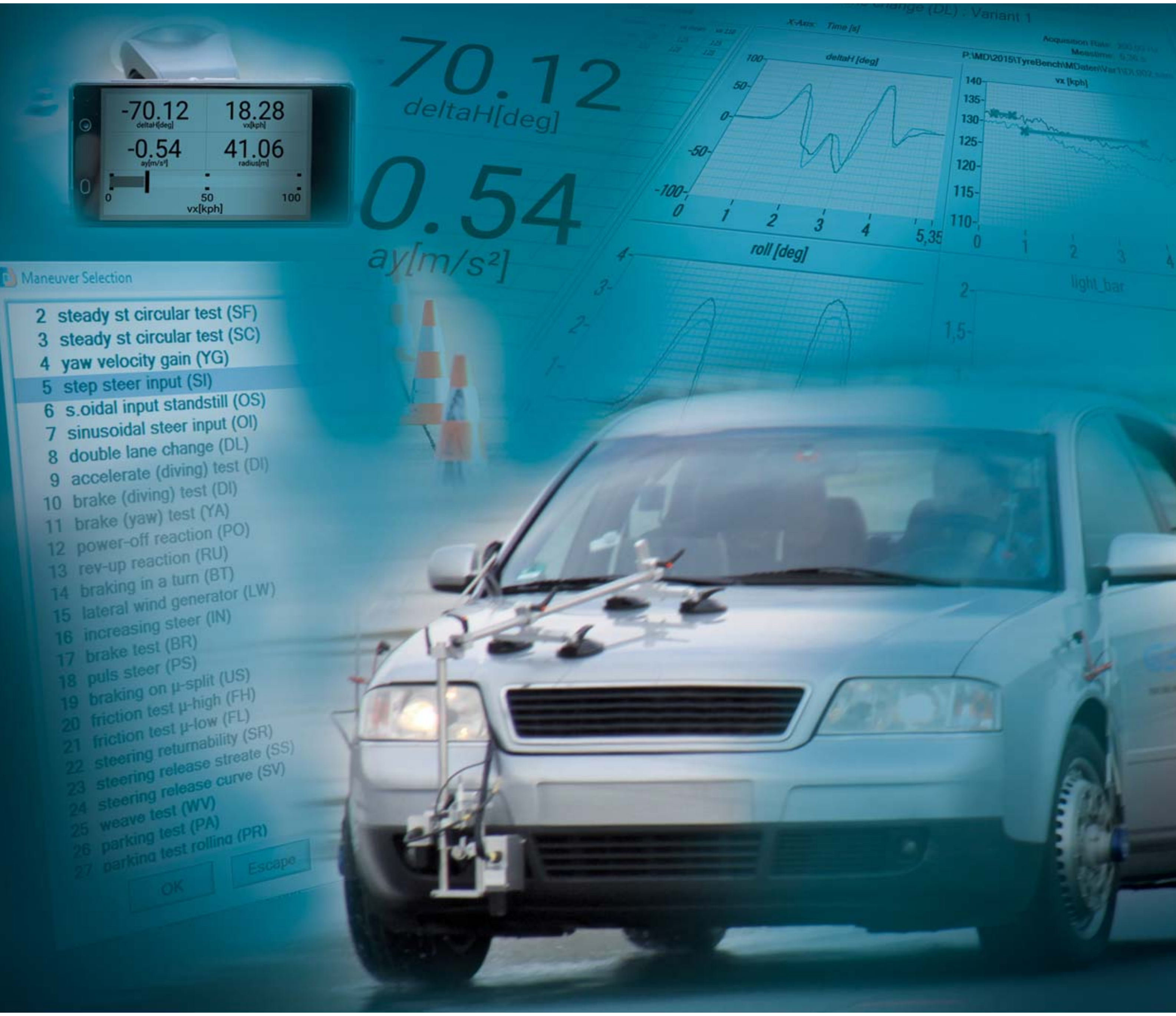
measX
Measurement System Experts



The Key to Efficient Driving Dynamics Testing

MOSES
DRIVING DYNAMICS

The Reliable Scout for the Entire Driving Dynamics Measurement

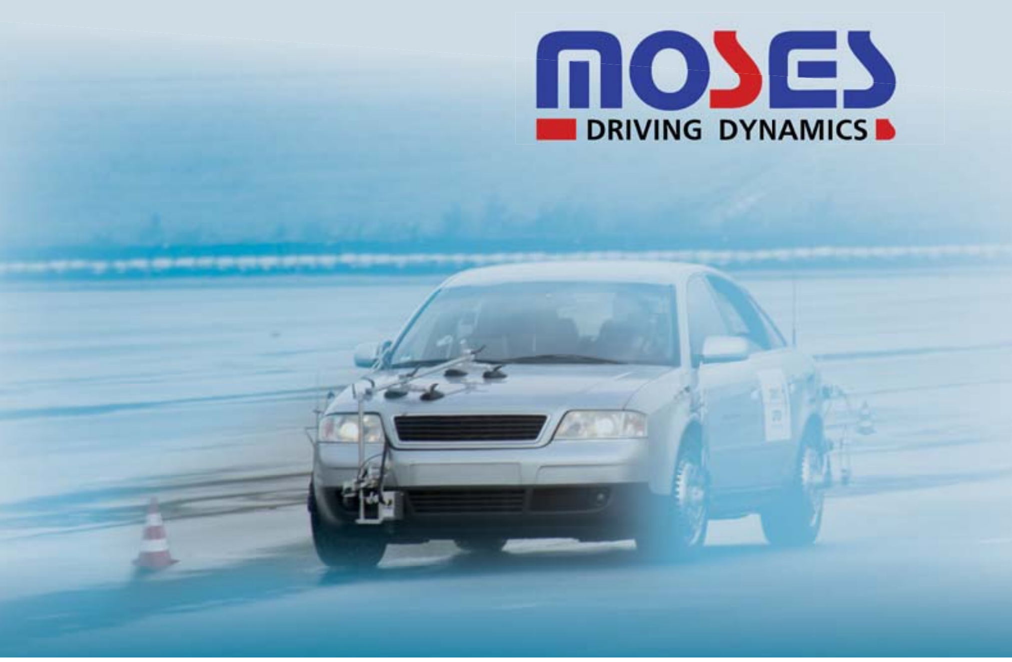
Extensive tests for driving dynamics are a fixed part of vehicle development today. Both the diversity of the tests as well as the requirements for their efficiency are constantly increasing. Strong driving dynamics parameters must be delivered while under high pressure in terms of logistics and time. The MOSES software system assists you in planning, performing and evaluating your driving dynamics tests. It was developed in close collaboration with one of the world's best known vehicle manufacturers and has been geared to the workflow of test drivers down to the smallest detail. MOSES has been proven through practice for many years: Users quickly achieve reliable measuring results and, with that, a solid basis for making important decisions in vehicle development.

A Strong Concept

MOSES is more than just a portable measuring system. The software controls the entire test procedure, from the integration of the sensors through the test planning to the quality and validity control for the measurements. All steps are geared to one another and ensure efficient driving dynamics testing – at the highest level.

Predefined Standards, Individually Expandable

The highlight of MOSES is the strict maneuver-oriented design of the software with an extensive inventory of pre-defined maneuvers and interfaces for data collection. This allows standardized single tests to be performed with higher reproducibility. At the same time, the system is open for changing boundary conditions and customer-specified requirements; it can



Everything is controlled through MOSES:

Test Planning

- Maneuver configuration
- Sensor configuration

Test Performance

- Maneuver selection
- Maneuver assistance
- Maneuver control

Measuring Technique

- Initial operation
- Calibration

MOSES optimizes your driving dynamics tests.

Huge time savings
Optimal quality of results
High comparability
Lower costs

be modified and expanded flexibly at any time.

Maximally Oriented to Users

Whether function keys, short keys, buttons or special menu items – the operation and navigation are simple and clear. The essential work steps like the selection and configuration of the maneuvers, the initial operation of the measuring technique and finally the execution and evaluation of the measurement itself are supported by the input masks which are exactly adapted to the task at hand.

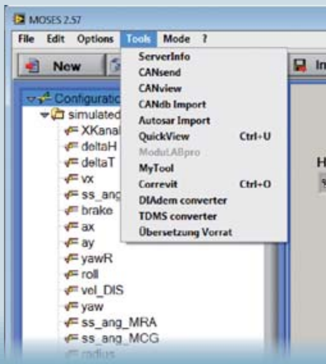
The Important Things Always in View

During test drives, MOSES makes the essential measurement data easy to read. For every maneuver, acoustic and visual signals indicate deviances from standard values. The Driver Assistant Display can show these parameters in the driver's field of vision on mobile devices. A real plus when it comes to safety in driving maneuvers.

Full concentration on the maneuver thanks to Driver Assistant Display

Perfect Support for the Driving Dynamics Measuring Technique

MOSES provides interfaces for acquiring analog channels, IEC-Bus, CAN-Bus, FlexRay and Ethernet so that almost every sensor can be connected. Using CAN-DB and CAN bus monitor, the CAN bus signals can be easily parameterized. MOSES talks directly to the sensors' external operating software. For standard sensors, suitable parameterization for direct use is already on file. The time spent on configuring the measuring technique, such as the array of the analog measuring positions and CAN signals as well as scaling, is significantly reduced.



User-oriented software – practically developed for practice.

Plan and Efficiently Perform Maneuver-Oriented Test Drives

Before the driving dynamics test, a test plan is prepared in which the maneuvers to be performed are defined. Configuration is enormously simplified with the maneuver-oriented structure of the software: MOSES supports a multiplicity of standardized driving maneuvers (ISO, DIN, NHTSA, etc.)

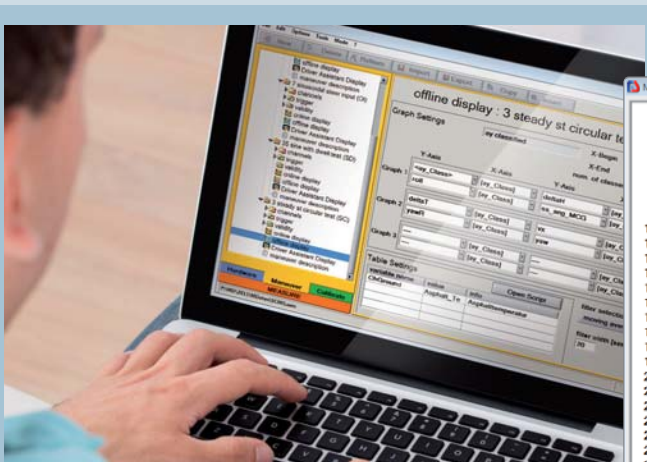
Configuration of Maneuvers

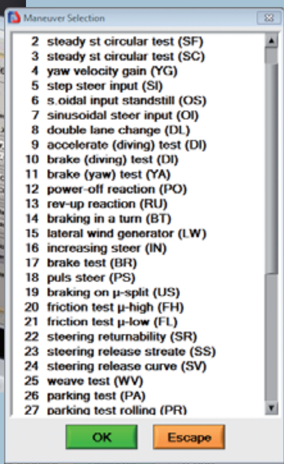
As soon as you have made your selection from the inventory of maneuvers, the pre-configured settings are automatically loaded for numerous parameters such as sample rate, channel selection, trigger conditions, test time etc. These standard settings can be changed any way you wish and you can make your own parameterization. The parameterized maneuvers create a test variant which can then be made into a measuring task and finally combined into a test plan. Vehicle data, variants and other additional information can be already inputted at this time. The meta-information is saved later with the measuring data.

Assistance with Maneuvers

MOSES also supports the driving dynamics measurement itself – also guided by maneuvers – and assures its quality: The test driver selects the maneuver that is to be performed and then switches to the measuring mode. During the measurement, maneuver-specific parameters are calculated and evaluated (online display). If, for example, maintaining a certain driving speed is important, this speed is automatically registered. Any deviation is indicated both visually and acoustically so that the driver can react directly.

Test Planning





With pre-configured maneuvers, test plans can be quickly created.

Maneuver Assistance

Particularly Useful: Integrated NHTSA Maneuvers

In addition to the standard tests according to ISO and DIN, MOSES also supports the special maneuvers by NHTSA (National Highway Traffic Safety Administration).

Evaluation while in the Vehicle

A pre-evaluation with important parameters and control values is calculated (offline display) after every driving maneuver. That lets you immediately evaluate whether the separate driving tests covered all of the needed areas and produced sufficient measured values for later evaluation. Both validation of already performed tests as well as the comparison of different vehicles are significantly simplified because of the high accuracy and reproducibility of the maneuvers.

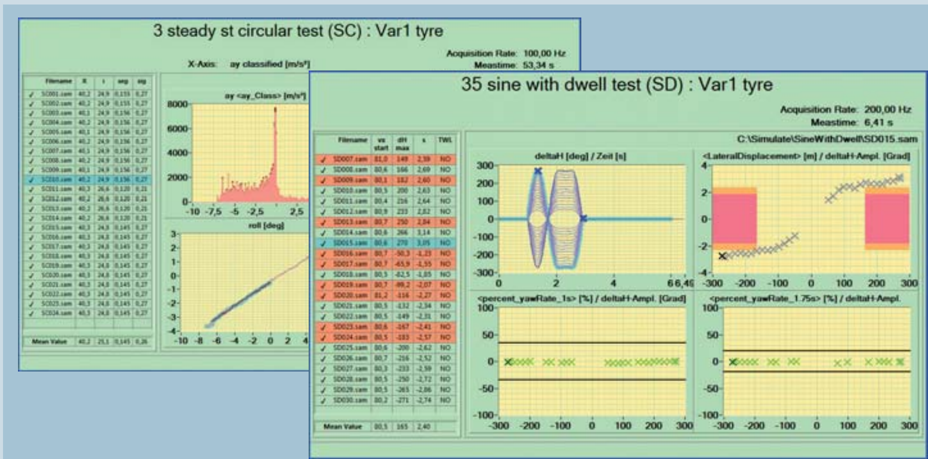
Individual evaluations can be supplemented with the Python scripting language.

Special Calculations and Unique Maneuvers

You can easily create your own offline calculations with the integrated Python interface and combine them with existing evaluations that have already been accomplished. This allows different results to be easily balanced against each other, for example. In addition, Python allows new, user-specific maneuvers to be defined. The „Free Measurement" maneuver has been supplemented with a suitable script for this purpose.

Pre-Rating and Evaluation

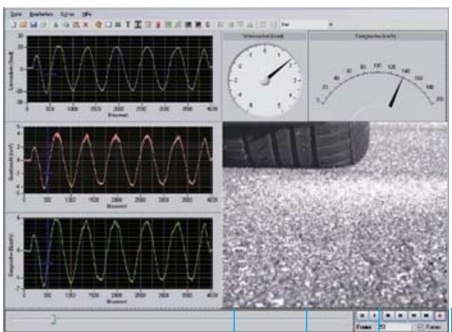
During the measurement, its quality is exactly monitored according to the maneuver.



The evaluations are performed relevant to the maneuver automatically after the measurement.

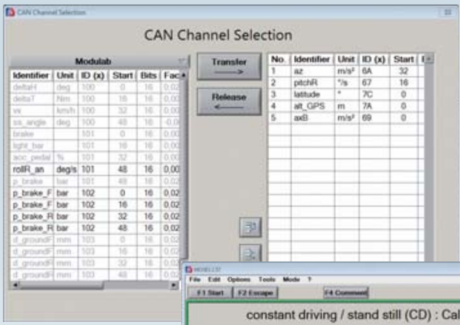
MOSES-Motion: Video Data Synchronously Recorded

The optional expansion module MOSES-Motion allows the synchronous video recording of measuring data with one or more cameras. You can define freely scalable windows for measured values, curve diagrams or video windows interactively which can then be used as templates for further measurements.

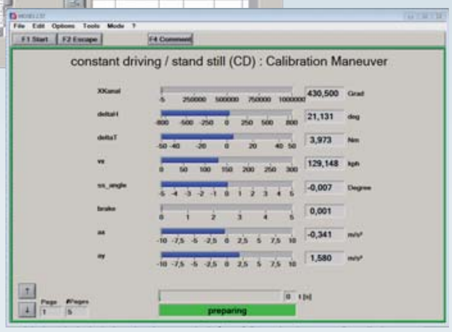


Adapted to Your Needs

MOSES offers a large spectrum of predefined interfaces for the most varied measuring sensors and it is constantly being expanded. Optical correlation speed sensors and inertial measuring systems are particularly supported. Prepared interface configurations for Correvit sensors, inertial strap-down platforms, GPS systems and measuring amplifiers make it easier to configure the hardware. Many measuring channels are pre-defined and can be selected from standard maneuver lists. These can then be supplemented with self-calculated channels any way you want.



The definition of the measurement channels is very easy.



MOSES can also help you in calibrating the sensors.

Easy Calibration

Special matching maneuvers and a dedicated mode for calibration simplify the initial operation of the sensor hardware. The zero-point match or a 2-point calibration takes place with just a press of a button, and for multiple channels simultaneously.

Supported sensors:*	
Analog inputs	Analog cards from National Instruments
CAN	Vector (CANCard X, CANCard XL), Eberspächer (FlexCard USB)
FlexRay	Eberspächer (FlexCard USB)
IEC-BUS	Measurement Computing
XCP	Support via Vector Informatics CANape
Ethernet	Matrox video server with fast camera (80 fps)
Inertial platforms	e.g. iMAR-DIS-FC, itrace, DIS-FMS, RMS, Genesys ADMA-G
UC processor with HF distance sensors	Kistler company
Correvit sensors	e.g. S-HR, S350 Aqua, SFII, SCE, SL, S-Motion
GPS sensors	e.g. smart-Pos by iMAR, ...

* More sensors and measurement systems on request.

Your Partner for Driving Dynamics Tests

Use our know-how in the areas of hardware, software, data collection, calculators and sensors. We can advise you comprehensively and provide individual support.
Just contact us!

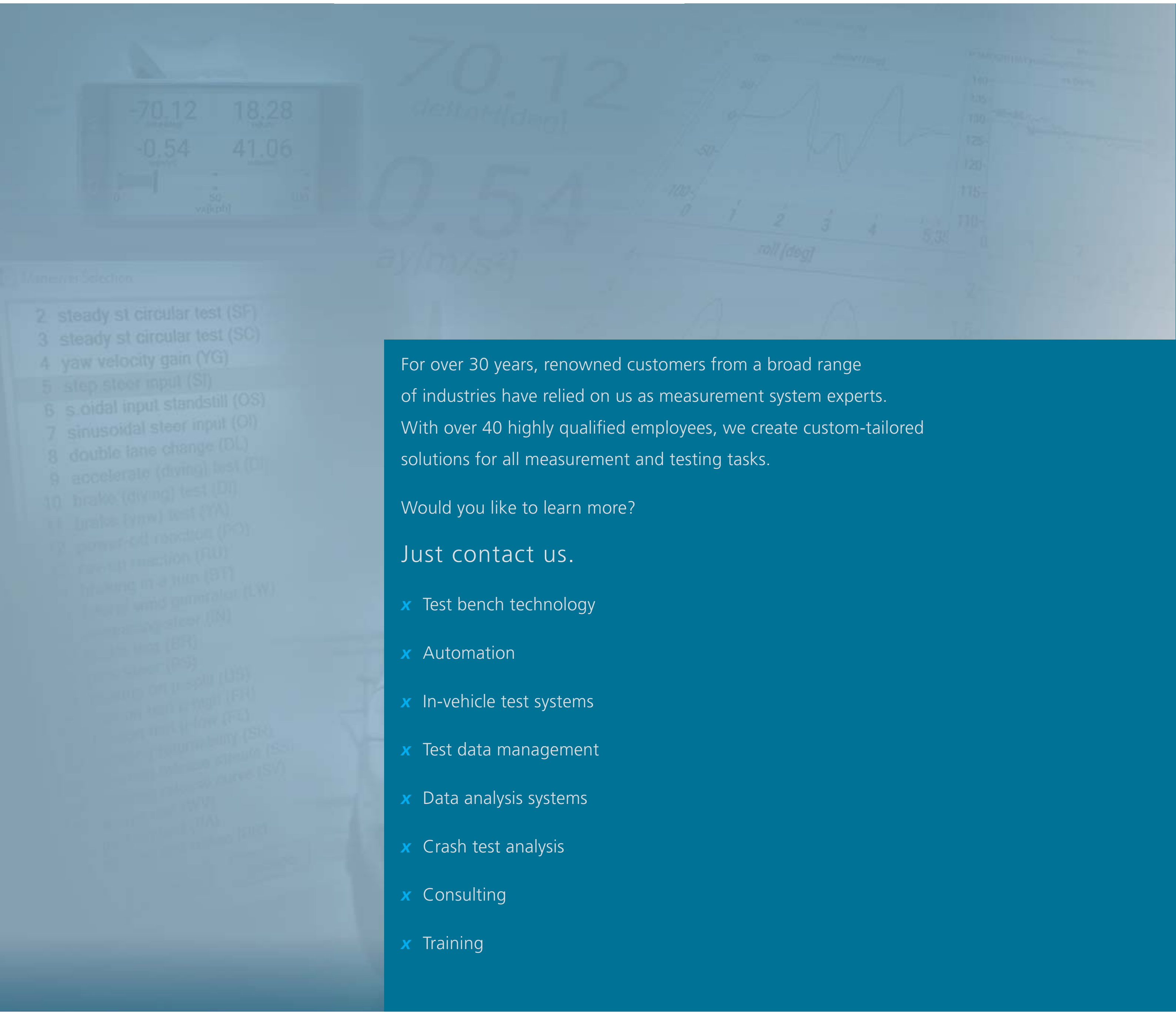
Start

Pre-Defined Maneuvers

Maneuver	Description
Free Measurement (FM)	Empty template to create your own maneuver.
Steady-state circular test (SF), (SC) / (ISO 4138)	Steady-state circular test with a constant radius of (R=40m or 100m) or a constant steering wheel angle.
Yaw velocity gain (YG)	Course of the yaw velocity gain at different driving speeds. Depending on the driving speed measurement with sinusoidal, low-frequency steering.
Step steer input (SI) / (ISO 7401)	Volatile turning-in from straight-ahead driving into a circular arc.
Sinusodial steer input (OI), (OS) / (ISO 7401)	Sinusodial steering with a constant steering wheel angle amplitude at a constant driving speed in the frequency range 0 to 5 Hz.
Double lane change (DL) / (ISO 3888-1)	Passing through the alleys of pylons (double lane change).
Accelerate diving test (DI)	Acceleration from a standstill.
Brake diving test (DI), brake yaw test (YA)	Braking from 100 km/h with different decelerations.
Power-off reaction (PO) / (ISO 9816)	Weight transfer reaction during deceleration in a curve.
Rev-up reaction (RU)	Weight transfer reaction during acceleration in a curve.
Braking in a turn (BT) / (ISO 7975)	Weight transfer reaction while braking in a curve.
Lateral wind generator (LW) / (ISO 12021-1)	Passing the lateral wind generator with a constant driving speed.
Increasing steer (IN)	Steering-in from driving straight-ahead with a constant steering speed.
Brake test (BR)	Emergency stop (all 4 wheels are in the control range) till the vehicle stands still.
Pul s steer (PS)	From straight-ahead driving fast steer-in and steer-back (500 °/s). Steering machine necessary.
Braking on µ-split (US) / (ISO 14512)	Emergency stop (all 4 wheels are in the control range) on a surface with a one-sided low friction value.
Friction test (FH), (FL)	ABS-regulated emergency stop (determination of maximum possible decelerations).
Steering returnability (SR)	Release of the steering wheel during circular test with a constant radius at different lateral accelerations.

Maneuver	Description
Steering release (SS), (SV) / (ISO 17288)	While straight-ahead driving or circular test, the steering wheel is shortly turned.
Weave test (WV) / (ISO 13674-1)	Sinusoidal steering with a steering frequency of 0.2 Hz at a lateral acceleration of $2 m/s^2$.
Parking (PA), Parking test rolling (PR)	While standing or rolling, the steering wheel is slowly turned to the left stop, then to the right stop and afterwards beyond the middle again.
Steering ratio (RA sinusoidal), (RA with increasing torque)	Measurement with a vehicle on a steering test stand. The steering wheel is slowly turned to the left stop, then to the right stop and afterwards beyond the middle again. The angle proportional wheel angle signals from the test stand have to be measured additionally. Online sensor drift monitoring.
Slalom test (SL)	Passing through the course of pylons.
VDA Test (VD) / (ISO 3888-2)	Passing through the alleys of pylons (double lane change).
NHTSA increasing steer (FI)	Steering-in from driving straight ahead with a constant steering speed. Preliminary test for further NHTSA maneuvers.
Consumer union test (CU)	Passing through the alleys of pylons (double lane change) according to NHTSA.
NHTSA Fishhook (FH)	Test performance according to NHTSA. Steering machine necessary.
NHTSA J-Turn (JT)	Test performance according to NHTSA. Steering machine necessary.
Sine with dwell (SD)	Test performance according to NHTSA. Steering machine necessary.
ADAC test (AD)	Passing through the alleys of pylons (double lane change).
High-speed braking (HB)	Braking from a circular test with different decelerations at high driving speeds.
Car-trailer combination stability (CT) / (ISO 9815)	Testing of the pendular swinging at a trailer in operation. Stimulation through a steering impulse.
Lift test (LT)	Constant driving with different driving speeds. The deflection of the axis because of aerodynamic effects is measured.
Suspension travel (ST)	Measurement with a vehicle on a steering test stand in order to calibrate integrated pitch of spring sensors. The angle proportional wheel angle signals of the hydraulic pillars from the test stand have to be measured additionally.

The list of maneuvers is being constantly modified and can be expanded for customized maneuvers.



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