AVL BRAKE TORQUE SENSOR

Your unique solution for vehicle and testbed brake performance evaluation and optimization

THE CHALLENGE

While horsepower and powertrain performance might be the obvious factors of importance, it is the braking that is a big performance differentiator. Today´s brakes are the most powerful component in the vehicle, and they are becoming more complex than in the past: In hybrid or electric cars, power distribution between the electric motor and the braking system is essential to regulate the braking behavior as evenly and consistently as possible and not to overload one system excessively. Furthermore, residual braking effects (dragging) and emissions from abrasion are challenges that will be regulated in near future and must therefore be solved.

THE SOLUTION

The AVL Brake Torque Sensor is the unique solution to validate and optimize brake performance on testbeds and vehicles of any kind.

Developed and produced by AVL groups high-performance sensor specialist Piezocryst Advanced Sensorics GmbH, the sensor is tailored to fit any disc brake geometry to precisely measure forces exactly where they occur. This future-proof technology delivers measurement results to further improve modern braking systems.

The cutting-edge sensor allows a perfect torque characterization of complex brake system behavior with sampling rates of up to 5 kHz – which is highly dynamic compared to traditional solutions. It is designed to have the lowest possible impact on the test setup by installing it directly onto the brake system.

These unique characteristics make the new sensor interesting for most automotive sectors from racing teams, to OEMs and brake manufacturers.

PERFORMANCE BENEFITS & HIGHLIGHTS

- **Using the same Brake Torque Sensor** from early testbed stages throughout real-life track testing
- **Recording of brake events during track and open-road runs** under real-life conditions
- **Evaluating disc uniformity** thanks to highly dynamic measurements in order to ensure that no unnecessary or avoidable drag of the brake disc reduces the car's performance (Fig. 1)
- **Analyzing fading and the correlation of brake torque to the brake system pressure** for optimized braking behavior over long distance (Fig. 2)
- **Balancing between different brakes** (front vs. rear / left vs. right) is crucial for properly adjusting the brake balance on the vehicle (Fig. 3)
- **Measuring under various road and environmental conditions** to get an even deeper insight into the actual braking performance
- **Mounting** the 4 mm thin Brake Torque Sensor **as close as technically possible** directly between caliper and knuckle enables a direct measurement **at the place where the brake forces occur**. Due to the static mounting position the measurement is not influenced by the moment of inertia during wheel speed changes at all (Fig. 4)

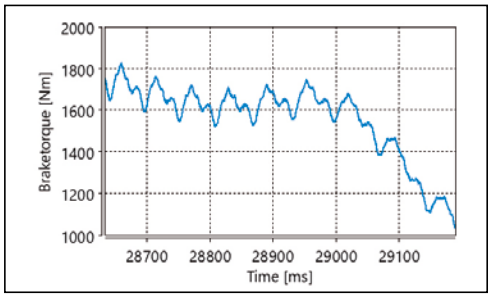

Fig. 1: Evaluate disc uniformity and detailed braking behavior

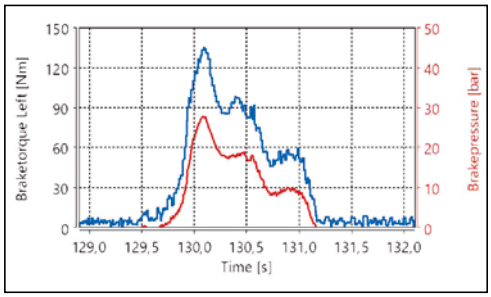

Fig. 2: Analyze fading and correlation to the brake system pressure

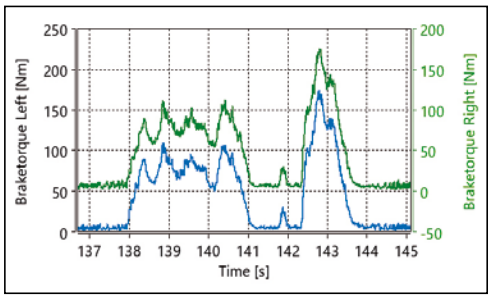

Fig. 3: Balancing between different brakes

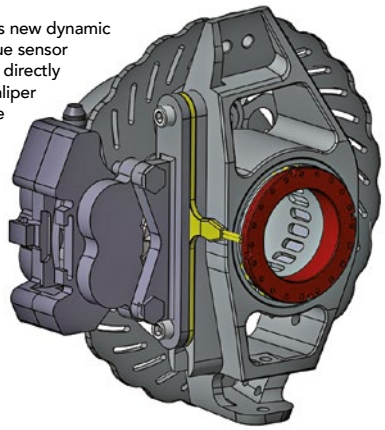

Fig. 4: AVL's new dynamic brake torque sensor is mounted directly between caliper and knuckle

TECHNICAL SPECIFICATIONS

Operating principle	Piezoelectric, charge output
Torque output	Mz axial
Dynamic torque range	Virtually unlimited (friction-type connection)
Accuracy[1]	±1% FSO
Resolution[2]	0.3 Nm
Natural frequency	>120 kHz
Standard bolt diameters	M6 ... M14
Brake types	Radial, axial
Charge amplifier	Analog (0 … 5 V)

[1] Empirically determined, depending on test set up
[2] At 5 kNm measuring range

FIND OUT MORE

AVL List GmbH, Hans-List-Platz 1, 8020 Graz, Austria
Patrick Dengg, Product/Key Account Manager

E-mail patrick.dengg@avl.com
www.avlracetech.com

April 2022, Classification Public