

Media Release

Jaguar Land Rover is using the best available technology to generate the real world data for accurate tyre modelling.

The automotive industry uses computer aided design (CAD) and computer aided engineering (CAE) widely to reduce design and development time and costs whilst improving quality and durability of the end product. Almost every aspect of a new design, from manufacturing processes to dynamic performance, can be verified before any metal is cut. One area where this is not true is in the tyre performance arena where the ability to model tyre performance is far less well developed. Jaguar Land Rover is one company taking steps to close the gap by using the best available technology to generate the real world data essential for accurate tyre modelling.

The method adopted by Jaguar Land Rover uses Kistler RoaDyn® Wheel Force Transducers for measuring the three forces and three moments of a rotating wheel under real world operating conditions. A large SUV fitted with four RoaDyn® measuring wheels and other sensors is used to gather data about tyre performance on a variety of on-road and off-road surfaces.



Fig. 1: Kistler RoaDyn® S660, mounted on rim.

An important advantage of the RoaDyn® system is the data signals from the six 3-component strain gauge load cells are amplified in the load cell and fed to the wheel electronics where the data are filtered, digitized and coded. This significantly reduces signal noise and crosstalk before the data stream is transmitted via a rotor/stator pair to the wheel inner side, transformed in the on-board electronics unit and output to a data acquisition device. In the Jaguar Land Rover installation, approximately 170 data channels are acquired, with large sampling rates to capture the transient behaviour of the tyre, producing a huge amount of data for each tyre/road surface combination. In addition to testing tyres on its UK test track, Jaguar Land Rover also run tests on a variety of on-road and off-road surfaces ranging from

vehicle dynamic platforms, to ice, snow and also mud to build up a comprehensive dataset for developing a highly precise, computer generated tyre model.

In common with other vehicle manufacturers, Jaguar Land Rover currently uses data from sandpaper covered belt test rigs. Whilst these rigs offer measurement consistency and repeatability, they do not represent real world road surfaces. The objective is to use the data from the RoaDyn system equipped vehicle, to develop a more accurate tyre model, relevant to real world driving conditions. The models can then be used in computer simulations to decrease development time and increase system robustness, resulting in a more efficient development process.

Simon O'Neill, Technical Specialist - Durability Measurement and Analysis at JLR, says, "In addition to providing much better quality real time data, the Kistler RoaDyn system is giving us greater insight into the performance of tyres, on and off road, which will enable JLR to significantly reduce physical testing, especially in environments with a restricted test window, for example winter testing.

This will not only cut development costs, it will, in the medium to long term, allow us to co-operate with the tyre manufacturers to design the tyre we desire based on simulation results. With the robust data from the Kistler RoaDyn programme we will be able to confidently apply CAE to every part of the development process, including the tyres.”



Fig. 2: Jaguar Land Rover uses Kistler technology.

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Kistler Group

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