

# Torque sensors help to test EV motors

Wireless rotary torque transducers are at the heart of a test rig being used to develop next-generation motor technologies for electric and hybrid vehicle powertrains.

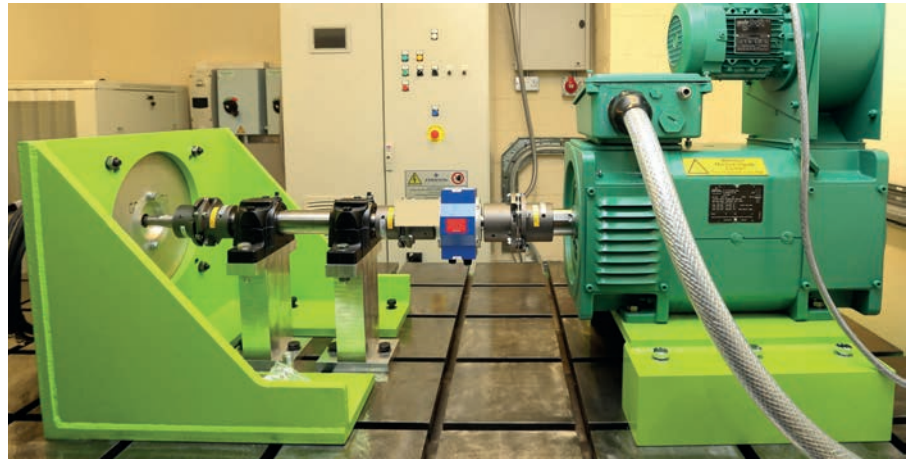
**A**vid Technology, based in Cramlington in Northumberland, is a leader in the design and production of electrified powertrain and advanced thermal management systems for heavy-duty and high-performance electric and hybrid vehicles. Its technologies can also improve the efficiency of conventional internal combustion engines through a combination of reducing parasitic losses, efficient thermal management, lubrication and waste heat recovery.

The company develops powertrains for a wide range of electric and hybrid vehicles, including high-performance passenger cars, heavy-duty trucks and buses, motorsport vehicles, and off-highway machines. Its high-efficiency electric motors and power electronics technologies result in class-leading electrified powertrains and propulsion systems.

To test and characterise the electric motors that it uses in its electric and hybrid powertrains, Avid has designed and built a special-purpose test rig. The rig incorporates an wireless rotary torque measurement device from Oxfordshire-based Sensor Technology.

This non-contact surface wave acoustic (SAW) transducer is said to offer significant advantages over the strain gauges, magnetic torque sensors or optical devices that are typically fitted to a conventional dynamometers used to characterise the performance of electric motors.

The TorqSense torque sensors incorporate



two tiny SAW devices made of a ceramic piezoelectric material that contain frequency-resonating “combs”. These are glued onto the drive shaft at an angle of 90 degrees to each another. As the torque increases, the combs expand or contract in proportion to the torque being applied. In effect, they act in a similar way to strain gauges, but measure changes in resonant frequency.

A nearby RF device emits radio waves towards the SAWs, which are then reflected back. The change in frequency of the reflected waves indicates the current torque. There is no need to supply power to the SAWs, so the sensor is non-contact and wireless.

These characteristics make the transducers ideal for use in the drive test rig. According

Avid Technology is relying on innovative torque transducers in its automated test rig for electric motors

to Avid Technology sales director, Jordan Taylor, the sensors “allowed us to use a fixed pedestal load motor and eliminate frictional losses and parallax errors from the load installation in the measurements”.

This is allowing the company to produce “very accurate performance characterisation results compared to a conventional motor dynamometer”.

Not only has the sensor delivered superior and more accurate characterisation results, it also enabled Avid to design a simpler test rig. The company is confident that the rig will be a key in helping it to provide even smarter powertrain electrification, and to deliver its vision of a cleaner, greener world. ■

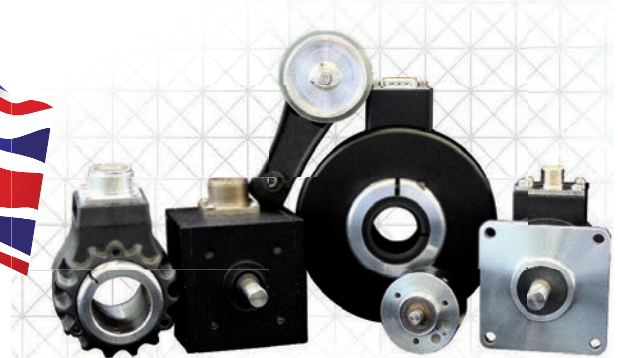
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