Continental tests sport tires using imc measurement systems

High-performance “SportContact6” tires meet the test track

Continental tires undergoing brake testing in wet conditions – data acquisition performed with imc measurement systems

Confucius on the test track

“Tell me and I’ll forget. Show me and I’ll remember. Involve me and I’ll understand.” One can demonstrate a new product most convincingly when the target group is included in field trials. What the Chinese philosopher Confucius formulated 2500 years ago still holds true today and is effective in product marketing. This is why, for the launch of their new high-performance SportContact6 tires, Continental chose to do track testing at the renowned Bilster Berg track in Germany. With its difference in track heights and multiple fast stretches, the Bilster Berg is an ideal location to test the SportContact6.

New Continental tires: SportContact6, ©Photo: Continental

Members of the press and product distributors were invited to try the new sport tires both in precision driving and with wet braking tests under the motto "Sixperience". It was exciting for the test drivers to compare their subjective driving experiences with the measurement data collected during the trials. A total of 15 sports cars were outfitted with imc BUSDAQ-X data loggers in their trunks which recorded measurement data during the test and, with imc LINK data transmission software, transmitted the data during the pit stop.

In order to give the participants at the launch event an insight into the tire development, they were able to test three different tires on the track after receiving a theoretical introduction. These included two test tires from the development program and the final product, in which the development goals were reached as a combination of the latter two: driving precision at high speeds and good traction under wet conditions. To bring these features to the street, Continental engineers improved the chemical composition of the tread, the tread pattern and the tire construction as compared to its predecessor.

Measurement system requirements

imc BUSDAQ-X: the compact and intelligent data logger

When choosing a measurement system, Continental had the following requirements:

- Data logger with GPS connectivity which can store measurement data autarkic during the actual test
- Software for automated remote transmission of measurement data in the pit

- Support for standard buses like CAN, LIN, FlexRay, J1939
- GPS connection
- Connect external CAN sensors
- Use of digital inputs for an auxiliary panel developed by Continental for displaying steering wheel angle and speed
- Compact and robust design for installation in the trunk
- Interface capability: data analysis should be possible with a Continental-developed evaluation program

imc BUSDAQ-X, Front

For their tire testing, Continental relies on the imc BUSDAQ-X universal and configurable multi-bus measurement system. The device works autarkic and is protected against supply outages by a UPS. With its signal-controlled Sleep Mode, the imc BUSDAQ is particularly suitable for fleet tests since its start-up time (Wake-Up-on-CAN) is only 200 ms.

The device can be expanded with additional interfaces on up to eight nodes and allows simultaneous measurement of all vehicle buses. An imc BUSDAQ can not only be connected to vehicle buses, but also sensors, measurement amplifier modules (e.g., imc CANSAS) or ECUs. Measurement data, status information, etc. can be read with the imc BUSDAQ. For test driving, its GPS capability and remote access to measurement data are also important criteria.

In the trunk of a test vehicle: imc BUSDAQ-X

The compact imc BUSDAQ systems are far more than simple loggers: they offer real-time evaluation and trigger options. Moreover, imc BUSDAQ supports different protocols, such as SAE J1939, which describes CAN bus communication in vehicles as well as control information.

Precision driving test: steering response of tires

© Photo: Continental

For precision handling, Continental is looking for accurate tracking when cornering, a small amount of steering input and direct steering response of the tires.

Assessment criteria for driving precision:

- Steering response: vehicle reaction to small amount of steering input
- Steering wheel angle demand: lateral

acceleration during large steering angles

Assessment methods for driving precision:

- Subjective: evaluation by test driver groups
- Objective: measuring relevant driving-dynamic parameters during specific driving maneuvers, data analysis of tire characteristics

© Photo: Continental

In order to test the responsiveness of the tire, small steering inputs were given during a slalom run at a speed of 110 km/h. Here, the imc BUSDAQ-X measurement device read steering wheel data from the vehicle bus - such as the raw values of the steering wheel angle, positive or negative direction, the calculated steering wheel angle, the raw value of the steering torque and the calculated steering torque. The imc BUSDAQ-X then stored this data on an internal storage medium. In addition to the steering wheel data, further data could be read, such as accelerator pedal raw values, brake pressure, fuel level and outside temperature.

Over external CAN sensors, x-, y-, and z-acceleration values, as well as the x- and y-ground speed were acquired and then time-synchronously written to the vehicle data on the storage medium.

The determination of the steering angle demand was made again during a slalom test (at 110 km/h), whereby the steering wheel turned within a predetermined angular range.

To facilitate the drivers' compliance with vehicle speed and steering angle and to obtain reasonable measurement results, the engineers at Continental developed an auxiliary panel for the cockpit. Thanks to markings placed on the steering wheel and LED indicators, it was possible for the untrained drivers to comply within the specified parameters.

Automatic measurement data transmission and status monitoring with imc LINK

Continental relied on imc LINK to implement remote access to imc measurement devices and to automatically transfer the data at the pit stop after the respective test run.

Brake testing in wet conditions

For brake testing in wet conditions, the vehicle underwent braking from 80 km/h to a full stop on a wetted track section. Vehicle and wheel dynamics during ABS braking in wet conditions were of particular interest.

© Photo: Continental

Braking behavior was recorded with an imc measurement device. The measurement data, together with the recorded speed values (x- and y-directions) via an external optical sys-

tem and a triaxial acceleration sensor for x-, y- and z-directions, as well as the information from the vehicle bus, were supplied for evaluation.

Additional information:

imc Meßsysteme GmbH

Voltastr. 5
13355 Berlin, Germany

Telephone: +49 (0)30-46 7090-0
Fax: +49 (0)30-46 31 576
E-Mail: hotline@imc-berlin.de
Internet: www.imc-berlin.com

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imc measurement systems work in mechanical and mechatronic applications offering up to 100 kHz per channel with most popular sensors for measuring physical quantities, such as pressure, force, speed, vibration, noise, temperature, voltage or current. The spectrum of imc measurement products and services ranges from simple data recording via integrated real-time calculations, to the integration of models and complete automation of test benches.
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