

ASC GmbH

ASC RAIL Sensors to Improve Railway Performance

ASC's RAIL sensor series provides high-precision, robust yet flexible inertial sensor technologies. The tailored solutions support railway customers in improving the safety, capacity and overall productivity of their rolling stock.

Expanded ASC RAIL Series Meets Applicable EN 50155 Standards

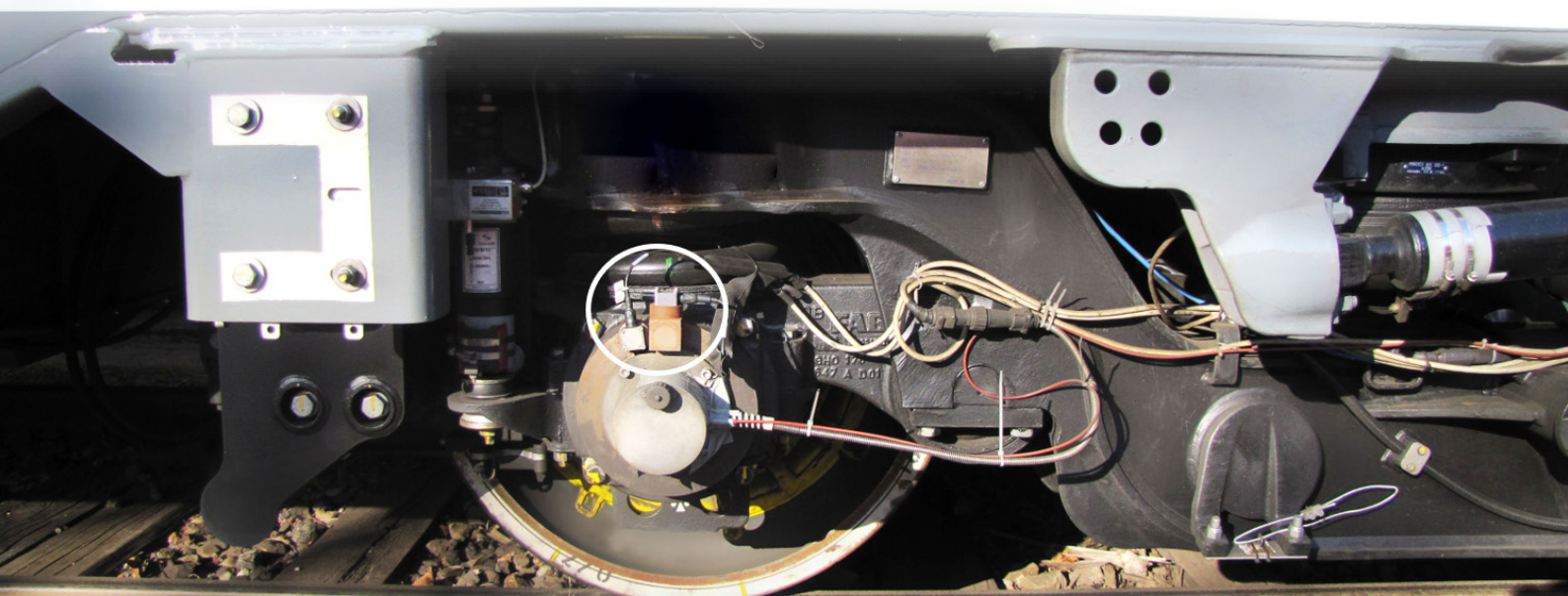
“Through the rigorous testing and documentation of our RAIL sensor series’ performance, we’re making it significantly easier for railway operators to configure and implement individual inertial sensor solutions on their rolling stock,” says Renate Bay, CEO at ASC Sensors. *“They can now rely on a proven set of stable precision sensors ready for installation, which meet the required norms and significantly reduce individual documentation requirements on the part of the operator.”*

Pre-qualified accelerometers of type ASC RAIL-x152LN

are already being used by European and global rail operators. In June 2024, the sensor series was expanded with an additional accelerometer type ASC RAIL-x151LN, featuring a more compact housing to be able to fit into smaller spaces. The same smaller housing was used for the new gyroscopes of type ASC RAIL-27x1. For all three models, comprehensive evaluations by an independent testing lab resulted in clear outcomes for ASC's reliable, accurate RAIL series.

The following tests have been performed according to railway standard EN 50155:2021 to confirm climatic resistance and dynamic-mechanical robustness:

- Low temperature storage test – test A
- Low temperature start-up test – test A (OT6)
- Dry heat test – test B (OT6)
- Damp heat, cyclic – test Db
- Insulation tests (before and after damp heat, cyclic)
- Vibration, broad-band random – long time test Fh (category 3: axle-mounted)
- Vibration, broad-band random – functional test Fh (category 3: axle-mounted)
- Shock testing – test Ea (category 3: axle-mounted)



Further, interference emission and interference immunity tests were conducted according to standard EN 50121-3-2:2016+A1:2019, confirming electromagnetic compatibility:

- Conducted continuous disturbance at battery port
- Radiated disturbance, electrical field
- Immunity radiated electromagnetic fields
- Conducted immunity, injected currents
- EFT / Burst
- Electrostatic discharge test / ESD

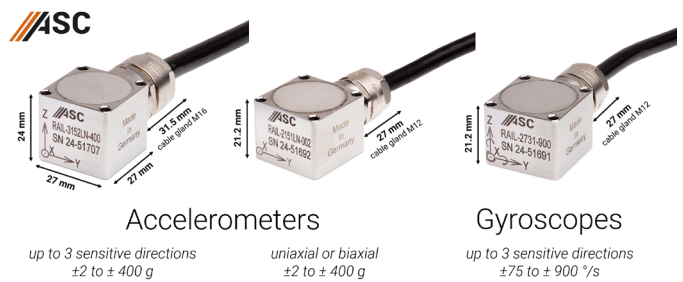
Robust Solutions Ready for Stable Long-Term Performance

In addition, all components of the ASC RAIL series were confirmed to meet the latest fire protection standards including EN 45545 for electronic equipment on rolling stock. This includes a robust, non-flammable, laser-welded stainless-steel housing featuring protection class IP68 as well as rail-certified cables and cable glands. Together with the proven in-built technologies this leads to a reliable sensor ecosystem capable of withstanding the hardest shocks, vibrations, temperatures and other adverse conditions typically encountered in rail applications. This ensures optimal performance and stable long-term operation of the sensor solutions even under the harshest conditions.

The standard accelerometers ASC RAIL-x152LN are available in uniaxial, biaxial and triaxial configuration. The newly developed, even more compact housing option is used for uniaxial and biaxial accelerometers ASC RAIL-x151LN, to fit them into narrower spaces.

Both accelerometer models are based on proven MEMS technology and capacitive operating principle. This technology enables the measurement of static (DC) and constant accelerations, which can be used to calculate the velocity and displacement of moving objects. Depending on the design of the spring-mass-damping system, however, it is also capable of detecting dynamic (AC) accelerations of amplitudes from $\pm 2g$ up to $\pm 400g$ and within a maximum frequency response range of up to 1kHz ($\pm 5\%$). The integrated electronic circuits enable differential analog voltage output ($\pm 4V$ FSO) and outstanding noise performance from 7 to $400\mu g/\sqrt{Hz}$.

The ASC RAIL-27x1 gyroscopes are based on established MEMS vibrating ring sensor elements. The design of



the micro-mechanical silicon structures makes these gyroscopes extremely insensitive to external impacts and vibrations. Their integrated electronic circuitry enables a single-ended, analog voltage output (0.66 to 2.64V FSO). These uniaxial, biaxial or triaxial gyroscopes are available in four measurement ranges (75°/s to 900°/s), featuring a bias stability of 12°/hr and an angular random walk of $0.2^\circ/\sqrt{hr}$.

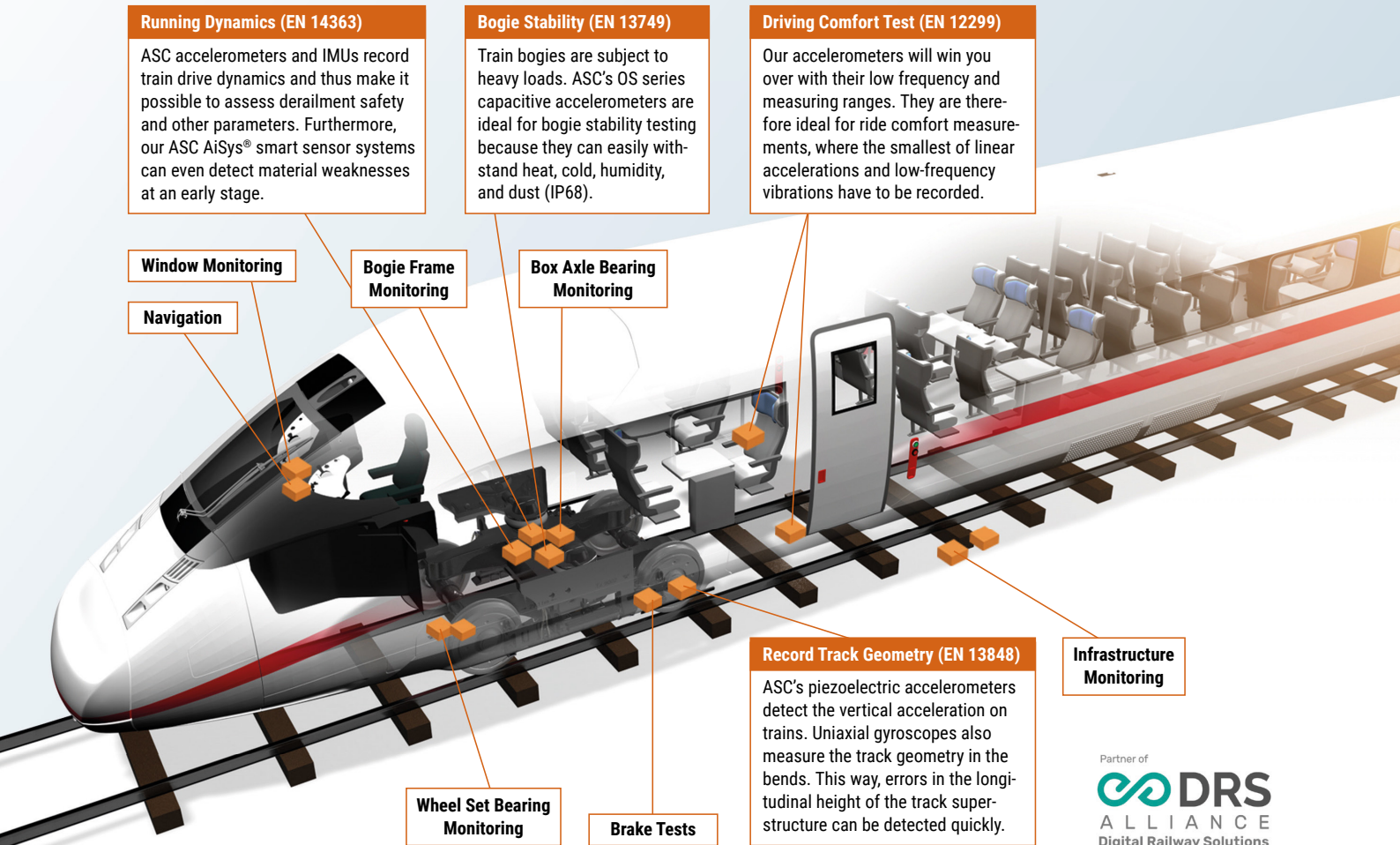
Convenience for Rail Operators

ASC has further started configuring special editions of this same series of dedicated RAIL sensor applications. By combining accelerometer and gyroscope sensor elements, an integrated sensor system featuring up to three degrees of freedom with individually adjustable measurement ranges can be achieved. Considering all possible variations, this leads to the most flexible precision sensor toolbox for railway operators. This comprehensive solution is available to accurately capture, evaluate and manage all relevant factors required by individual customers, in a small, highly robust inertial sensor box.

“In essence, rail operators can now mix and match from ASC’s ready RAIL series components in building customised sensor solutions to meet their unique needs,” concludes Markus Nowack, Application Engineer at ASC Sensors. *“Choosing from a proven set of inertial sensors meeting applicable national and international standards will significantly facilitate these tailor-made solutions, saving time and budget while strengthening safety and economic outcomes.”*

www.asc-sensors.de





ANALOG • DIGITAL • SMART

The evolution in sensor technology

For maximum safety and comfort in rail transport

High-precision measurement of smallest vibrations in vehicles and infrastructure is a basic requirement for safe, comfortable rail transport. Inertial sensors therefore play a key role in the design and localization of trains, as well as systems for monitoring tracks and bridges. Many manufacturers have long relied on accelerometers, gyroscopes and inertial measurement units from ASC for these tasks.

Based on this know-how, smart sensors from ASC enable new solutions for real-time monitoring, early detection of future material weaknesses as well as efficient and predictive maintenance applications.

With ASC, customers don't just get a sensor, but an individual comprehensive solution for its use.

