification and solving of communication problems and function errors)

The Diagnostic Tool Set makes it possible for developers, engineers and technicians to create consistent diagnostic functions and sequences on the basis of international standards and to ensure that vehicle diagnostics works reliably over the entire value chain.

SUCCESSFULLY MASTERING CHALLENGES

Increased competition and frequent model changes are major challenges for the manufacturers of cars and commercial vehicles as well as for system suppliers. Vehicles are becoming more and more powerful, safe and environmentally-friendly all the time. These innovations nearly always entail new software developments. The number of ECUs and the associated networking are thus continually increasing.

MASTERING COMPLEXITY SAFELY

This growing complexity must be mastered over the entire lifetime of the vehicles. In addition to the actual control functions, diagnostic functions have also gradually become more and more significant. Originally, diagnostics was only intended for checking that legal emissions standards were being adhered to. Today diagnostics is used in the entire value chain from engineering through testing and manufacturing to repair shop service.

APPLYING CURRENT STANDARDS

Together, vehicle and tool manufacturers have specified an international standard for a diagnostic runtime system (also known as "communication server" or "D-Server"). It receives, processes and sends diagnostic data. During data processing, the internal machine-readable representation is transformed into a symbolic representation that is readily understandable for the user. The interfaces of the diagnostic runtime system are completely standardized: The data interface defines Open Diagnostic Data Exchange (ODX) as a data model and universal data exchange format. The application interface (D-Server API) allows symbolic access to ECU and vehicle information. The VCI access interface (D-PDU API) makes it possible to use all kinds of bus protocols via vehicle interfaces from different manufacturers. The Diagnostic Tool Set implements these standards with 100% compatibility.

STANDARDS

- Communication servers: ISO MVCI server / ASAM MCD runtime system (COS)
- ODX data interface: ISO 22901-1/ASAM MCD-2D
- Application interface: ISO 22900-3/ASAM MCD-3D
- Bus system interface: ISO 22900-2 (D-PDU API) over CAN, K-line, Ethernet
- ISO 13400 (DoIP)
- ISO 13209 (OTX)
- ISO 14229 (UDS)
- ISO 14230 (KWP2000)
- ISO 15031 (OBD)
- ISO 15765
- ISO 27145 (WWH-OBD)
- SAE J2534
- SAE J1939

and many more

HIGHLIGHTS

- MCD-3D3-0
- DOiP
- ODX 2.2 + 2.0.1
- OTX
- Runtime data: ultra-compact + encryptable

DTS COS

Communication server for vehicle diagnostics based on the latest ASAM MCD-3D 3.0 standard.

AREAS OF APPLICATION

- Engineering/testing: release of ECUs, creation and validation of test sequences, HiL systems
- Manufacturing: end-of-line test systems, test benches, programming stations
- After-sales service: diagnostic runtime system for service testers

BENEFITS

- Faster and more affordable engineering, as well as less dependence on individual tool suppliers as it is based on the latest standards
- No detailed knowledge of the bus protocol necessary as access takes place symbolically
- Downward-compatible: ODX 2.0.1 Legacy Mode, DTS 7 projects based on D-PDU API protocols, DTS 7 Java Job Legacy
- Ultra-compact runtime format reduces memory requirement and enables faster updates in the field
- Considerable increase in security thanks to OEM-specific runtime data encryption

Using the standardized runtime system DTS COS for diagnostic communication simplifies the development of proprietary applications. This enables users to focus on the actual task and get results fast.

BASED ON THE LATEST ISO STANDARDS

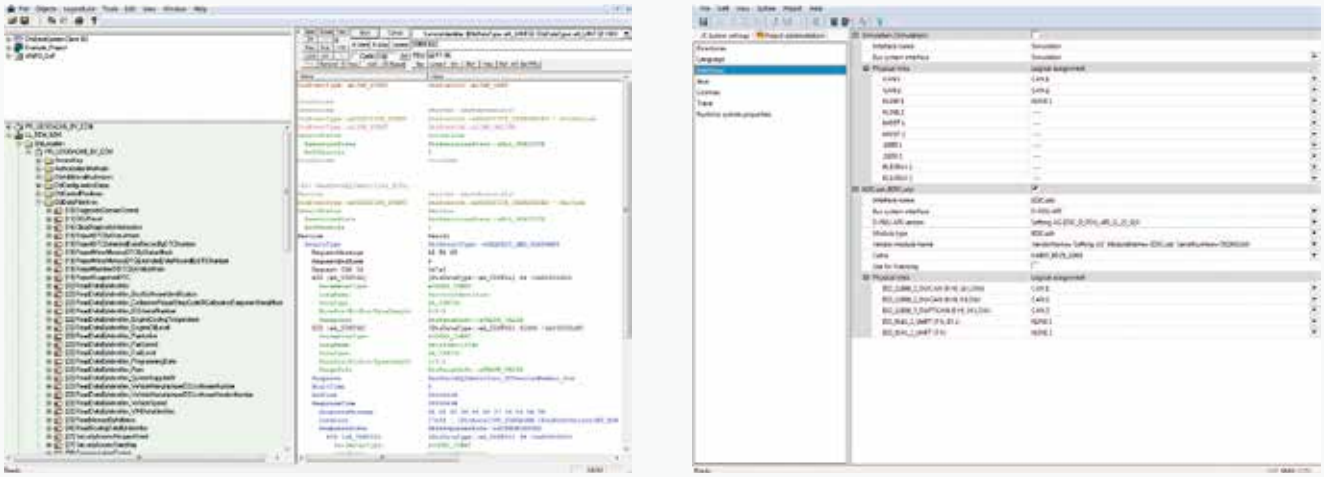
The diagnostic runtime system DTS COS is part of Softing's Diagnostic Tool Set product family. Verified by extensive tests in accordance with the ASAM test suite, it is highly compatible with all relevant standards and at the same time offers excellent performance. DTS COS makes it possible to use all kinds of bus protocols over different manufacturers' interfaces. It can be used to access several ECUs at the same time or the whole vehicle over different bus systems. If necessary, parallel communication is possible over several vehicle interfaces.

HIGH PERFORMANCE AND SIMPLICITY OF USE

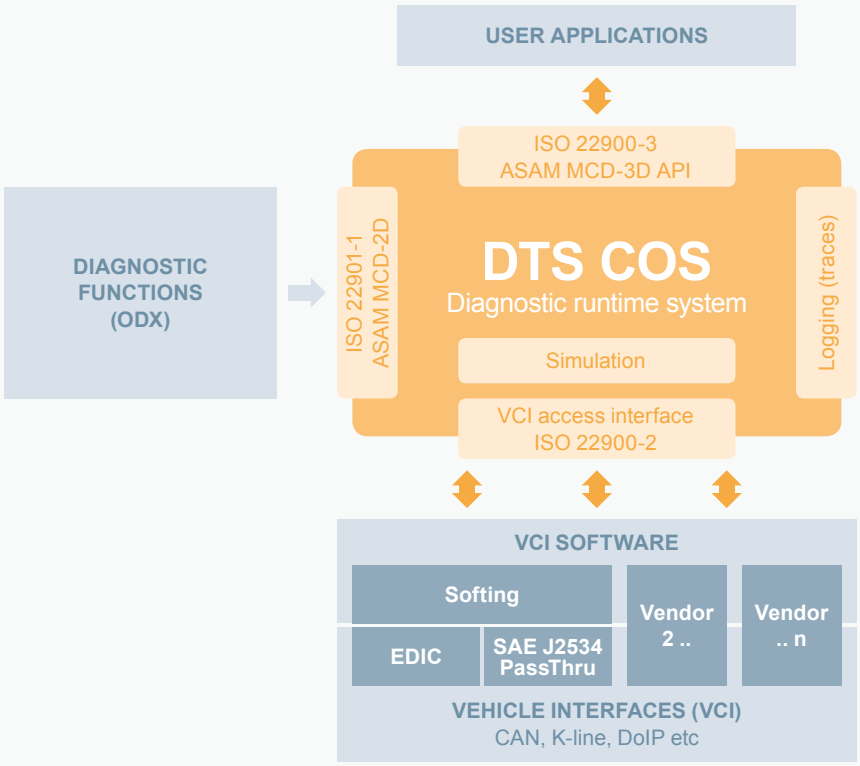
System and project settings can be managed centrally using the System Configurator. Assistants are available to help import data and create new projects. The Database Differ makes it possible to compare databases in the runtime formats. The Differ makes it easy to quickly find changes made between the different vehicle statuses. Using a special "simulated" interface, test sequences and user applications can even be tested without real ECUs. Extensive trace functions enable developers and engineers to quickly detect errors in their own applications or in the communication with the ECUs. Trace files can be analyzed "offline" with the Analyzer.

FASTER CREATION OF INDIVIDUAL APPLICATIONS

In addition to extensive documentation and programming examples, the API Developer Kit contains a special test application. This makes it possible for developers to establish communication to the vehicle via the runtime system immediately and without their own application development. Using a special Configuration API, the runtime system can be configured entirely by an external application in terms of interfaces, projects etc.



▲ *Fig.: Configuration API – to establish communication to vehicle via runtime system*



▲ *Fig.: Runtime system DTS COS for diagnostic communication*

RUNTIME FORMATS

SOD	Editable runtime format which can be exported back to ODX.
SRD	"Monolithic" ultra-compact* runtime format with closed database as with ODX/SOD.
SMR	Modular** ultra-compact* runtime format.

* Vehicle and flash data are 60 to 180 times more compact than ODX data (depending on OEM/data structure); optional OEM-specific encryption

** For ODX categories/individual ECU

PRODUCTS

DTS COS	Communication server DTS 8 COS for vehicle diagnostics. Over and above the function scope of the DTS Base System, it is possible for user applications to symbolically access ECU and vehicle information over the MCD-3D application interface on an ODX data basis. Note: Neither Softing's VCI software nor the OTX runtime environment are part of the delivery scope.
DTS COS LITE	Communication server DTS 8 COS for vehicle diagnostics with the limitation that a maximum of a single ECU can be contained in the ODX data or DTS projects used.
API DEVELOPER KIT	API Developer Kit for developing your own applications based on the communication server of DTS 8 COS. Incl. TestApp, ConfigAPI and interface description files for accessing the COM API. Documentation: ASAM MCD-3D reference, C++/JAVA/COM API with Softing-specific extensions. Sample applications: Java, Python in Visual Studio 2010 Solution for COM, C#, C++.
DEVELOPER STARTER PACKAGE	Starter package with max. 40 hours of instruction and application support by phone / e-mail / web conference or in person at Softing in Haar incl. personal transfer and instruction in the documentation.
MODULAR RUNTIME FORMAT	For ODX categories/single ECU: Ultra-compact runtime formats: Vehicle and flash data are 60 to 180 times more compact in comparison to ODX data (depending on OEM and data structure); optional OEM specific encryption.
DTS COS-SMR-SETUP	Initial process consulting for using the modular, ultra-compact runtime format SMR and its generation with the transformer.

DTS Automation

Particularly easy access to diagnostic communication for manufacturing and test bench applications.

AREAS OF APPLICATION

- Flash and calibration stations in manufacturing
- Diagnostic test benches
- End-of-line test systems
- HiL systems

BENEFITS

- Simple interface design enables fast familiarization
- Variety of ECUs is easy to manage
- Minimal setup times thanks to configuration exchange
- The use of the DTS Base System ensures wide-ranging implementation
- Constant interface even in migration of ODX data formats (e.g. from ODX 2.0.1 to ODX 2.2.0)

DTS Automation supports standard interfaces widely used in industrial automation. If required, the entire software for automation and diagnostics can be installed on a single PC. Using configurations that have already been created and stored enables very short setup times.

MASTERING COMPLEXITY

DTS Automation is part of the Diagnostic Tool Set product family and is based on the DTS Base System. The ASAM MCD-3D application interface enables symbolic access to ECU and vehicle information or functions without any detailed knowledge of the bus protocols used being necessary. The service and data type descriptions as well as conversion methods contained in the ODX database are used. The ODX databases of modern vehicles are highly complex and usually become more so during their lifetime due to additional variants, maintenance measures and function extensions.

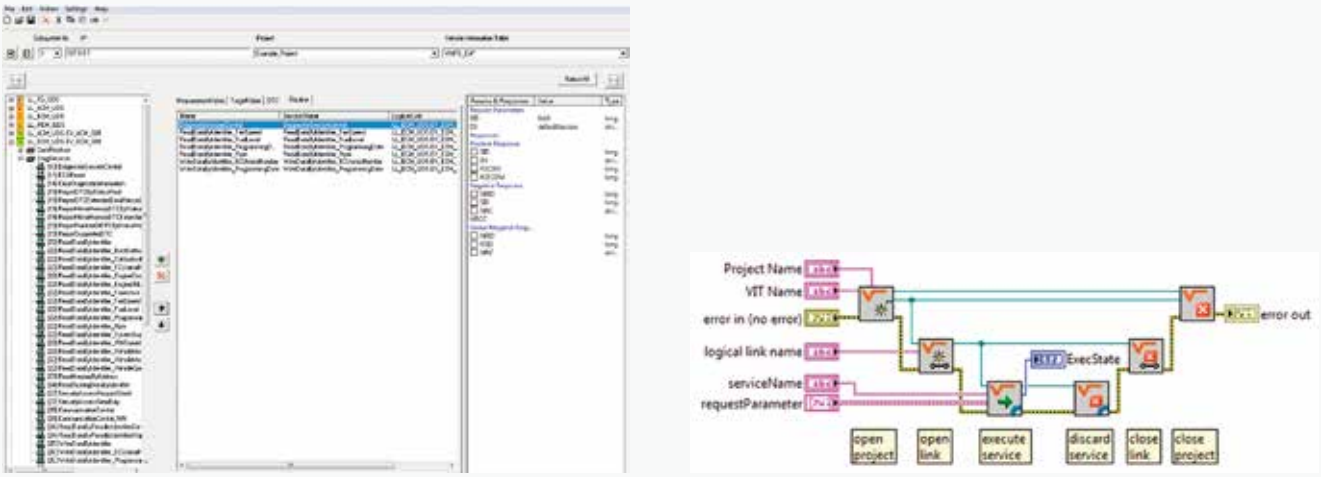
SIMPLE ACCESS OVER STANDARD INTERFACES

Simplified access to diagnostic functions is often desired when it comes to realizing test benches in ECU and vehicle manufacture. This has to take place with standard interfaces widely used in industrial automation. DTS Automation offers an API reduced to the scope of these applications, thus considerably simplifying the API at the same time. The communication mechanisms it is based on are transparent for the user.

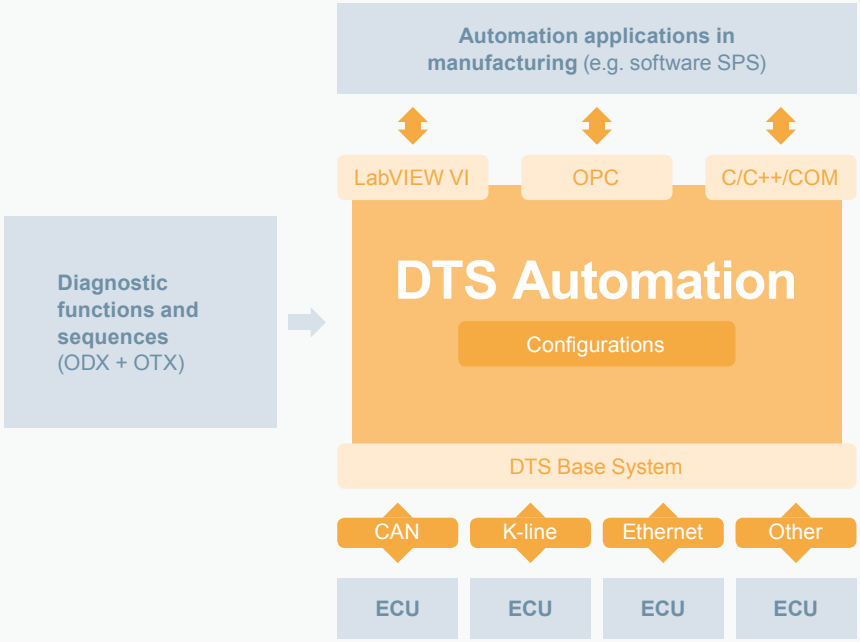
Standard tasks, such as connection setup or tear-down, can thus be taken care of with considerably fewer and simpler steps than with direct access to the MCD-3D API.

SHORT SETUP TIMES

The DTS Automation Configurator is used to select and parameterize diagnostic services. Access from the user application can take place either over C/COM-DLL, LabVIEW VIs or OPC. Depending on the configuration, objects or variables that can be combined to form a test sequence in the test bench application are available at the interfaces. These configurations can be saved, enabling short setup times as the sequence in the test bench application does not have to be modified.



▲ *Fig.: DTS Automation Configurator to select and parameterize diagnostic services*



▲ *Fig.: DTS Automation for manufacturing and test bench applications*

PRODUCTS	
DTS AUTOMATION	Automation offers manufacturing and test bench applications particularly easy access to diagnostic communication over standard interfaces widely used in industrial automation: C-/C++/COM API, LabVIEW VI and OPC Server.
AUTOMATION CONFIGURATOR	The Automation Configurator makes it possible to create user-specific configurations for DTS 8 Automation. Recommended for short setup times. Mandatory when using OPC.
STARTER PACKAGE	Starter package with max. 40 hours of instruction and application support by phone / e-mail / web conference or in person at Softing in Haar incl. exemplary creation of a sample application for communicating with a user ECU.

DTS Monaco

All-in-one engineering tester for diagnostic and control functions of vehicle ECUs.

AREAS OF APPLICATION

- Development of diagnostic and control functions for vehicle ECUs
- Function test and validation
- Integration and system test
- Preparation of test sequences for manufacturing and after-sales service
- Analysis of returns and quality assurance

BENEFITS

- Cost reduction and shorter familiarization time as DTS Monaco covers the functionality of several tools, previously separate: e.g. OBD Scan Tool, data and bus monitor
- Fast results due to intuitive operation and preconfigured templates
- Top quality thanks to early detection and remedy of communication problems and function errors
- Highly effective as it can be flexibly adapted to suit different tasks
- All communication data and test results can be documented in entirety

DTS Monaco covers vehicle diagnostics in entirety in the areas engineering, testing and the preparation of tests, and can be flexibly adapted to suit all kinds of tasks and user groups. And this means reliable diagnostics can be ensured.

FLEXIBLY ADAPTABLE TO THE RELEVANT TASK

DTS Monaco is part of the Diagnostic Tool Set product family and is based on the DTS Base System. Monaco stands for Modular Analyzer for Vehicle Communication. A start page enables fast and simple access to the functions required most frequently. The actual DTS Monaco workspace is divided into two: one area with a fixed layout and one with layouts that you can toggle between using tabs. A status display below shows communication server messages. The various functions are realized using special, configurable interface elements. In Configuration mode, these HMI controls can be arranged freely in the layouts and can be fully configured.

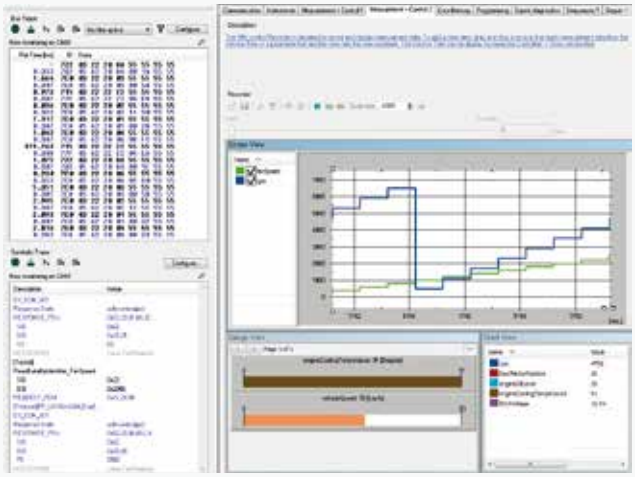
EARLY DETECTION OF PROBLEMS AND ERRORS

In Run mode, a saved workspace can be "started". Individual functions can be started automatically and communication established in advance if so required. Self-generated test sequences enable both simple and very complex function tests. This makes it possible to detect, and remedy, communication problems and function errors at an early stage. Communication data and test results can be documented in entirety in the process.

GETTING RESULTS FAST

For typical use scenarios predefined templates including an universal database for the OBD self-diagnosis as well as various a protocol templates (for WWH-OBD, J1939-73 among others) are supplied. In Demonstration mode, all functions can be tested, without an interface or license, using a detailed example including simulation. A completely integrated OTX runtime environment enables the running and testing of complex test sequences compliant with ISO 13209. A development environment for creating such OTX sequences can be launched directly from DTS Monaco.

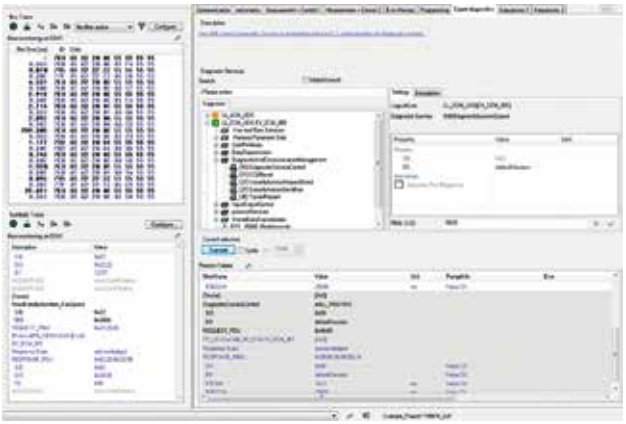
▲ *Fig.: DTS Monaco – startpage*



▲ *Fig.: Flexible adaption and configuration of layouts*

COMMUNICATION

BUS TRACE	Fundamental analysis of diagnostic and onboard communication at bus level in hexadecimal notation.
DIAGNOSTIC SERVICES	Data verification and communication test with full access to functions and sequences for experts.
SYMBOLIC TRACE	Analysis of diagnostic communication at the application level in symbolic notation.
OTX	Execution of complex diagnostic sequences in acc. with ISO 13209 (OTX).



▲ *Fig.: Data verification and communication test*

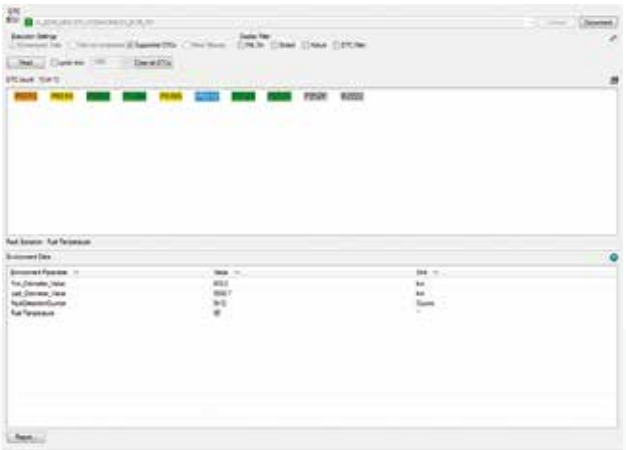
CONTROL

ANNOTATION	Visualizing tests with pictures, text or link to RTF/PDF/CHM files.
COMMUNICATION CONTROL	Automatic setup and tear-down of communication to ECUs.
LOGICAL LINK LIST	Monitoring and influencing the communication status of ECUs.
TOGGLE SEQUENCES	Activation/deactivation of a switch each starts a sequence of services (e.g. change ECU state).

▲ *Fig.: Activation/deactivation of defined switches*

FUNCTION

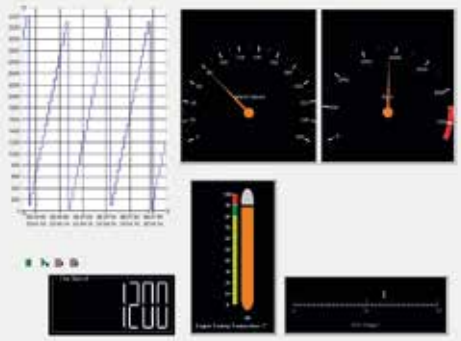
DTC	Diagnostic trouble codes: One-off or cyclical reading out as well as clearing of ECU fault memory.
IO CONTROL	Setting of individual or a group of ECU variables.
FLASH	ECU programming – see page 21.
OBD	Validation and release of OBD self-diagnosis – see page 21.
SOFT KEY	Running services, jobs or sequences using buttons.



▲ *Fig.: Running services, jobs or sequences*

MEASURING

DATA DISPLAY	One-off or cyclical reading out of configurable measured values/blocks in list form.
RECORDER	Recording/saving ECU variables (list, instruments or oscilloscope) and modifying them (actuator).
GRAPHICAL INSTRUMENT	Visualizing and modifying ECU variables using various graphic elements.



▲ *Fig.: Visualization and modification of ECU variables*

DELIVERY SCOPE

TEMPLATES	Communication and Analysis, Error Memory, Measuring and Parameterizing, Onboard Diagnostics, Programming, Test Sequences Communication.
PROJECTS	Comprehensive Monaco workspace as an introduction to the most important functions using sample authoring with three ECUs and detailed documentation as well as tutorial, OBD authoring compliant with ISO 15031-5/SAE J1979 – as an all-purpose version for gasoline and diesel vehicles.

PRODUCTS

DTS MONACO	All-in-one engineering tester DTS 8 Monaco for diagnostic and control functions of vehicle ECUs which covers vehicle diagnostics in entirety in the areas engineering, testing and the preparation of tests, and can be flexibly adapted to suit all kinds of tasks and user groups. With basic function scope (HMI controls of the communication library) incl. OTX runtime environment. There are limitations to the configuration of HMI controls when released by the creator of the workspace. Based on the DTS Base System.
HMI LIBRARIES	Option: All further HMI controls of DTS 8 Monaco that are not included in the basic function scope.
CREATION AND CONFIGURATION	Option: Creating and configuring user-specific workspaces with DTS8 Monaco. HMI controls can be configured without limitation. For users without this license, limited configurability of individual HMI controls can be granted.
ACCESS TO MCD-3D API	Option: Access to the ASAM MCD-3D application interface for user applications. Adds the functionality of DTS8L-COS to DTS 8 Monaco. Warning: DTS8L-API-DK and DTS8S-COS-START are a mandatory additional part of the order for each first user license – see the DTS 8 COS data sheet.
DTS FLASH	DTS Flash tool for the flexible flash programming of ECUs based on DTS Monaco. Contains only the HMI controls Flash, Bus Trace, Symbolic Trace as well as Toggle Sequences and cannot be extended afterwards.
DTS OBD	DTS OBD – tool for the comprehensive validation and release of the onboard diagnostics of individual ECUs or an entire vehicle based on DTS 8 Monaco and the DTS Base System. Contains the HMI controls of the communication library as well as the HMI control OBD and cannot be extended.
MAINTENANCE AND SUPPORT PACKAGE	Maintenance and support package incl. support by telephone and e-mail with regard to installation, setup and operation as well as minor and medium software upgrades free of charge.

DTS Flash

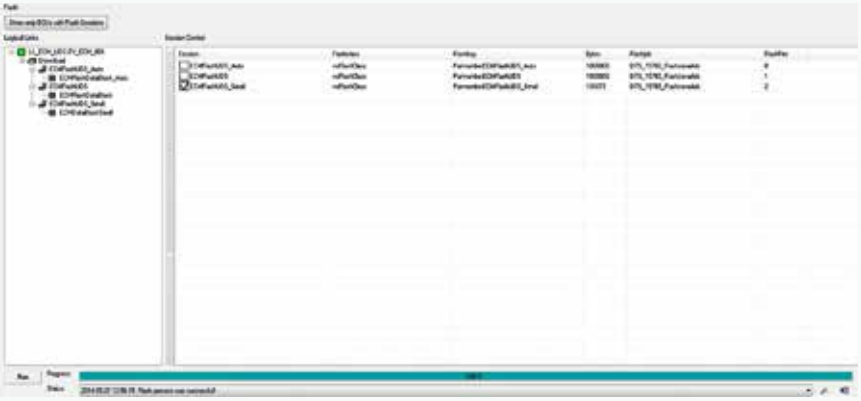
Separately available solution for flash programming.

AREAS OF APPLICATION

- Testing and execution of flash sequences
- Updating ECU to defined software status
- Analysis of returns

BENEFITS

- Fast results due to intuitive operation
- Simple configuration
- Preconfigured template



▲ *Fig.: Flexible programming of ECUs with DTS Flash*

DTS Flash is an easy-to-use tool based on the ODX standard for flash programming ECUs. It is possible to program both single and multiple flash sessions of an ECU. The programming sequence is easy to adapt to the particular use scenario if required.

DTS OBD

Separately available solution for validation and release of the self-diagnosis.

AREAS OF APPLICATION

- Onboard diagnostics engineering for individual ECUs or entire vehicles
- Function test and validation
- ECU integration and system test
- Test drives

BENEFITS

- Fast results due to intuitive operation and preconfigured templates
- Top quality thanks to early detection and remedy of function errors

▲ *Fig.: DTS OBD – validation and release of self-diagnosis*

DTS OBD is a tool for validating and releasing the self-diagnosis of individual ECUs or an entire vehicle in vehicle engineering. It comprehensively covers onboard diagnostics, combining the functionality of an OBD Scan Tool as well as a data and bus monitor in a single tool. The type of bus connected can be detected or selected automatically. There are various analysis functions for the OBD modes available at any one time. Measured values can be updated manually or cyclically and logged for the purposes of documentation or external analysis (e.g. Excel spreadsheets). Parameters can be modified using symbolic names and sent to the relevant ECU for response analysis. Communication can be analyzed in entirety down to the very last detail and, if required, recorded at bus level (hexadecimal raw data) or on the application layer (symbolic representation). When used on a notebook, e.g. during a test drive, the font can be enlarged in several stages on the screen.

DTS Venice

Powerful authoring system for ODX 2.2 and 2.0.1 for diagnostic experts and developers of vehicle ECUs.

AREAS OF APPLICATION

- Description and validation of diagnostic functions and ECU communication
- Data interoperability test
- Provision of test data for integration and system test
- Data adaptation in production preparation and for use in repair shop testers

BENEFITS

- Efficient creation of the diagnostic specification thanks to assistant support in data entry
- Greater data quality thanks to testing of both syntax and semantics
- Data consistency over the entire process chain thanks to standard tool with central database (single source)
- Considerable cost saving thanks to the possibility of importing existing data descriptions and early error detection
- Shorter approval process as suppliers can test conformity with the OEM regulations themselves

DTS Venice enables the convenient creation, testing, management and maintenance of diagnostic specifications over the entire process chain for OEMs, system and ECU suppliers. User-specific authoring guidelines are easy to integrate.

SIMPLE CREATION OF ODX DATABASES

DTS Venice is part of the Diagnostic Tool Set product family and is based on the DTS Base System. Venice stands for Vehicle Communication Database Editor. New databases can be created both on the basis of existing ODX/PDX files and of supplied protocol templates. The delivery scope still includes sample authoring with three ECUs, detailed documentation and a tutorial.

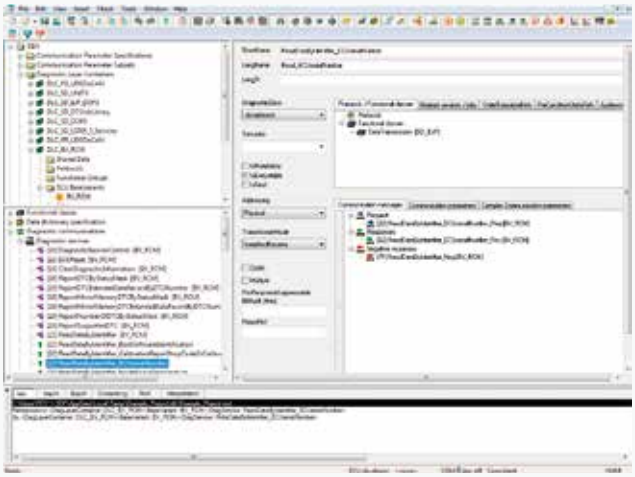
CONVENIENT PROCESSING OF ODX DATA

A start page enables fast and simple access to the functions required most frequently. The entire ODX data model can be edited in the editor's expert view. The ECU view provides a simplified view of the most important data of a single ECU as well as its variants. Diagnostic description inheritance is visualized graphically. Assistants are available to help with data input. Both working with ECU shared data and the simultaneous editing of several databases are supported. The diagnostic specifications created can be issued as RTF files for documentation purposes. In Demonstration mode, ODX databases can be viewed without a license.

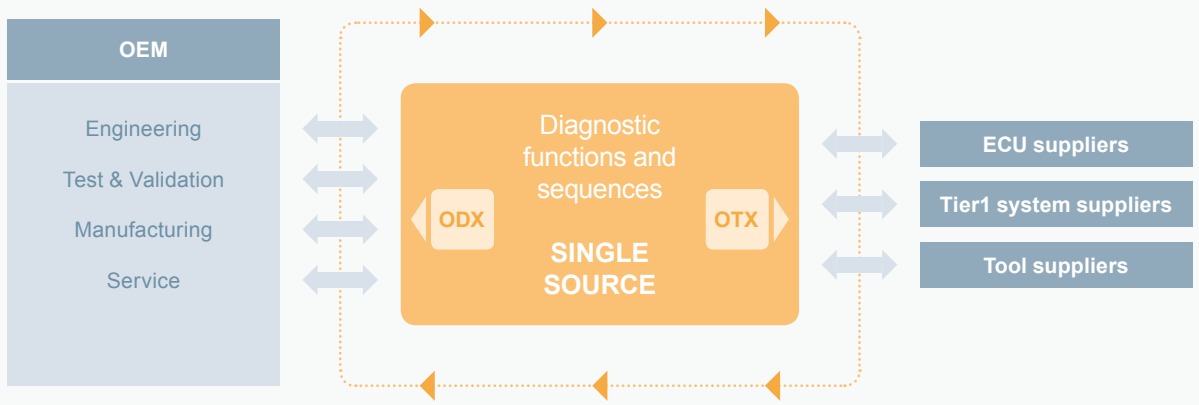
TOP DATA QUALITY FROM THE OUTSET

The ODX databases of modern vehicles are highly complex and usually become more so during their lifetime due to additional variants, maintenance measures and function extensions. DTS Venice ensures the consistency and completeness of the database at all times. Formal checks testing ensures the basic compliance with the ODX standard and optionally with the ASAM ODX Recommended Style. Extensions by Further tests can ensure adherence to user-specific authoring guidelines if so required are possible.

▲ *Fig.: DTS Venice – startpage*



▲ *Fig.: Standard tool with central database (single source)*



▲ *Fig.: DTS Venice – authoring system for creation, validation and administration of diagnostic specifications*

PRODUCTS

DTS VENICE	Powerful authoring system DTS 8 Venice for ODX 2.2 and 2.0.1 for the convenient creation, testing, management and maintenance of diagnostic functions of individual ECUs or an entire vehicle.
MAINTENANCE AND SUPPORT PACKAGE	Maintenance and support package incl. support by telephone and e-mail with regard to installation, setup and operation as well as minor and medium software upgrades free of charge.

OTX Studio

All-in-one development environment for diagnostic sequences.

AREAS OF APPLICATION

- Graphic specification of diagnostic sequences
- Creation of test sequences in ECU development
- Test sequences with user interface for EOL testers in manufacturing
- Guided fault search for repair shop testers
- Suitable for both programmers and pure diagnostic users
- Engineering, testing, manufacturing, after-sales service
- Flash programming, coding, testing

BENEFITS

- Convenient specification and creation of diagnostic sequences in one tool without in-depth programming knowledge
- Simple exchangeability of sequences between ECU, system and vehicle manufacturers
- Universal implementation as the full function scope of OTX is available
- Storage of OTX scripts in binary format hinders unauthorized modifications and protects expertise
- Long-term protection of investments thanks to the implementation of an international standard
- Different views for programming experts and diagnostic users without programming knowledge

OTX Studio is a tool for creating, implementing and debugging diagnostic and test sequences (based on the ISO 13209 standard). With a special GUI editor, it is easy to generate graphic user interfaces and link them to the sequences created. Diagnostic data is supported in compliance with ODX V2.0.1 and V2.2.0.

SPECIFYING AND IMPLEMENTING DIAGNOSTIC SEQUENCES

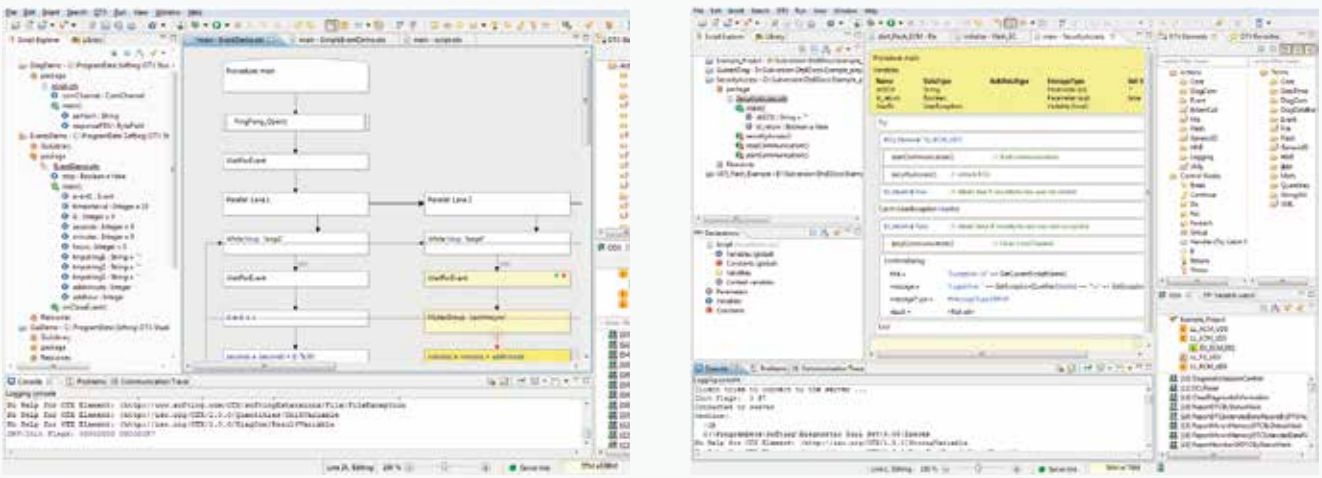
The new OTX (Open Test sequence eXchange) standard compliant with ISO 13209 enables users to write simple test sequences for anything from function tests to complete tester applications. OTX Studio supports the user in the specification phase and in subsequent implementation. It makes it easy to create graphic sequence diagrams with a clear representation of the sequence logic. The integrated OTX Differ enables the convenient comparison and compilation of scripts of different development levels. The adaptation of existing sequences to new diagnostic data is effectively supported by special wizards.

SUITABLE FOR BOTH FIRST-TIME USERS AND EXPERIENCED DEVELOPERS

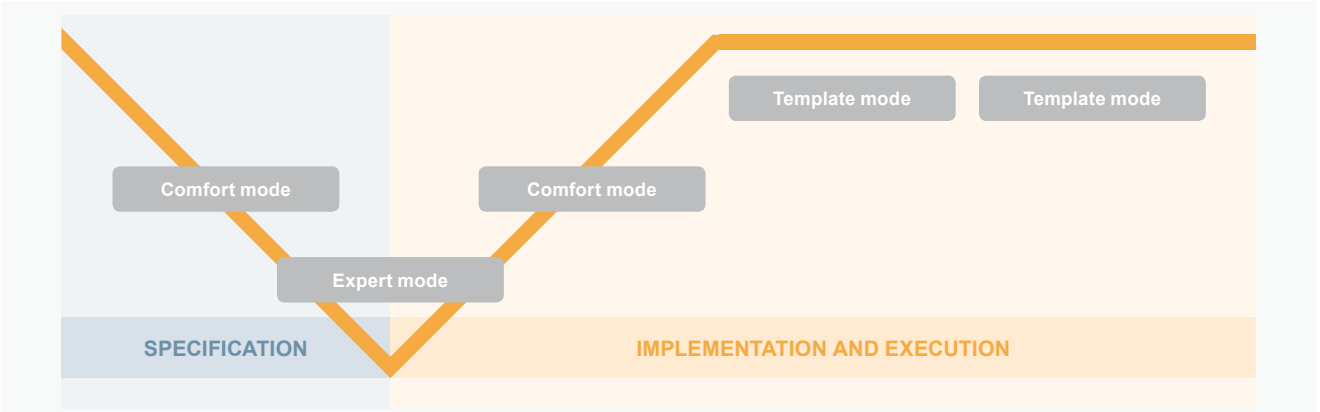
OTX Studio provides all the necessary input assistants. An automatic complete function allows users to create sequences without having in-depth knowledge of the OTX language elements. Comprehensive project administration with integrated version management ensures a clear overview in large projects. The library concept that many users are familiar with from standard programming languages supports users in the implementation of application-oriented and at the same time modular creation of their diagnostic sequences.

FROM FLASH SEQUENCE TO REPAIR SHOP TESTER

Typical areas of application are, for example, the creation of flash or test sequences. Particularly test planners for complete repair shop testers benefit from the integrated tools. The integrated GUI editor enables the designing of the entire test interface and the simple connection of interface elements to OTX scripts to graphically display variable values used. There is no limitation to the number of OTX function libraries that can be used. Developers of programs for guided fault search on the vehicle use the foreign language editor, the document viewer and browser for repair instructions and technical drawings. The comprehensive debugging possibilities are indispensable for all users.



▲ *Fig.: OTX Studio – for creating, implementing and debugging diagnostic and test sequences*



▲ *Fig.: Different views for programming experts and diagnostic users*

USER- AND USE-CASE-RELATED CREATION VIEWS

In the life cycle of a vehicle, from planning through engineering, testing, manufacture and after-sales service, there are all kinds of users, for example diagnostic specialists, testing specialists, test engineers and repair shop technicians. Each of these groups has its own tasks, knowledge and requirements regarding the drafting and use of diagnostic sequences. These tasks and tool requirements have to be covered appropriately in their entirety in one development environment. The flexible creation concept of OTX Studio from Softing targets exactly this issue.

You can conveniently toggle between three different operating modes in the creation process:

- **Expert mode**
  OTX programmers develop pure OTX code and library functions with fast access to all OTX language elements.
- **Comfort mode**
  Vehicle experts create sequences as modules in which they can access libraries predefined by experts. Report function and error handling can be configured with just a few clicks of the mouse.
- **Template mode**
  Authors for guided fault search (GFS) combine completed templates to form complete sequences with intelligent branching.

This concept makes it possible for virtually every user group to create its very own OTX access to develop the required diagnostic solution in each case.

PRODUCTS

OTX STUDIO	Complete OTX workflow solution based on the DTS8 Base System with Script Editor, Compiler, Debugger and Differ as well as Softing-specific OTX add-ons (ExternCall, File, XML, SoftingDiagnostics).
OTX SERVER	OTX runtime system based on the DTS8 Base System.
GUI EDITOR	Optional editor for creating graphic user interfaces which are linked with OTX sequences.
ADMINISTRATOR PACKAGE	Optional add-on package with: ■ Support of version control (subversion) in OTX Studio ■ Export and import of XLIFF files for collaboration with translation agencies ■ Support of release/distribution management, variant management
FLOW CHART EDITOR	Display mode as flow chart with freely positionable OTX elements.

Softing TDX

The flexible solution for diagnostics and flash programming in the repair shop and in road tests.

AREAS OF APPLICATION

- Service repair shops of vehicle manufacturers
- Service repair shops of system manufacturers, e.g. in the retrofit market
- Mobile diagnostic systems for service technicians
- R&D departments, e.g. road tests
- Creators of diagnostic sequences for vehicle tests and in sales organizations

BENEFITS

- Lean diagnostic solution based on laptop/tablet, VCI and state-of-the-art software
- Fully adaptable to individual requirements (processes, CI, language)
- Future-proof due to the use of international standards (e.g. OTX, ODX, UDS)
- Unlimited diagnostic functionality
- Comprehensive report functionalities
- Flexible with regard to diagnostic methodology (symptom-/ECU-based)
- Can be operated in the traditional manner using a mouse and keyboard or alternatively using a touchscreen

Softing TDX is the universal repair shop tool intended to be used by vehicle and component manufacturers. It supports all necessary diagnostic functions in troubleshooting, repair and in the setup of entire vehicles or individual components.

THE FLEXIBLE TOOL FOR HARD USE IN SERVICE

It is easy to create a service tester with Softing TDX: Just install the software on a "ruggedized" laptop and connect to a(n) – ideally wireless – VCI (Vehicle Communication Interface) and you're done! The full system can now be used in the repair shop or in the field (in/next to/under the vehicle) as well as in almost all climatic conditions. It is virtually impossible to have more diagnostic freedom.

COMPLETELY ADAPTABLE

The Softing TDX user interface does not depend on the diagnostic methodology used. Regardless of whether traditional ECU-based diagnostics is used, whether work is based on symptoms or AI is the measure of all things: TDX presents no obstacles. The sequences are generated in the authoring system and linked to appropriate displays and repair aids (instructions or circuit diagrams as PDF files, but also as images, videos). The user interface can be adapted to suit the particular corporate design and individual area of application.

WITH INTEGRATED SECURITY

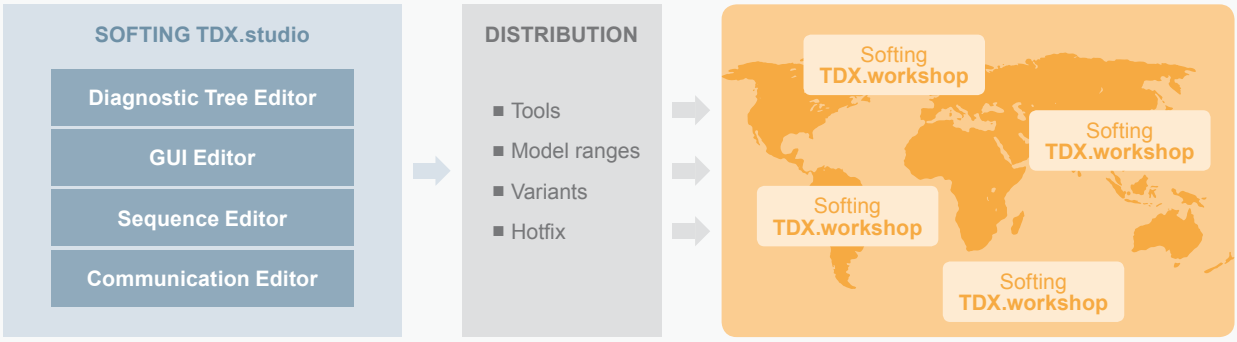
There is an incredible amount of expertise and potential to be protected in service applications and Softing TDX is ready to do just that. It protects your software from being illegally copied, offers licensing and the user management facility (in development) means malpractice can be prevented. And the data on the hard disk is also safe: It is encrypted.

SUPPORTING STANDARDS SAFEGUARDS INVESTMENTS

For diagnostic sequences, Softing TDX is based on the OTX standard for ECU communication and data interpretation on the ODX standard. OTX and ODX data already used in the company can thus be reused or can continue to be used with Softing TDX.

▲ *Fig.: Fully adaptable user interface*

▲ *Fig.: ECU oriented diagnosis – sample*



▲ *Fig.: Authoring system (Softing TDX.studio) – distribution of diagnostic projects to diagnostic tester (field/ Softing TDX.workshop)*

TWO TOOLS – ONE GOAL: THE SIMPLE DEFINITION OF FAST REPAIR TIPS

Softing TDX consists of two tools. Softing TDX.studio is the authoring system with which diagnostic trees, sequences and the representation are generated. The input of communication data also takes place using Softing TDX.studio. There are templates and wizards to ensure that standard tasks can be carried out in next to no time. The diagnoses created can then be compiled to form a distribution – either as a whole or in parts. This is made available to service technicians and/or test engineers online or on data carriers.

Softing TDX.workshop is designed for use in the field. It is used as a sequence environment for the diagnostic sequences created beforehand with Softing TDX.studio. These can be updated and/or modified at any time later on with the update mechanism. Diagnostic results can be saved as a report – all activities thus always remain transparent. Furthermore, all data is available for additional analyses.

SOFTING TDX.studio	System for creating diagnostic trees, procedures and visualization.
SOFTING TDX.workshop	Runtime environment for diagnostic procedures (generated with Softing TDX.studio).
CONSULTING, TRAINING	We offer support in the subjects of diagnostics, ODX, OTX and on using Softing TDX – all available as general training sessions or alternatively specially adapted to suit customer requirements. Give us a challenge!

Technical data

Diagnostic Tool Set 8 – Base System

HARDWARE-INTERFACES VS. VCI ACCESS INTERFACE/ APPLICATION/ TRANSPORT PROTOCOLS	DIAGNOSE-INTERFACES								
	Softing EDICusb	Softing EDICwlan [1]	Softing EDICblue	Softing EDICpci	Softing EDICard2	samtec HSX [1, 2]	samtec HSC [1, 2]	samtec HSlight II/HS+ [2]	I+ME Actia eCOM Box [1, 2]
ISO 22900-2/D-PDU API over CAN									
UDS/ISO14229: ISO 15765-3 on 15765-2	●	●	●	●	●	●	●	●	●
OBD/ISO15031: ISO 15031-5 on 15765-4	●	●	●	●	●	●	●	●	●
KWP2000/ISO15765: ISO14230-3 on 15765-2	●	●	●	●	●	●	●	●	●
SAE J1939: SAE J1939-73 on J1939-21						●	●		
KW1281 over VW TP1.6	●	●	●	●	●				
KWP2000 light plus over VW TP1.6/2.0	●	●	●	●	●				
ISO 22900-2/D-PDU API over K-Line									
OBD/ISO15031: ISO15031-5 on 14230-4	●	●	●	●	●	●	●	●	●
KWP2000/ISO14230: ISO 14230-3 on 14230-2	●	●	●	●	●	●	●	●	●
KW1281	●	●	●	●	●				
KWP2000 light plus over VW TP1.6/2.0	●	●	●	●	●				
DoIP (Tester <–> Gateway)						○	○		●

Bus systems MOST, FlexRay and LIN as well as proprietary bus system interfaces VeCom and EIDBSS on request.

DTS BASE SYSTEM	
STANDARD CONFORMITY, ETC	■ ISO 22901-1/ASAM MCD-2D, ODX V2.2.0 and 2.0.1 (Open Diagnostic Data Exchange) ■ ISO 22900-3/ASAM MCD-3D V3.0.0 application interface ■ ISO 22900-2/D-PDU API over CAN, K-line and Ethernet (ISO 13400 DoIP/Tester - Gateway) ■ ISO 13209/OTX V1.0.0 (Open Test Sequence Exchange)
HARDWARE INTERFACES	**Approved interfaces:** See table **Parallel communication:** Depending on the type/combination ≤ four diagnostic interfaces (more on request)
SIMULATED INTERFACE	Enables test of developed diagnostic functions even without ECU.
PROTOCOL TEMPLATES IN THE DELIVERY SCOPE	**As the basis for protocol tests and creating ECU authoring compliant with ISO 22900-2/D-PDU API:** ISO_15765_3_on_ISO_15765_2, ISO_14230_3_on_ISO_15765_2, ISO_14230_3_on_ISO_14230_2, ISO_OBD für K-Leitung und CAN, ISO_15765_3_on_ISO_15765_2, ISO_14229_5_on_ISO_13400_2, SAE_J1939_73_on_SAE_J1939_21, WWHOBD_on_CAN (ISO_27145_3_on_ISO_15765_2)
DATABASES IN THE DELIVERY SCOPE	OBD authoring compliant with ISO 15031-5/SAE J1979:2012-02 – as an all-purpose version for gasoline/diesel vehicles, sample authoring with three ECUs and detailed documentation as well as tutorial.

CAN-INTERFACES															PASSTHRU			
Softing CANusb/CANpro USB [2]	Softing CAN-AC2-PCI [2]	Softing CANcard2 [2]	Softing CANpro PCI Express [2]	KVASER Leaf Prof./Leaf Lite HS [1, 2]	KVASER Memorator Pro HS/HS [1, 2]	KVASER USBcanII HS/LS [1, 2]	KVASER PCIcanx HS/HS [1, 2]	KVASER PCIEcan HS/HS [1, 2]	Vector CANcard XL [1, 2]	Vector CANcase XL [1, 2]	Vector CANboard XL [1, 2]	Vector VN16xx [1, 2]	Vector VN7600 [1, 2]	Vector VN8900 [1, 2]	DrewTech CarDAQ+ v1.9.13 [1, 2]	I+ME Actia PassThru XS+ v2.07 [1, 2]	DearBorn VSI-2423 v2.04.16 [1, 2]	BlueStreak iFlash v4.20/2.13 [1, 2]
●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●
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															●	●	●	●
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															○	○	○	○

● Available ○ On request [1] Additional USB license dongle required [2] Driver from manufacturer required

DTS BASE SYSTEM

RUNTIME FORMATS	**SOD:** Editable runtime format which can be exported back to ODX **SRD:** "Monolithic" ultra-compact runtime format with closed database as with ODX/SOD **SMR:** Modular* ultra-compact runtime format (* .. for ODX categories/individual ECUs) **Ultra-compact runtime formats:** Vehicle and flash data are 60 to 180 times more compact than ODX data (depending on OEM/data structure); optional OEM-specific encryption
OPERATING SYSTEMS	**Windows**7 SP 1 and 8.1 (both 32+64 Bit) **Linux:** support for DTS COS on request
GENERAL PC REQUIREMENTS	**Processor:** type and clock (≥ 1.5 GHz) – depending on the system configuration and data complexity **RAM:** ≥ 2 GByte – depending on the ODX data **For hardware interface(s):** PCI-/PCMCIA slot, USB/LAN port, Wireless LAN or Bluetooth **For optional dongle:** USB port **Screen resolution:** See data sheets on the relevant products

MEASUREMENT TECHNOLOGY

The continued development of modern vehicles has, among other things, brought with it tougher requirements in terms of the measurement technology used. In addition to physical variables, bus signals have to be acquired, measured data evaluated and stimuli generated. The type and number of signals to be processed vary constantly, the environmental conditions make tough demands of the systems used and, in spite of rapid technological change, investments made in measuring equipment still have to be future-proof. Softing's Measurement Technology Division counters these and many other practical challenges with its modular families SMT and µ Series as well as the measuring software PEA.

PRODUCT OVERVIEW

SMT	SMT combines sophisticated measurement technology with signal generation, communication, computer power and memory depth. The modular family provides a whole range of physical IOs and communication interfaces in one modular system.*
PEA	With its measuring software PEA, Softing impressively demonstrates that powerful data acquisition and processing do not automatically have to be complicated.
µ Series	The µ Series completes Softing's measurement technology portfolio. It enables top-quality and reliable measurements even under extreme environmental conditions. At the same time, transmitting measured values via CAN enables simple integration into existing measurement environments.
Accessories	There are all kinds of accessories available for the product families listed above. The company also offers an extensive portfolio of connecting cables, extension leads and patch cords and is more than willing to customize these to suit your individual requirements and demands.

* For additional information, please refer to the extended solutions catalog for measurement technology.

SMT Softing Measurement Technology

Softing Measurement Technology – the universal measurement and automation system for mobile and stationary applications.

AREAS OF APPLICATION

- Mobile measurement technology for road tests
- Measurement data acquisition in test bench applications
- Process monitoring
- Application of control and regulation systems
- Automation of component test benches
- Test system for manufacturing tests

BENEFITS

- High degree of coverage of different applications
- Compact, rugged and 100% suitable for use in vehicles
- Flexible adjustment to the particular application
- Uniform measurement technology and peripherals (sensors, connectors, cables, …) in mobile and stationary use
- Future-proof thanks to open and generic interfaces
- Can be used standalone without additional components
- Comprehensive fail-safe and onboard diagnostic functions
- System assembly and module exchange possible at the flick of a wrist and without tools
- Simple parameterization using transducer memory
- All ports accessible from the front
- Optical display of channel and module state

SMT combines sophisticated measurement technology with signal generation, communication, computing power and memory depth. The module family provides a whole range of physical IOs and communication interfaces in one modular system.

SYSTEM DESIGN

The unique module concept enables optimal adaptation to each individual application. Channels can be scaled to virtually any degree – from just a few IOs to several hundred. Not even decentral systems or large spatial distances pose a problem thanks to intelligent networking possibilities. The modularity of SMT is in no way limited to measurement and communication channels. Fundamental system characteristics such as energy supply, cooling and computing power can be adapted to suit the individual case of application. At the same time, the Softing Measurement Technology is geared to the best possible integration. The sophisticated housing mechanism means the systems only ever grow to the minimum size required for a particular function scope.

AREAS OF APPLICATION

As SMT systems are rugged, they are perfect for harsh, mobile use in test vehicles. However, they are also often used in stationary applications such as test benches and in manufacturing. SMT tasks are in no way limited to simply acquiring measured values. As a combined measurement, test and automation system, Softing Measurement Technology is responsible for relevant functions in the areas control and regulation, process monitoring and automation, real-time simulation and data logging.

▲ *Fig.: Sample modular measurement system SMT*

PEA – measuring software

Powerful data acquisition, visualization and digital signal processing for SMT and µ Series.

AREAS OF APPLICATION

- Configuration of SMT and µ Series modules
- Measurement data acquisition and recording
- Live visualization of any process values
- Triggering and/or controlling the measurement sequence
- Sequence control and process automation

BENEFITS

- Simple and intuitive operation
- Guaranteed real-time capability
- Synchronized acquisition of all kinds of measurement data
- Compilation of different data in a common measurement record
- Standard software for test parameterization and execution
- No programming knowledge necessary for standard applications
- Acquisition software perfectly suited to the measurement system
- Varied operating system and hardware support
- User-specific adaptations and extensions using well documented extension interfaces

PEA is used to configure all hardware components, record measurement and communication data and, if required, represent process values graphically. Furthermore, the software provides users with a range of options for digital signal processing, triggering, simulation and automation.

DATA HANDLING

The measuring software combines data from a whole range of sources in one common process map. Whether discrete measured values, signals extracted from messages, results of mathematical operations or simulation model interfaces: All data channels can flexibly be linked to each other, continue to be processed and recorded in a synchronized way.

REAL-TIME CAPABILITY

The vision of real-time-capable acquisition and data processing software was systematically implemented to create PEA. The measuring software is thus based on a powerful operating system platform and consistently distinguishes between the different real-time requirements of its tasks. Upcoming operations are always intelligently distributed over the available hardware resources enabling PEA to remain efficient and powerful even in multi-channel applications.

EASE OF USE

The PEA user interface ensures that standard users enjoy simple and intuitive operation with a very short familiarization time while providing power users with sophisticated extension possibilities. Classic operating concepts, such as configuration dialogs and drag&drop mechanisms, in combination with powerful programming and modeling interfaces suit both user groups.

▲ *Fig.: PEA – measuring software: visualization and digital signal processing for SMT and µ Series*

µ Series

Field bus measurement technology for use in physically challenging environments.

AREAS OF APPLICATION

- Measurements on chassis, power train and exhaust emissions system
- Battery-operated test equipment

BENEFITS

- Reduced cabling thanks to measured value acquisition on the measurement object
- Greater accuracy thanks to measured value acquisition in close proximity to the measuring point
- Decentral system assembly with limited space
- Low demands made of energy supplies in mobile use
- Flexible mounting possibilities
- Data acquisition regardless of proprietary measuring software

The µ Series comprises a range of compact measurement modules connected via CAN. Examples of supported features include temperature measurements with thermocouples and resistive sensors, a whole range of testing bridges and active transducers as well as the acquisition of frequency- and time-based signals.

DATA ACQUISITION

The µ modules are supported by the SMT system software PEA. This makes it easy and fast to integrate them into complex SMT systems. In the case of pure CAN applications, it is also possible to record and evaluate measure data with standard CAN tools. The software that is required for configuring the modules is available for free.

ENVIRONMENTAL CONDITIONS

As the µ Series requires little space and features an extremely sturdy design, it is perfect for use in harsh application environments. It enables reliable measurements in extremely high or low environmental temperatures as well as in moist and dirty conditions, or where vibrations have to be tolerated.

PERFECT IN PRACTICE

Their extremely low power consumption as well as a whole range of mounting possibilities underline the modules' suitability for practical, regular use.CAN and power supply are combined on one connector and can thus be fed through from module to module. This enables simple wiring with point-to-point connections and standard cables.

▲ *Fig.: µ Series – field bus measurement technology by Softing*

TEST SYSTEMS

Today, software is making vehicles more and more powerful, safe and environmentally-friendly all the time. It also enables a large number of device variants which in turn facilitate different equipment options and country-specific models. The resulting complexity in combination with the choice of variants has led to an incredible increase in the amount of testing involved. Testing denotes the execution of a function under given conditions, the comparison of results with defined target values and the documentation of these results. Tests are carried out throughout the life cycle with varying points of focus. Starting with the engineering of ECUs, in system integration, in combination with mechanical components, in the integration in the lab vehicle with a large number of subsystems and as vehicle tests. In manufacturing as component tests, installation tests on the line and EoL (End of Line) tests. In after-sales service as vehicle tests. And naturally testing takes place in quality assurance and field returns are verified. Manual tests and automated tests are carried out, they take place as SiL (Software in the Loop), HiL (Hardware in the Loop) or as tests in the real environment, as electrical tests, as communication tests, as function or diagnostic tests, as endurance tests, as road tests: The list is endless.

This situation naturally has a knock-on effect: More demands are now being made of test tools. Ideally, they should support all kinds of use scenarios in accordance with the test examples named above. In practice, the number of use scenarios will depend on the number of tool manufacturers and suppliers a company works with. And minimum requirements certainly have to be satisfied: the simple reusability of created tests, the management of all kinds of test projects and the comprehensive documentation of test results.

PRODUCT OVERVIEW

Test automation	**ECU-TEST**	Universal test automation for all application cases (SiL, HiL, real environment). It contains integrations of established test systems, e.g. INCA, CANoe, DTS, Ediabas, Matlab/Simulink.
	OTX Studio	OTX Studio is a tool for creating, implementing and debugging diagnostic sequences (based on the standard ISO13209).
Simulation	**TestCUBE$_2$**	Counterpart for all cases of application in which an ECU is not yet (e.g. preparation of workshop tests) or no longer (e.g. tester regression test) available.
	CanEasy	Automatically configured simulation, analysis and test environment that supports all cases of application in ECU engineering and development.
Manual/semi-automatic diagnostic test	**DTS Monaco**	Universal engineering tester for diagnostic and control functions of vehicle ECUs with OTX Runtime.
Test systems	**Testing & verification**	From the adapter box to complex test systems for an automated full ECU test.

ECU-TEST

Automated ECU test based on standard tools.

AREAS OF APPLICATION

- Automated and systematic tests of networked embedded systems in the automotive field
- ECU tests in simulated vehicle environments SiL and HiL
- Test preparation, even without ECU and ECU configuration

BENEFITS

- Support of (virtually) all relevant test systems
- High reusability of tests thanks to generic test description (cross-mapping)
- Intuitive graphic user interface
- Networked test environment via client/server solution
- Integrated support of subversion
- Easy to extend for customer-specific requirements

ECU-TEST was designed for test automation and for the validation of ECUs. Standard test tools are already integrated and can be used together in tests. ECU-TEST is used to design, realize, run and evaluate tests.

USER FRIENDLINESS

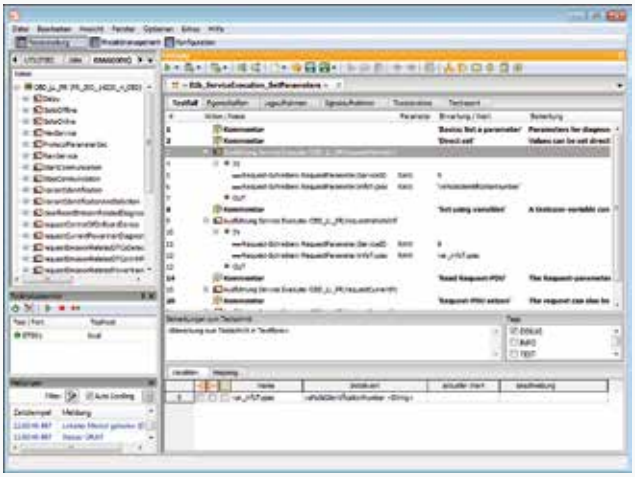
The user interface enables effective and productive testing of ECU software and hardware without users having to spend a great deal of time familiarizing themselves with the system. In addition to controls for developing test cases, plug-ins for tool control and variable mapping are also available. The client/server solution contained enables interfaces and software tools to be addressed on several test bench systems of a networked test environment.

REUSABILITY

Test cases can be parameterized and structured. Thanks to a generic test description (cross-mapping concept), the test cases generated are virtually independent of the specific test environment hardware/software and can thus be reused extensively.

DOCUMENTATION

All test results are logged and are easy to analyze. Overviews are created for quick familiarization but in-depth views of the individual tests are also shown. The reports are easy to save or print for documentation purposes.



▲ *Fig.: ECU-TEST – test automation and validation of ECUs*

SUPPORTED SOFTWARE PLATFORMS

- dSPACE ControlDesk
- dSPACE ControlDesk Failure Simulation
- ETAS LabCar Operator
- ETAS INCA
- ETAS ASCET SD
- Mathworks MATLAB/Simulink
- National Instruments LabVIEW
- Softing EDIABAS
- Softing DTS
- Vector CANoe/CANalyzer
- Vector CANape

TestCUBE$_2$

Configurable simulation of ECU diagnostics.

AREAS OF APPLICATION

- Preparation of workshop testers in engineering, testing, manufacturing
- Tester and production system release tests
- Tester regression tests
- Recording of CAN traces

BENEFITS

- Development of tests even before the ECU is available
- Fast familiarization enables easy handling
- Clear management of variants with archiving of simulation files
- High test quality thanks to various configuration possibilities
- Best-case and worst-case tests
- Modification and exchange of the simulation via programming interface

TestCUBE$_2$ is a configurable hardware and software solution for simulating ECU diagnostics with real bus communication. With just one device, you can simulate several ECUs or even an entire vehicle at the same time.

FRONTLOADING IN TEST PREPARATION

Creating test sequences is often challenging along the entire value chain: The ECU required as a test counterpart is missing. But particularly in the test environment, the test methodology should be developed at an early stage to run function tests as soon as the ECUs are available. Which means it is useful if the test sequences are already available and tested.

This is simple with TestCUBE$_2$ because test sequences can already be verified during ECU development.

TESTER REGRESSION TESTS – WITHOUT CHANGING ECUS

Software updates at regular intervals ensure that diagnostic testers are assigned all the latest functions. The ECUs required for a regression test must be available in entirety and in all variants to be able to ensure sufficient test coverage. As this is usually impossible, a simulation is the required solution. With the simulation, it is easy to select ECUs and ECU variants: All you have to do is exchange simulation files in the unit. You can take care of this manually using the intuitively operable graphic user interface or conveniently in test automation with the DLL interface.

SIMPLE CREATION OF SIMULATION FILES

For test preparation and regression tests, there are suitable methods with which simulation files are fast and easy to create. In test preparation, suitable pairs of requests (from the tester) and responses (from the simulation) can be entered at symbolic level using existing ODX data. This means errors are virtually excluded.

For regression tests, traces are recorded with real ECUs and simulation files are then generated automatically – at the push of a button. Additional ECU responses are easy to add manually. Faulty responses are also possible to test the correct behavior of the tester.

EVEN MORE FEATURES

- Influencing of communication parameters (address, timings,...)
- Residual bus simulation

▲ *Fig.: High-performance interface*

▲ *Fig.: Applications for creating and configuring ECU simulation*

Residual bus simulation

Checking of individual ECUs via residual bus simulation on the CAN bus,
even during the engineering phase.

The modification of values, setting of pulses and switching of signals (on/off): fast and easy simulation and stimulation using the device-own configuration tool to suit individual requirements. The simulation parameters can be created individually without any programming and can be used independently of the PC, both in mobile and stationary scenarios.

The residual bus simulation and configuration can be saved on an SD card and are thus available in a flexible form for further applications in the customer process chain.

If the customer so desires, the device can also be equipped with an LCD display as well as digital and analog IOs.

AREAS OF APPLICATION

- In the development of prototypes
- In test boards, lab vehicles
- In all kinds of testing facilities
- In Quality Assurance
- On the component test bench
- In the vehicle for all kinds of testing

BENEFITS

- Can be adapted to suit customer requirements
- Stand-alone operation without a PC
- Can be used as a mobile device
- Affordable
- Signal modification using potentiometers and switches

Transmission measuring device LTW-I

Testing the quality of synthetic housings,
measuring of transmission on synthetic lids intended for laser welding.

THE SITUATION

Many electronic components are delivered and installed in synthetic housings. This is true of many ECUs which are used in large numbers by all automobile manufacturers. Material variance in the quality of the synthetic housing can lead to leaks, which in turn can result in extremely cost-intensive product recalls. This can be avoided as early as the production process by testing with the LTW-I.

THE MEASURING PRINCIPLE

The light of an LED is routed into an aperture via a diffusion disk. On the other side of the test unit, the transmitted light meets the opening of a stainless steel pipe with an internal diameter of < 2mm. The pipe contains an optical fiber which absorbs the light in a solid angle of around 60 degrees and routes it to a photodiode. The photodiode current is in proportion to the transmission.

SOFTWARE

With the configuration and measuring software, all properties of the device can be set and measuring programs managed. For this purpose, a PC (Windows) is connected with the LTW-I via the USB interface. For the actual measuring, this is an option, i.e. the device works as a device. Several measuring can be loaded onto the LTW-I and selected correspondingly.

BENEFITS

- Access authorization and user management
- Configuration of the device parameters
- Parameterization depending on the plastic to be measured (good/bad recognition,...)
- Creation and management of measuring programs
- Visualization and saving of measured values
- Creation and processing of envelope curves
- Configuration of limit monitoring
- Generation of log files

▲ *Fig.: Transmission measuring device LTW-I*

COMMUNICATION TECHNOLOGY

As the link between an application and the physical interface to the vehicle, vehicle communication interfaces (VCIs) are the basis of all kinds of communication and diagnostic applications. The VCIs from three product families are made available in different performance classes and with specific features and interfaces for the applications concerned.

The scalable software tool CanEasy provides the residual bus simulation often required for diagnostic applications. The well-established programming interfaces (APIs) are made available to users for access via customer-specific or third-party applications.

PRODUCT OVERVIEW	
HS INTERFACES	The diagnostic interfaces of the HS family are based on a 32-bit microcontroller platform and are particularly suitable for use in the higher performance range such as, for example, challenging diagnostic tasks and flash applications on the entire vehicle. The HS interfaces are characterized by secure communication mechanisms regardless of the PC operating system. Users have diagnostic interfaces at their disposal with various wired or wireless interfaces to the PC.*
EDIC INTERFACES	The diagnostic interfaces of the EDIC family are based on a 16-bit microcontroller platform and are predestined for use in the medium performance range for diagnostic tasks and flash applications with a range of ECUs. The EDIC platform has proved itself over time and is characterized by its stable runtime behavior and the implementation of a large number of standardized and customer-specific diagnostic protocols.
CAN INTERFACES	The communication interfaces of the CAN family make it possible to integrate send and receive tasks in all kinds of applications. Alternatively, the VCIs can also be operated with the D-PDU API for simple diagnostic tasks.
APIs / PROGRAMMING INTERFACES	The VCIs of the three product families are available with several programming interfaces. ■ D-PDU API compliant with ISO 22900-2 ■ PassThru API compliant with SAE J2534 ■ CAN Layer2 API
CANEASY	CanEasy simulates complex bus systems, enables an analysis of the bus communication and offers high automation, individual configuration and simple extendibility.

* For further information on HS Interfaces please refer to our extended catalog for vehicle interfaces.

Programming interfaces

Depending on the particular use case, customer-specific constraints and country-specific regulations, the VCIs are used in diagnostic systems with different programming interfaces. While the standardized D-PDU API is used with a D-Server compliant with ISO 22900, a PassThru interface compliant with SAE J2534 is often required for applications on the open market. A CAN-API on layer 2 is also the right choice for pure CAN communication.

D-PDU API (ISO 22900-2)

The Modular Vehicle Communication Interface Concept (MVCI) developed by leading vehicle manufacturers in ASAM e.V. includes not only the API for the diagnostic server and a modular VCI, but also the software interface for the VCIs which was then standardized as ISO-22900. This means the D-PDU API is part of a consistently standardized diagnostic system allowing connection to a diagnostic server as a diagnostic base system with which ODX data can continue to be processed. Alternatively, the D-PDU API can also be accessed directly from an application. The advantage of using a VCI with D-PDU API, alongside the modularity, is the simple integration into the application which in turn is relieved of complex protocol-specific mechanisms (e.g. FlowControl, segmenting). The handling of communication parameters and bus properties is fully encapsulated in the D-PDU API.

Every D-PDU API registers in the system during installation using the Root Description File (RDF) and provides the diagnostic server with the specific information. The Module Description File (MDF) specifies the function scope of a D-PDU API or of a VCI and any freely definable options. Alongside resource management functions, a D-PDU API supports two groups of functions. Diagnostic functions are used for accessing Logical Links, sending and receiving messages, and for parameterization. Several Logical Links can be managed which in turn makes it possible to communicate with several ECUs, even over different bus systems. What are referred to as IO control functions make it possible to access the extended functionality of the VCI. This can, for example, be ignition verification or accessing VCI inputs and outputs. A standard-compliant D-PDU API can support numerous standardized and proprietary protocols. Which ones are actually supported is the responsibility of the manufacturer. This modular approach gives OEMs the flexibility to implement VCIs with D-PDU APIs from different manufacturers. Synergies in the development and design of the products in the VCI environment mean cost-effective solutions and can be created long term.

SAE J2534 API

The SAE J2534 API (or: PassThru for short) is an interface for diagnostic communication and for programming ECUs in the car sector which has been standardized by the American Standardization Committee SAE. It basically describes a manufacturer-independent API which, in conjunction with a corresponding hardware interface, enables ECUs to be accessed. The applications to be made available by the OEMs and a PassThru Device should enable independent repair shops to reprogram ECU software regardless of the manufacturer. A further area of use for the PassThru Device is OBD acceptance tests. A PassThru interface basically enables the sending and receiving of telegrams on a vehicle bus system. Only the most important communication principles are implemented in the interface, without any specification of whether this is on the PC side or in the VCI firmware.

CAN LAYER2 API

The CAN Layer2 API is a software interface which enables the sending and receiving of CAN telegrams on layer 2 of the OSI model. The application can access the CAN Layer2 API directly as a low-level interface. Alternatively, the CAN Layer2 API can be used in combination with the Softing D-PDU API. This means that all diagnostic protocols supported by the D-PDU API can be used for diagnostic communication over the CAN bus. Thanks to the standardized D-PDU API, affordable CAN interfaces can be used in connection with a basic diagnostic system, such as DTS.

The CAN Layer2 API can be used in operating modes with FIFO and object buffer. In comparison to programming interfaces from manufacturers of other CAN interfaces, the Softing CAN Layer2 API is characterized by its high performance, the versatility of operating modes and the fact that it is possible to send messages cyclically. The delivery scope of the CAN Layer2 API includes a demo program in source code which enables simple communication with a CAN interface and can be used as a basis for an application.

HS interfaces

Large selection of very powerful VCIs for all areas of application in the process chain.

AREAS OF APPLICATION

- Diagnostic applications for engineering, manufacturing and after-sales service
- Test and validation
- Fast and reliable flash programming
- Functional ECU tests and communication tests
- Data logging during manufacturing, in development, in fleet tests
- Future-proof diagnostic solutions with DoIP (Diagnostics over IP)
- Suitable for cars and commercial vehicles

BENEFITS

- VCIs tailored to the different areas of application
- Data preprocessing and protocol handling in the interface
- Several independent channels: CAN, K-line, Ethernet
- Virtual Machine (VM) for programmable sequences
- Interface to the host PC over USB, Bluetooth, LAN or WLAN (IEEE 802.11 a/b/g/n/h)
- DoIP (Diagnostics over IP)
- Linux operating system for the integration of customer-specific applications
- Large number of standardized and OEM-specific vehicle protocols available
- Galvanic isolation
- Several independent channels: CAN, K-line, FlexRay, Ethernet

The diagnostic interfaces of the HS family are based on a 32-bit microcontroller platform and are particularly suitable for use in the higher performance range such as, for example, challenging diagnostic tasks and flash applications on the entire vehicle. The HS interfaces are characterized by secure communication mechanisms regardless of the PC operating system. Users have diagnostic interfaces at their disposal with various wired or wireless interfaces to the PC.

FOR EACH USE CASE THE APPROPRIATE VCI

The HSX interfaces and the HSC in particular are perfect for multi-link communication in diagnostic and flash applications on the entire vehicle as protocol processing takes place on the interface with a 32-bit high-performance CPU.

With the compact design of the HSC and interfaces to the PC over WLAN, LAN and USB as well as interfaces to the vehicle over CAN, K-line and Ethernet, the VCI is particularly well suited for future-proof mobile manufacturing and after-sales service applications.

With the addition of up to two extra boards, the Multibus VCI HSX Breakout can quickly adapt the number of communication channels available on the PC system to the relevant application. Modules with two additional CAN and FlexRay interfaces each are available.

HSC

Compact WLAN interface for after-sales service/manufacturing with DoIP.

HSX Breakout

Multibus VCI with USB and LAN interface for use in engineering and testing.

HSX Heavy Duty is impressive because of its ruggedized design combined with its powerful CPU and communication with the host PC over WLAN. This makes the device particularly suitable for mobile applications in the manufacturing environment and in the repair shop.

With HSD a VCI connected via USB with a basic configuration of at least one CAN channel and one K-line will be available for cost-sensitive use cases. Mobile areas of application can also be covered when the variant with integrated Bluetooth is used.

STANDARDIZED AND POWERFUL PROGRAMMING INTERFACES

The VCIs of the HS family can be updated with software upgrades and are thus always equipped for future applications. This is also the way to realize customer-specific software solutions. Based on the D-PDU API as a standardized programming interface, the Diagnostic Tool Set DTS from Softing can deliver a complete solution compliant with the MCD-3D standard (ISO 22900-3) and ODX technology.

Take a look at the following link for more information on other designs of the VCIs from the HS family as well as suitable accessories: **www.samtec.de**

HSX Heavy Duty

Sturdy VCI with WLAN/USB for after-sales service and manufacturing.

HSD

Compact and affordable interface for after-sales service and manufacturing.

EDIC interfaces

EDIC family for use in the medium performance range.

AREAS OF APPLICATION

- Diagnostic applications for engineering, manufacturing and after-sales service
- Test and validation
- Fast and reliable flash programming
- Functional ECU tests and communication tests
- Use for residual bus simulation with CanEasy
- Suitable for cars and commercial vehicles

BENEFITS

- VCIs tailored to the different areas of application
- Data preprocessing and protocol handling in the interface
- Several independent communication channels for CAN and K-line
- Intelligent data buffering for parallel communication channels
- Large number of standardized and OEM-specific vehicle protocols available
- Galvanic isolation

The diagnostic interfaces of the EDIC family are based on a 16-bit microcontroller platform and are predestined for use in the medium performance range for diagnostic tasks and flash applications with ECUs over CAN and K-line. The EDIC platform has proved itself over time and is characterized by its stable runtime behavior and the implementation of a large number of standardized and customer-specific diagnostic protocols.

THE RIGHT VCI FOR EVERY CASE OF APPLICATION

The Multibus VCI EDICusb is particularly suitable for the use of heterogeneous onboard networks with CAN bus, K-line and LIN bus, and enables universal implementation in engineering and testing. With its Bluetooth interface and compact design, EDICblue is perfect for use in mobile applications during test drives, in manufacturing and in after-sales service. Alternatively, EDICblue can communicate with the host PC over USB. Thanks to its sturdy design, EDICwlan is particularly suited for mobile use in harsh environmental conditions as are often found in the manufacturing and service environment. EDICpci is a versatile interface and is primarily used in stationary applications thanks to its high-performing internal link via the PCI bus.

STANDARDIZED AND POWERFUL PROGRAMMING INTERFACES

The diagnostic protocols are handled directly in the interface. This ensures fast response times and reliable real-time behavior regardless of the PC operating system. Extensive buffer mechanisms make parallel operation of several communication channels possible. By combining several diagnostic interfaces, the number of communication channels available on the PC system can quickly be adapted to the relevant application. The VCIs can be updated with software upgrades and are thus always equipped for future applications. This is also the way to realize customer-specific software solutions. With many VCIs, the CAN bus physics can be varied by using piggybacks or by switching the CAN bus physics. Based on the D-PDU API as a standardized programming interface, the Diagnostic Tool Set DTS from Softing can deliver a complete solution compliant with the MCD-3D standard (ISO 22900-3) and ODX technology.

1

2

3

4

1. **EDICblue:** VCI with Bluetooth interface for use in testing and after-sales service.
2. **EDICusb:** Multibus VCI with USB interface for use in engineering and testing.
3. **EDICwlan:** Sturdy VCI with WLAN/USB for use in manufacturing and after-sales service.
4. **EDICpci:** High-performance VCI with PCI interface for stationary applications.

CAN interfaces

Communication interfaces for ordinary send and receive tasks.

AREAS OF APPLICATION

- Ordinary communication tasks
- Diagnostic applications for manufacturing and after-sales service
- Use for residual bus simulation with CanEasy

BENEFITS

- Active card with its own microcontroller
- Local data buffering and preprocessing in the interface
- Galvanic isolation
- Stable runtime behavior due to well established use

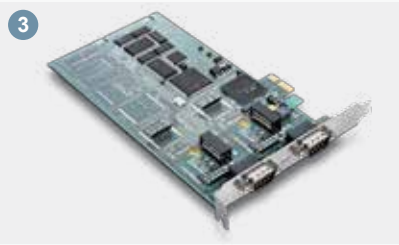
The communication interfaces of the CAN family make it possible to integrate send and receive tasks in all kinds of applications. Alternatively, the VCIs can also be operated with the D-PDU API for simple diagnostic tasks.

DIFFERENT VCI DESIGNS

CAN communication interfaces are an inexpensive alternative to diagnostic interfaces. The devices are available with different interfaces to the workstation and are equipped with one or two CAN channels. CANpro USB is the successor to the tried and tested CANusb and is suitable for all kinds of use cases as a universal VCI with USB high-speed interface. A product variant involves the electronics of the CANpro USB being installed in a diagnostic system without a case. CAN-AC2-PCI and CANpro PCIe are available as PC plug-in cards for stationary use cases with one or two CAN channels both with CAN high-speed and CAN low-speed. The two CAN interfaces Leaf Light HS v2 and USBcan II HS/ LS made by our cooperation partner Kvaser complement the product range by providing two affordable CAN interfaces for particularly price-sensitive cases.

POWERFUL PROGRAMMING INTERFACES

The communication software of the CAN API provides highly efficient communication mechanisms for CAN applications. Local data buffering and preprocessing on the VCI result in high performance and a reduction of time-critical tasks for the PC. Combining one of the CAN communication interfaces with the appropriate API software enables compact solutions for all kinds of communication applications. The CAN API thus supports reliable CAN communication on layer 2 in a simple way. For real-time applications, the very comprehensive and flexible CAN Layer2 API supports different object buffer modes and an FIFO mode which is particularly suitable for linking higher protocol layers. The optional D-PDU API software makes communication channels with higher diagnostic protocols available to applications via the standardized API and thus relieves the application of standard tasks.



1. **CANpro USB**: One-channel CAN interface with sturdy aluminum housing and USB port.
2. **CAN-AC2-PCI**: Two-channel CAN interface as PCI plug-in card, optionally CAN low-speed.
3. **CANpro PCI Express**: Two-channel CAN interface as PCIexpress plug-in card, optionally CAN low-speed.
4. **Leaf Light HS v2**: One-channel CAN interface with handy plastic housing and USB port.
5. **USBcan II HS/LS**: Two-channel CAN interface (high-speed and low-speed) with USB port.

Product overview VCIs

		DEVELOPMENT	
DIAGNOSTIC INTERFACES **Diagnosis and flash-programming entire vehicle**		**HSX BREAKOUT**	
	Performance	high end	
	Vehicle interface	2 x CAN, 1 x K, IOs	
	Galvanic isolation	yes	
	Housing	ruggedized	
	PC interface	USB / LAN	

		EDICusb	EDICcard2 + C2*
DIAGNOSTIC INTERFACES **Diagnosis and flash-programming a few ECUs**			
	Performance	high	high
	Vehicle interface	2 x CAN, 1 x K	1 x CAN, 1 x K
	Galvanic isolation	yes	yes
	Housing	standard	standard
	PC interface	USB	PC Card

		CANcard2 + IF*	USBcan II HS/LS
COMMUNICATION INTERFACES - CAN **Ordinary diagnostics** (operation depends on the system environment)			
	Performance	standard	standard
	Vehicle interface	2 x CAN	2 x CAN
	Galvanic isolation	no	no
	Housing	standard	standard
	PC interface	PC Card	USB

* discontinued

	MANUFACTURING		AFTER-SALES SERVICE	
	HSX HEAVY DUTY	**HSC**	**HSX HEAVY DUTY**	**HSC**
	high end	high end	high end	high end
	1 x CAN, 1 x K, IOs	1 x CAN, 1 x K, DoIP	1 x CAN, 1 x K, IOs	1 x CAN, 1 x K, DoIP
	yes	yes	yes	yes
	ruggedized	standard	ruggedized	standard
	USB / WLAN	USB / LAN / WLAN	USB / WLAN	USB / LAN / WLAN

	EDICpci	**EDICwlan**	**EDICblue**	**HSD**
	high	high	standard	high
	2 x CAN, 1 x K	2 x CAN, 1 x K	1 x CAN, 1 x K	1-2 x CAN, 1-2 x K
	yes	yes	Bluetooth yes	yes
	-	ruggedized	standard	ruggedized
	PCI	USB / WLAN	Bluetooth (USB)	USB (Bluetooth)

	CANpro USB	**CANpro PCIe**	**CANpro USB**	**Leaf Light HS v2**
	standard	standard	standard	standard
	1 x CAN	1 x CAN	1 x CAN	1 x CAN
	yes	yes	yes	yes
	ruggedized	-	ruggedized	standard
	USB	PCI / PCIe	USB	USB

CanEasy

The Windows-based automatically configured simulation, analysis and test environment for ECU development.

AREAS OF APPLICATION

- ECU development
- Quality assurance
- Prototype construction, sample construction
- Manufacturing

BENEFITS

- Highly automated – executable residual bus simulation available within just a few minutes
- Simple working environment that can be configured to suit the specific task
- Integrated development environments VBA and VSTA
- Can be integrated via COM interface or as DLL
- Recording of the complete CAN and LIN bus communication
- Convenient operation thanks to tree structure, drag & drop and shortcut menus
- Editing of database (communication matrix) via integrated editors

CanEasy solves recurring tasks in ECU development. It can simulate complex bus systems, analyze communication and offers a high degree of automation, individual configuration and simple extendibility.

SIMULATING

The simulation is quick and easy to configure using DBC files. The software integrates real and simulated ECUs in a single environment. Real and simulated ECUs communicate with each other. The user can monitor and modify the values of all CAN signals while communication is taking place with automatically generated panels. Practical functions of the ECUs to be simulated (nodes) can be configured using plug-ins or programmed using the integrated development environments in VB, VB.net or C#.

ANALYZING

Several ECUs are often involved in one function in CAN bus systems. This results in complex real-time communication. CanEasy records the messages of all connected buses (up to 99) without previous filtering. This makes it possible to access all past data at a later date. Alternatively, the data can be replayed in entirety or filtered on the CAN bus. These evaluations can also be automated using the API and the development environments integrated in CanEasy.

TESTING

The reaction of an ECU to high bus loads, certain values and defective communication can be tested using plug-in functions. Special test scenarios as well as automated tests are easy to configure using plug-ins or the integrated Scheduler. Dynamic and complex scenarios can be programmed and be used as many times as required, even simultaneously.

CANEASY EDITIONS	■ Professional (full function scope for simulation, testing and analysis) ■ Simulation (configuration of simulation and test environments) ■ Analysis (monitoring and recording bus traffic) ■ Basic (monitoring and recording on one bus)
SUPPORTED INTERFACES	■ Softing (CAN Layer 2): CANpro USB, CANusb, CANcard2, CAN-AC-PCI, CAN-AC-104 ■ Softing (D-PDU API): EDICusb, EDICblue, EDICpci
SYSTEM REQUIREMENTS	■ PC or notebook with at least 2 GHz ■ 1024 MB RAM and higher (2 GB RAM recommended)

ENGINEERING SERVICES

SERVICE OVERVIEW	
APP DEVELOPMENT	Development of tailor-made applications for mobile end devices (tablet, smartphone) in the business-to-business field.
ON-SITE SOLUTIONS	Our employees provide consulting and engineering services to help in the mastering of challenging tasks, either directly on customers' premises or outside the company facility.
TRAINING SESSIONS	User-oriented training sessions from Softing. Basic seminars on diagnostics, bus protocols, ODX, OTX, as well as workshops on DTS, OTX Studio, Softing TDX.
TEST UNITS & TEST SYSTEMS	Solutions for testing ECUs and electric components. Creation of customized test units and test systems.
ECU CONSTRUCTION	Engineering and manufacturing of ECUs and electronic components.

App development

Information and communication in and with the vehicle are central elements of automotive development. At Softing Automotive, we develop tailor-made applications for mobile end devices in the business-to-business field. In doing so, we specialize on the important platforms iOS and Android. We develop solutions for mobile end devices along the entire process chain. Based on our decades of experience in integrating vehicles and other interfaces, we offer that decisive competitive edge in the implementation and realization of challenging projects.

APP DEVELOPMENT FOR iOS UND ANDROID

- Development of tailor-made applications for mobile end devices in the business-to-business environment.
- Specialists on the important platforms iOS and Android.
- Solutions for mobile end devices along the entire automotive process chain.
- Based on decades of experience in integrating vehicles and interfaces, Softing offers that decisive competitive edge in the implementation and realization of challenging mobile projects.

DIAGNOSTIC APPLICATION

OTX Runtime
D-Server
D-PDU-API

EXAMPLE: OBD APP

With the OBD app from Softing, your Apple iPhone and Android Smartphone becomes an OBD diagnostic device. Your smartphone connects with the vehicle using the OBD-2 WLAN adapter "HSC VCI". You can use the OBD app to read out the fault memory as well as to determine measured values and ECU information. Communication data from running operations can be saved and analyzed offline.

Further functions/characteristics of the OBD APP:

- Clear event memory. Special feature: possible to clear fault memory by shaking the smartphone
- Display of velocity, engine speed and cooling temperature at a glance
- Symbolic interpretation of error codes
- Saving of log data and send function via e-mail
- Quick selection: bus trace on/off, cyclic sending on/off, Setup menu, VCI connection on/off
- Communication compliant with the standards ISO 15031-1 through 6, ISO 15765-4, SAE J1979, SAE J2012

On-site solutions

Softing Automotive not only manufactures reliable products that can be used flexibly but in Munich, Ingolstadt, Stuttgart and Wolfsburg offers top-quality project services at the relevant customer site. Our employees provide consulting and engineering services to help in the mastering of challenging tasks, either directly on customers' premises or outside the company facility, but always in close proximity to all relevant contacts in the specialist departments.

Our focus here is on our core areas of expertise - diagnostics, measuring and testing. With motivation and great dedication, our highly qualified employees work directly with all those involved in the project – either on the customers' premises or with colleagues at Softing. This is a significant characteristic of our way of working and key to the success of each individual project.

We develop with and for our customers the tools, components and processes for the automobiles of tomorrow.

Depending on the specific requirements of each project, our employees assume a number of different tasks:

- Development of software tools and components for various areas of application in engineering, manufacturing and after-sales service – from the actual concept through design and implementation to test and integration
- Testing and safeguarding of electronic vehicle systems – from individual components through to complex subsystems
- Concept evaluation and technology protection
- Guidance and support when using Softing products in specialist departments on site

Training sessions

In spite of standardization and user-friendly tools, the complexity of vehicle diagnostics basically demands more or less sound know-how, depending on the area of application and requirements.

USER-ORIENTED TRAINING SESSIONS FROM SOFTING

There is absolutely no way we would leave our users and prospective customers out in the rain and that is why we offer a well-balanced range of basic seminars on the subjects of diagnostics, bus protocols, ODX and OTX. Furthermore, we have developed a range of one-day seminars on our successful solutions, such as DTS, OTX Studio and Softing TDX, geared either to suit beginners or experts. The modular structure of our courses means participants can put together a training program to suit their very own requirements. Whatever the topic, our experienced team of trainers is particularly keen to deliver a diverting combination of theoretical content and practical exercises. If required, we would also be happy to put together a customized workshop perfectly tailored to suit your requirements.

For more information take a look at
www.softing.com/automotive-training

Test units & test systems

Products and solutions for testing and verifying ECUs and electric components have been implemented in the "TESTING" sector for over 30 years now. They range from simple adapter boxes through to highly complex test systems for an automated full test of ECUs of all kinds. These are almost always customized solutions which are usually an efficient combination of various standard components.

Breakout box, distribution box, power box, D-Tower

AREAS OF APPLICATION

- Lab equipment and developer workstations
- Test bench assemblies and test adaptations
- Testing and verification and measuring

BENEFITS

- Professional technology for high quality demands
- Efficient and convenient working
- Sturdy and compact and space-saving

Breadboard assemblies

AREAS OF APPLICATION

- Lab equipment and developer workstations
- Repair shop and manufacturing
- Demonstrator

BENEFITS

- Distribution of the components as in the vehicle
- Simple, flexible assembly of all components
- Good orientation thanks to clear structure

Battery pack

Independent power supply without using the on-board electrical system

AREAS OF APPLICATION

- Mobile measurement technology
- Development
- All kinds of vehicle testing
- Manufacturing

BENEFITS

- Compact and sturdy
- Easy to handle
- Performance (60Ah)
- Contains no security-relevant components

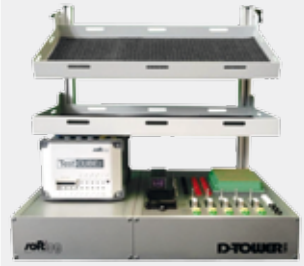
Test systems and testing equipment

AREAS OF APPLICATION

- HiL assemblies for component and integration tests
- Load and sensor simulation
- End-of-Line tester and development test benches
- Signal conditioning and error simulation

BENEFITS

- Test depth and automated test sequence
- Increase in efficiency and quality



▲ Fig.: Developer Workstation D-Tower

▲ Fig.: Breakout Box – sample

▲ Fig.: Distribution D-Box

▲ Fig.: Lab equipment – sample

▲ Fig.: Test system – sample

ECU construction

Engineering and manufacturing of ECUs and electronic components.

AREAS OF APPLICATION

- Working machines
- Agricultural machinery
- Special machines
- Electric walking frames
- Electric wheelchairs

BENEFITS

- Implementation of small series
- Full service and implementation from one source
- Short communication channels, simple communication
- Extensive experience

Machines and devices of all kinds are increasingly requiring electronic components and ECUs. Particularly when it comes to small batches, large companies are not interested and low-wage countries unattractive. Our aim is to implement your ideas to suit the market and manufacturing without making any compromises. And we have a team of specialists to do just that. We support you throughout the development and optimization of the products – from the prototype to series production including manufacturing and quality control.

DEVELOPMENT OF MECHANICS AND ELECTRONICS

We have extensive experience in this sector and have already developed a large number of components and ECUs for industry.

- Mechanical components, integration of electronics in the housing, determination of the geometries – together with the corresponding turnkey solutions.
- Electronic development
- CAD layout
- Selection of components

PRODUCTION AND MANUFACTURING

We provide you with the entire manufacturing portfolio, in other words from the prototype or first sample to the mass-produced product. We produce in batch sizes from around 100 pieces. Full production runs total around 5000 pieces per year.

TEST AND QUALITY ASSURANCE

Before a component leaves our premises, we carry out extensive tests on our function testers. We have our own test systems – from the special function tester to burn-in stands and endurance facilities. The function test is already planned during the development phase. Our aim is to achieve zero-error quality.

▲ *Fig.: Customer specific ECU – sample*

Glossary

A2L	ASAM MCD-2 MC Language
API	Application Programming Interface
ASAM	Association for Standardisation of Automation and Measuring Systems
CAN	Controller Area Network
DLC	Data Link Connector, Diagnostic Connector
DTC	Diagnostic Trouble Code
DTS	Diagnostic Tool Set
DoIP	Diagnostics over Internet Protocol
D-PDU API	Diagnostic Protocol Data Unit Application Programming Interface
GUI	Graphical User Interface
HDD	Heavy Duty Diesel
HMI	Human Machine Interface
ISO	International Organization for Standardization
JRE	Java Runtime Environment
LIN	Local Interconnect Network
MDF	Measured Data Format
MOST	Media Oriented Systems Transport
MVCI	Modular Vehicle Communication Interface
OBD	On-Board Diagnostics
OBD4HDD	On-Board Diagnostics for Heavy Duty Diesel
ODX	Open Diagnostic Data Exchange
OTX	Open Test Sequence Exchange Format
SAE	Society of Automotive Engineers
SMT	Softing Measurement Technology
TCP / IP	Transmission Control Protocol / Internet Protocol
TST	Tester, external test equipment
TDX	(Softing TDX) Tester and Diagnostic Exchange
UDS	Unified Diagnostic Services
UML	Unified Modeling Language
VCF	Vehicle Communication Framework
VCI	Vehicle Communication Interface
WWH-OBD	Worldwide Harmonized On-Board Diagnostics
XML	Extensible Mark-up Language

Migration from DTS 7 to 8

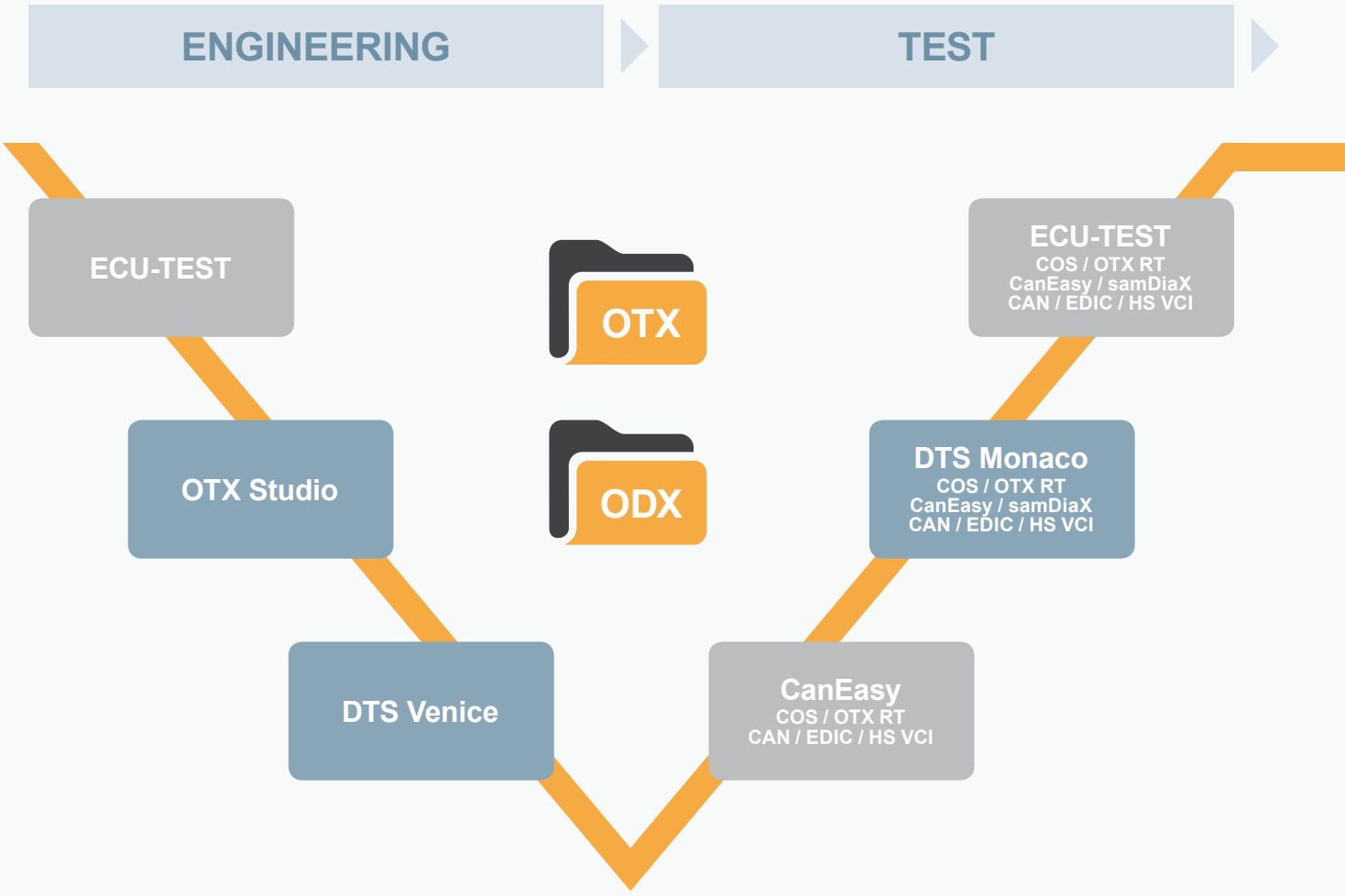
THE MOST IMPORTANT DIFFERENCES BE WEEN DTS 7 AND DTS 8 AT A GLANCE:

		DTS 7	DTS 8
ODX	Version 2.0.1 (No international standard)	✓	✓
	Version 2.2 (ISO standard)	✗	✓
ASAM MCD-3D	Version 2.0.2 (No international standard)	✓	✓
	Version 3.0 (ISO standard)	✗	✓
OTX	Version 1.0 (ISO standard)	✗	✓
DoIP	Diagnostics over Internet Protocol	✗	✓
RUNTIME DATA	Ultra-compact for fast updates in the field	✗	✓
	Can be encrypted to suit a specific OEM to protect a company's expertise	✗	✓
PACK & GO Easy data transfer	Saving and restoring of DTS projects for simple data exchange	✗	✓
QUICKSTART (Monaco+Venice)	Start page enables fast familiarization with the tool	✗	✓
	Demonstration mode with extensive example	✗	✓

Existing DTS 7 projects can be reused

- Providing they are based on the standardized D-PDU API bus system interface
- Including all DTS 7 Monaco configurations (workspaces)

Products & solutions



▲ *Fig.: Softing products and solutions alongside of extended V-Model*

MANUFACTURING

SERVICE

Softing FDX
COS / OTX RT /
CanEasy / samDiaX
CAN / EDIC / HS VCI

Softing TDX
COS / OTX RT
CAN / EDIC / HS VCI

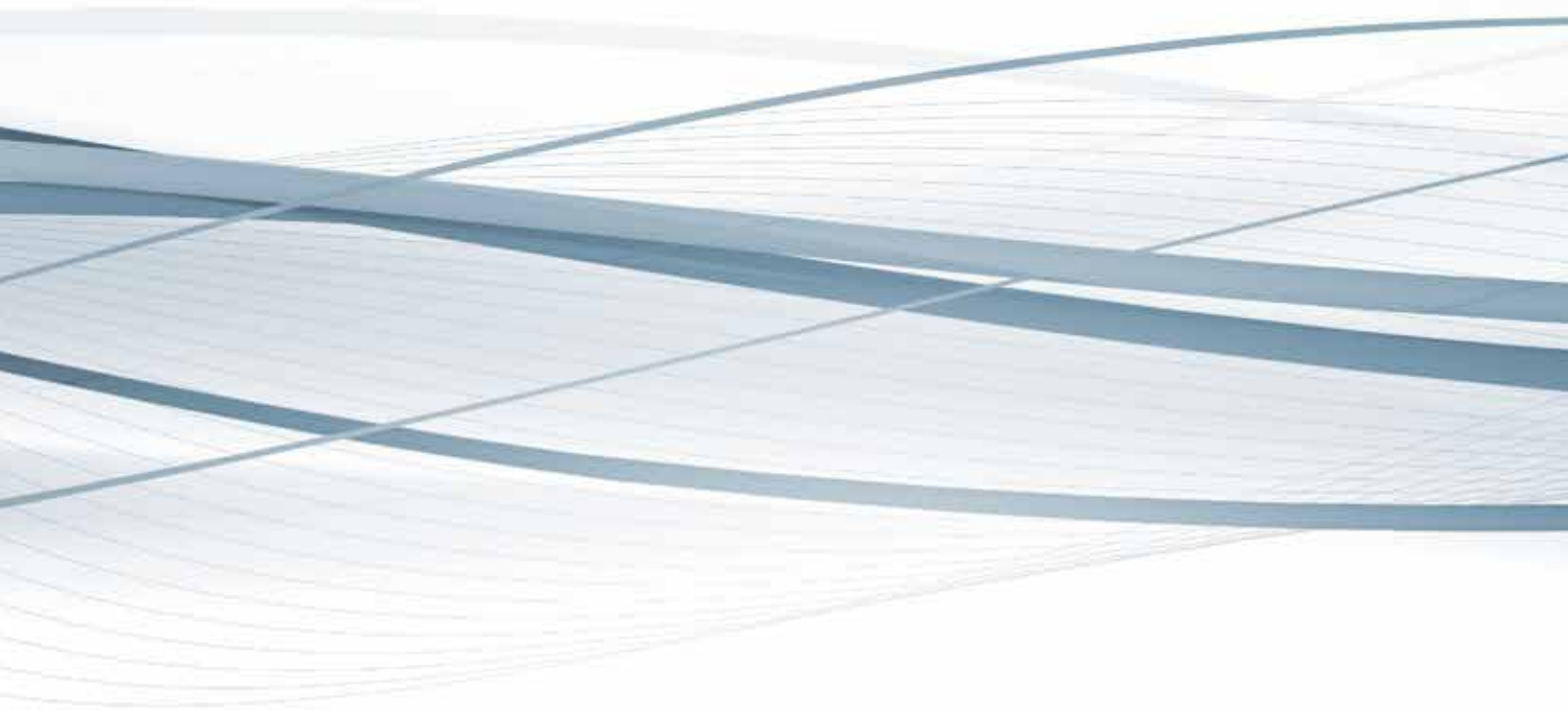
TestCUBE$_2$

OTX Studio
ECU ModulTester
COS / OTX RT
CanEasy / samDiaX
CAN / EDIC / HS VCI

Softing products

under development

Distribution by Softing



Softing Automotive · Richard-Reitzner-Allee 6, 85540 Haar – Germany
Phone +49-89-45656-420 · **Fax** +49-89-45656-499 · **Internet** www.automotive.softing.com