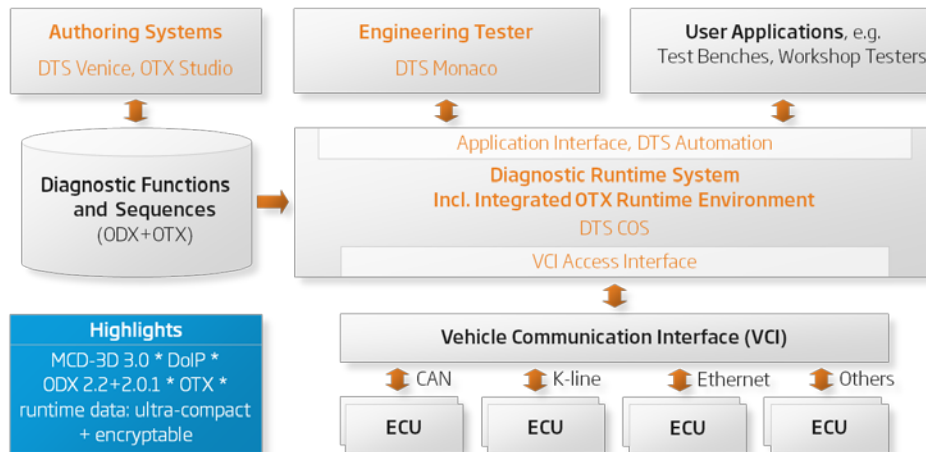# Diagnostic Tool Set 8

System Overview

The Diagnostic Tool Set enables developers, engineers and technicians to create consistent diagnostic functions and sequences based on international standards as well as to ensure that diagnostic communication works reliably over the entire value chain.

Authoring Systems
DTS Venice, OTX Studio

Engineering Tester
DTS Monaco

User Applications, e.g.
Test Benches, Workshop Testers

Diagnostic Functions and Sequences
(ODX+OTX)

Application Interface, DTS Automation
Diagnostic Runtime System
Incl. Integrated OTX Runtime Environment
DTS COS
VCI Access Interface

Highlights
MCD-3D 3.0 * DoIP *
ODX 2.2+2.0.1 * OTX *
runtime data: ultra-compact
+ encryptable

Vehicle Communication Interface (VCI)
CAN | K-line | Ethernet | Others
ECU | ECU | ECU | ECU

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 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 (alternatively called "D-Server" or "Communication Server"). This system receives, processes and transmits diagnostic data. During processing of this data, there is a conversion between the internal machine-readable and a for the user readily understandable symbolic representation.
The interfaces of the diagnostic runtime system are completely standardized: The data interface defines Open Diagnostic Data Exchange (ODX) as the 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) enables the use of different bus protocols and VCIs from various manufacturers.
The Diagnostic Tool Set implements these standards 100% compatible.

AREAS OF APPLICATION
- **All possible applications of diagnostics in Engineering, Testing, Manufacturing and Service**
- **For manufacturers of cars, trucks, buses, motorcycles and non-road mobile machinery as well as tier 1 system suppliers and ECU suppliers**

BENEFITS
- **Significant cost reduction in comparison to proprietary developments**
- **Highly effective because diagnostics only has to be implemented once in the entire value chain**
- **Future-proof as based on current international standards**
- **Top quality thanks to data verification as well as early detection and remedy of comm. problems and function errors**

STANDARDS
- **Communication server: 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) via 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

Base System
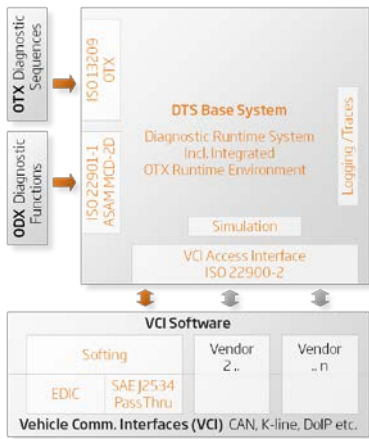
DTS Base System

The base system comprises a full diagnostic runtime system with integrated OTX runtime environment. The VCI access interface enables the use of various bus protocols and interfaces from different manufacturers. The included VCI software enables the usage of Softing's EDIC interfaces immediately without having to install additional drivers.

A "simulated" interface enables the diagnostic functions to be tested even without an ECU. Three different runtime data formats with optional encryption optimally cover the various requirements of engineering, production and service.

Using the **System Configurator** you can centrally manage system and project settings, easily create new projects and import data. The **Database Differ** makes it possible to compare databases in the runtime formats. The **Analyzer** is used to analyze trace files and snapshots "offline".

AREAS OF APPLICATION
- Base System for the DTS product family

DTS COS
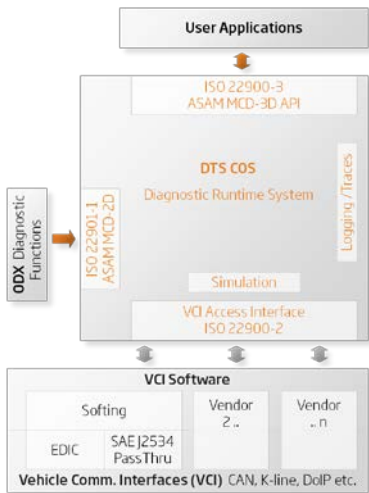

Communication Server for Vehicle Diagnostics

The communication server DTS COS more or less corresponds to the DTS Base System, whereby neither Softing's VCI software nor the OTX runtime environment with access to the OTX application programming interface are utilizable. In addition, based on the ODX data user applications can symbolically access via the MCD-3D application interface the ECU and vehicle information.

The **API Developer Kit** beside extensive documentation and programming examples comprises a special test application. It makes it possible for developers to establish communication to the vehicle via the runtime system immediately, i.e. without their own application development.

AREAS OF APPLICATION
- **Engineering/Test:** release of ECUs, creation and validation of test sequences, HiL systems
- **Manufacturing:** end-of-line test systems, test benches, programming stations
- **Aftersales:** diagnostic runtime system for service testers

DTS Automation
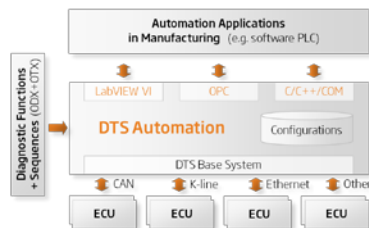
Simple Access to Diagnostics for Manufacturing and Test Bench Applications

DTS Automation offers user applications to access particularly simple the diagnostic communication via standard interfaces widely used in industrial automation. Standard tasks, such as connecting and disconnecting, can thus be managed with considerably fewer and simpler steps than in direct access to the MCD-3D API.

Configurations can be saved, resulting in short changeover times.

AREAS OF APPLICATION
- Flash stations in Manufacturing
- HiL systems
- Test benches
- End-of-line test systems
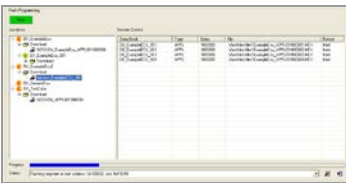
DTS Monaco
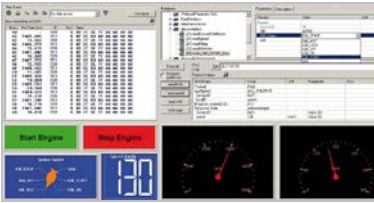
All-in-one Engineering Tester

DTS Monaco comprehensively covers all tasks in the areas of engineering, testing and preparation of manufacturing tests: testing communication, analyzing data on bus, examining ODX data vs. ECU, reading/deleting error memory, programming flash memory, displaying measuring values, parameterizing ECUs, coding variants, executing ECU routines, testing OBD functions and creating/executing test sequences.
Thanks to the fully integrated OTX runtime complex diagnostic sequences can be run.
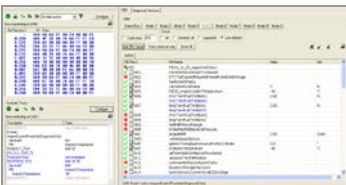
AREAS OF APPLICATION
- Development of diagnostic and control functions
- Function test and validation
- Integration and system test
- Preparation of test sequences for Manufacturing and Service
- Analysis of returns and Quality Assurance

Sub-function available separately:
DTS Flash is an easy-to-use tool based on the ODX standard for flash programming ECUs.
The programming sequence is easy to adapt to the particular use scenario.
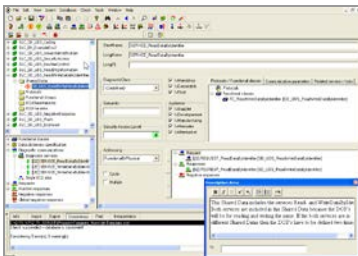
AREAS OF APPLICATION
- Development of flash sequences
- ECU applications
- Exchange of calibration data
- Saving of logistics information
- Analysis of returns

Sub-function available separately:
DTS OBD is a development tool for the validation and release of the self-diagnosis of individual ECUs or an entire vehicle. It covers the entire spectrum of OBD tests completely and enables problem analyses at all levels of communication.
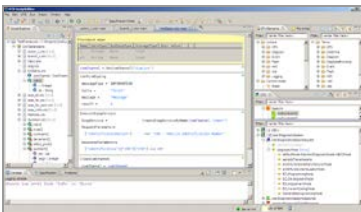
AREAS OF APPLICATION
- Development of OBD functions for vehicle ECUs
- Function test and validation
- ECU integration and system test
- Test drives

DTS Venice

Powerful ODX Authoring System

DTS Venice is an ODX 2.2+2.0.1 editor for the convenient creation, testing, management and maintenance of diagnostic data of single ECUs or a complete vehicle. In the Expert View the entire ODX data model can be processed. In contrast the ECU View enables a simplified view of the most important data of an individual ECU as well as of its variants. Diagnostic description inheritance is visualized graphically. Integrated assistants support data input.

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

OTX Studio

Authoring Tool and Runtime System for Complex Diagnostic Test Sequences

OTX Studio is a tool for creating, implementing and debugging of complex diagnostic and test sequences based on the ISO 13209 standard. With a special GUI editor, it is easy to generate user interfaces and link them to the sequences created. The **OTX Server** enables user applications to access the OTX runtime environment via the OTX application programming interface.

AREAS OF APPLICATION
- Specification of complex diagnostic sequences
- Creation of test sequences during the ECU development
- User interfaces and test sequences for EOL testers in the production
- Guided troubleshooting for repair shop testers

Diagnostic Tool Set 8

Technical Data DTS Base System

Standard compliance, e.g. (others see cover sheet)	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 via 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 below, Parallel communication: depending on type and combination ≤ 4 diagnostic interfaces (more on request)
Simulated Interface	Enables the diagnostic functions to be tested even without an ECU
Protocol templates within scope of delivery	As base for protocol tests and the creation of ECU data in accordance with ISO 22900-2/D-PDU API: ISO_14230_3_on_ISO_15765_2, ISO_14230_3_on_ISO_14230_2, ISO_OBD for K-line and 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 within scope of delivery	OBD database in accordance with ISO 15031-5/SAE J1979:2012-02 for gasoline/diesel vehicles, Sample database with three ECU and detailed documentation as well as tutorial
Runtime data 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/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/data structure); optional OEM specific encryption*
Operating systems	Windows 7 SP 1 and 8.1 (both 32+64 Bit)
General PC requirements	Processor: type and clock (≥ 1.5 GHz) depending on the system configuration and complexity of ODX data, RAM: ≥ 2 GByte– depending on ODX data, For hardware interfaces: PCI-/PCMCIA slot, USB-/LAN port, wireless LAN or Bluetooth for HW interface, For optional USB Dongle: USB port, Screen resolution: see detailed data sheets on the relevant products

HARDWARE INTERFACES VS. VCI ACCESS INTERFACE/ APPLICATION/TRANSPORT PROTOCOLS	Softing EDICusb	Softing EDICwlan[1]	Softing EDICblue	Softing EDICpci	Softing EDICcard2	samtec HSX[1,2]	samtec HSC[1,2]	samtec HSlight II/HS+[2]	I+ME Actia eCOM Box[1,2]	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]
		Diagnostic Interface								CAN Interfaces															PassThru			
ISO 22900-2/D-PDU API over CAN																												
UDS/ISO 14229: ISO 15765-3 on 15765-2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●
OBD/ISO 15031: ISO 15031-5 on 15765-4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●
KWP2000/ISO 15765: ISO 14230-3 on 15765-2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●
SAE J1939: SAE J1939-73 auf 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/ISO 15031: ISO 15031-5 on 14230-4	●	●	●	●	●	●	●																		●	●	●	●
KWP2000/ISO 14230: ISO 14230-3 on 14230-2	●	●	●	●	●	●	●	●																	●	●	●	●
KW1281	●	●	●	●	●																				○	○	○	○
KWP2000 light plus VW	●	●	●	●	●																							
DoIP (Tester <–> Gateway)						○	○	●																				

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

●.. available / O..on request / [1]..additional USB dongle necessary for license / [2].. driver from manufacturer required