

Fatigue strength tests

Determining the lifespan of materials subjected to cyclic loads is used to optimize heavily stressed vehicle components such as driver, rear and sliding doors. ASC's accelerometers and gyroscopes are used in week-long endurance tests. They record exact accelerations, rotational movements, maximum speeds and reversal points while other relevant forces impacting the vehicle are calculated from this data.

Test drives for optimized vehicle dynamics

ASC's inertial sensors are used in test drives such as lane-change, brake and driving maneuver tests to determine representative load collectives. They are installed on engine mounts, near the wheels, on the frame or in seat backs to capture vehicle dynamics, reliability, comfort and the impact of vibrations on the driver. The outcomes are leveraged to create evaluation profiles and provide important data for the validation of vehicle models that are used in simulations.

E-Mobility

Significant differences exist regarding the drivetrain of electric vs. combustion engine vehicles. For example, the low number of gear steps in e-vehicles reduces friction and damping. Therefore, vibrations caused by internal (torque changes, brake interventions), external excitation (uneven road surfaces, potholes) and torsional vibration phenomena need to be analyzed. ASC's IMU 7 provides the most flexible precision sensor 'toolbox' for improving the driving dynamics, comfort and efficient operation of your vehicles.

Test benches for operational stability

Dynamic structural test benches are used for comprehensive, combined analyses of vehicle safety and reliability. Operational stability procedures help determine the behavior of materials and components under real-world loads. A range of inertial ASC sensors gets leveraged in vibration, fatigue and shock tests performed across diverse test rigs.

MEMS capacitive accelerometers

ASC's capacitive accelerometers are based on high-quality sensor elements (MEMS) of impressive long-term stability and reliability. This technology makes it possible to measure static (DC) as well as constant and dynamic (AC) accelerations, with a 7 kHz range and amplitudes of up to ± 400 g. Due to the design of the micro mechanical structures the sensors feature an extremely short recovery time, with shock resistance of up to 6,000 g.

IEPE accelerometers

ASC's IEPE (Integrated Electronics Piezo Electric) accelerometers are based on both shear and compression principles. This technology offers a high pass characteristic, meaning no static DC components are detected. However, highly dynamic measurements with a very wide bandwidth of up to 16 kHz and amplitudes up to ± 800 g are feasible.

FATIGUE STRENGTH TESTS



TEST DRIVES FOR OPTIMIZED VEHICLE DYNAMICS



E-MOBILITY

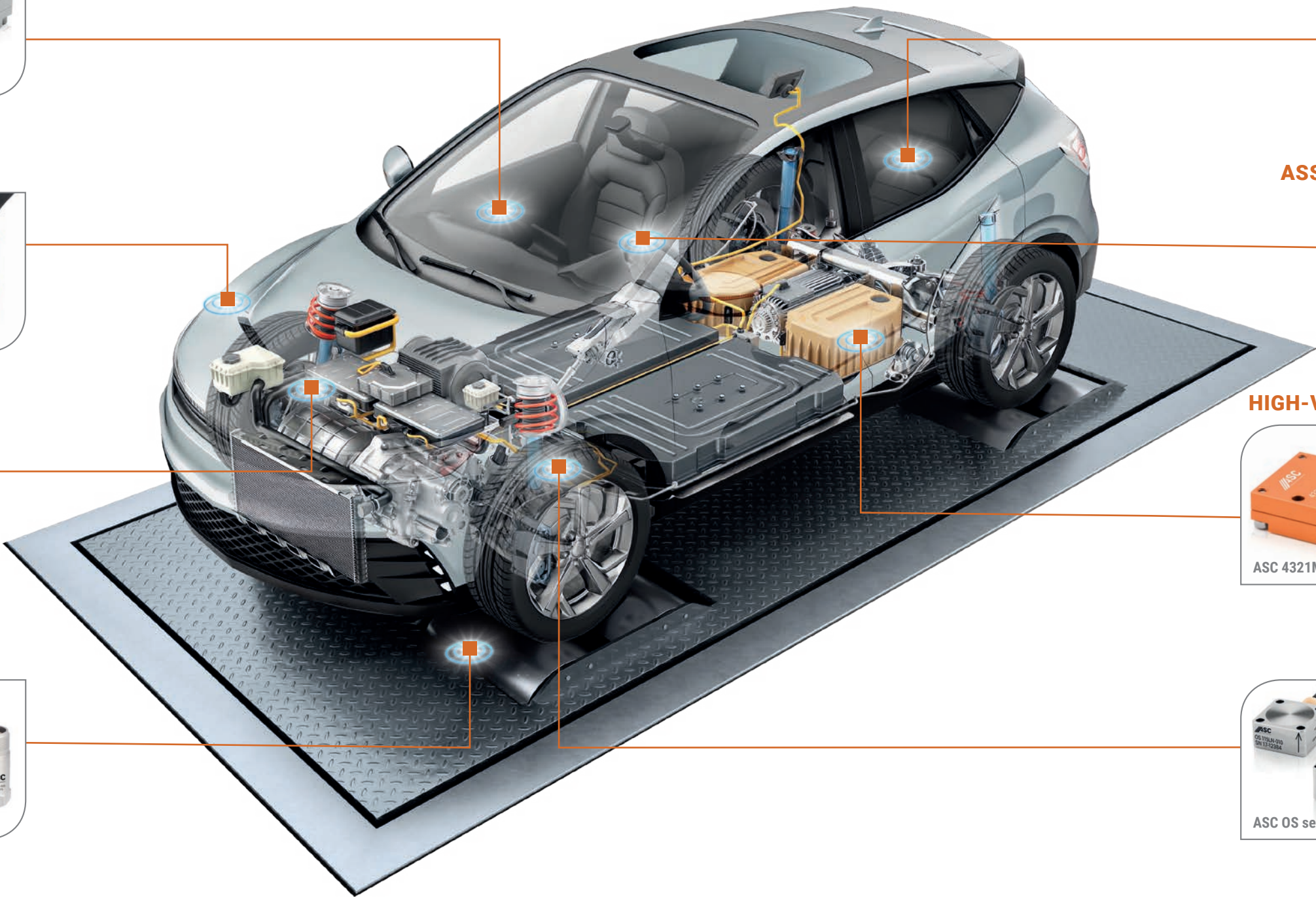


TEST BENCHES FOR OPERATIONAL STABILITY



Inertial sensors for automotive industry

Robust. Flexible. Precise.



DRIVING COMFORT MONITORING



ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)



HIGH-VOLTAGE BATTERY TESTING



ROAD LOAD DATA ACQUISITION (RLDA)



Driving comfort monitoring

Analyzing the effects of vehicles' motions through driving comfort tests is necessary as human perception of mechanical vibrations varies greatly, depending on direction, frequency and amplitude. Discomfort, however, mainly occurs below 10 Hz, so that the precise monitoring of minimal linear motions, low-frequency vibrations and impacts becomes critical to optimizing driving comfort.

Advanced driver assistance systems (ADAS)

ADAS are key technologies to enable autonomous driving: They capture vehicle data and driving situations, process the acquired information in real time and derive measures such as generating feedback to the driver or intervening in the operation or control of the vehicle. ASC's MEMS based gyroscopes provide excellent response behavior leading to minimal latency.

High-voltage battery testing

The rigorous testing of complex HV-battery structures requires extremely accurate and reliable measurements. Operational stability testing of electric vehicles is enabled by a wide range of capacitive ASC accelerometers. They are used in shock, vibration and sled tests as well as misuse scenarios.

Road load data acquisition (RLDA)

RLDA is a testing method used in automotive development to quantify vehicles under known, real-world operating and infrastructure conditions. Challenges to the robustness of a vehicle vary greatly from country to country. Capacitive ASC accelerometers installed at the chassis or body help manufacturers optimize their vehicles to local road conditions.

Digital and smart sensor solutions

ASC DiSens® accelerometers are based on proven MEMS technology and capacitive operating principle. In addition, configurable filter settings and sampling rates are already integrated and various application-specific options for digital interfaces available including USB, CAN and RS-232.

ASC AiSys® smart sensor systems combine the user-friendly configurations of digital accelerometers with implemented algorithms for extracting application-specific information. For example, frequency analysis through Fast Fourier Transformation (FFT) or calculating dynamic velocity and displacement are already in-built features. Smart sensor systems of the ASC AiSys® series provide information via standardized, digital interfaces.



Find out more!
www.asc-sensors.de/en

Inertial measurement units (IMUs)

ASC's analog IMUs are based on a modular concept. By combining three accelerometers and three gyroscopes, an integrated sensor system featuring up to 6 DOF with individually adjustable measurement ranges can be achieved. For example, the ITAR-free ASC IMU 8 features accelerometers with measurement ranges from ± 2 to ± 30 g and an in-run bias stability of $< 45 \mu\text{g}$, as well as angular rate sensors of measurement ranges from ± 10 to $\pm 400^\circ/\text{s}$, an angular random walk of $< 0.01^\circ/\text{hr}$ and bias stability of $< 0.1^\circ/\text{h}$, leading to tactical grade performance.

Gyroscopes

ASC's analog gyroscopes are based on proven MEMS vibrating ring technology. The design of micro mechanical silicon structures makes them extremely insensitive to external impact and vibrations. In terms of maximum accuracy, the uniaxial and triaxial gyroscopes are available for both industrial grade performance (bias stability $< 12^\circ/\text{h}$, measurement range ± 75 to $\pm 900^\circ/\text{s}$) and tactical grade performance (bias stability $< 0.1^\circ/\text{h}$, measurement range ± 10 to $\pm 400^\circ/\text{s}$).

Because when your data is precise, your decisions are powerful!

Efficiency. Safety. Productivity.

ASC offers tailor-made high-precision inertial sensors, engineered for the toughest requirements in demanding engineering applications. Built on trust and quality, we are your partner for tailor-made solutions to help maximize the efficiency of your vehicles, keep passengers and freight safe and your business productive. That's why vehicle manufacturers, test centers and operators around the globe rely on customized solutions from ASC. When can we convince you?

Concrete pump vehicle optimization



Challenge: Liebherr's innovative, robust truck-mounted concrete pumps are installed on a heavy-duty transport vehicle. Shocks and vibrations are induced in the structure and chassis by the pumping process, as well as by potholes and other obstacles when driving to and from construction sites.

Solution: Measurements during the development process to ensure operational safety and protect the onboard electronics. From that, medium and long-term effects of loads on the vehicle are calculated and various damping materials verified.

Product: Triaxial MEMS capacitive accelerometers ASC 5511LN feature an outstanding low noise performance. They are installed on the frame of prototypes, among other areas, to precisely record and evaluate the smallest vibrations.

Sensor solutions for automotive safety



Challenge: Truck and other commercial vehicle components can be subject to 90 times the acceleration of gravity in difficult road conditions. Tests are needed to simulate similarly extreme loads up to 2,000 m/s² peak acceleration and over a broad frequency spectrum from nearly 0 to 200 Hz.

Solution: As a leading provider of vehicle testing facilities, IABG runs a state-of-the-art simulation center to evaluate and ensure functional safety. The quality and flexibility of ASC's sensors enable tailored solutions for innovative test benches.

Product: Triaxial MEMS capacitive accelerometers ASC 5711LN are customized solutions. Depending on application they feature specific cable assembling, housing and calibration procedures.

Reducing complexity and cost of vehicle testing



Challenge: Manufacturers such as MAN offer a broad portfolio of trucks, buses and other commercial vehicles for use in the most diverse parts of the world and areas of application. Road types, surfaces and environmental conditions vary greatly.

Solution: At predefined spots, sensors capture the exact vertical, horizontal and cross acceleration forces affecting the vehicle. From these values, the impact of a variety of load and road conditions on relevant areas of the truck can be determined. Using this input MAN can optimize individual vehicle components and extend the productive lifetime.

Product: Triaxial MEMS capacitive accelerometers ASC 5525MF feature a wide frequency response. The robust stainless-steel housing is ideally suited for test drives in harsh environments.



Reliable calibration of your inertial sensors?
Talk to us!

Sensors have to be calibrated at regular intervals to ensure accurate measurements in the long term. Our calibration lab is accredited in accordance with DIN EN ISO/IEC 17025:2018 for the measurement of acceleration – for both sinus and shock calibration.

- The ASC calibration lab offers
- **Factory calibrations**
(non-traceable and therefore not covered by the EA MLA)
 - **DAkkS accredited calibrations in accordance with Directive DKD-R 3-1 for acceleration**

We calibrate accelerometers and vibration sensors of all manufacturers, regardless of technology:

- **Capacitive accelerometers**
- **Piezoelectric accelerometers (IEPE)**
- **Piezoresistive accelerometers**

We also offer a factory calibration service for the measurand angular velocity. We calibrate:

- **Gyroscopes**
- **Inertial measurement units**

Our specialists also calibrate rod potentiometers and cable position sensors, as well as – in cooperation with partners – tilt sensors.

Professional calibration ensures the quality of your sensors! On request, we will remind you of the next scheduled calibration.



ANALOG • DIGITAL • SMART

ASC Inertial Sensor Technology

Enhancing automotive capacity,
safety and productivity



AUTOMOBILES

MOTORBIKES

INDUSTRIAL VEHICLES

SPECIAL VEHICLES

CONSTRUCTION VEHICLES & MACHINES

AGRICULTURAL VEHICLES & MACHINES



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