



DESIGNING AND BUILDING A RIG TO TEST AND CHARACTERISE THE MOTORS USED IN ELECTRIC AND HYBRID POWERTRAINS

Energy consumption and exhaust emissions contribute significantly to climate change, urban air quality and the rising cost of energy. With governments around the world driving moves towards a future where air is cleaner and transport more sustainable, the UK government has introduced its draft clean air policy, and announced that sales of petrol-only and diesel-only vehicles will be banned from 2040, bringing the role of hybrid and electric vehicles to the fore.

AVID Technology designs and manufactures electrified powertrain and advanced thermal management systems for heavy-duty and high-performance electric and hybrid vehicles. Its technology also improves conventional internal combustion engine efficiency through parasitic loss reduction, efficient thermal management, lubrication, electrified ancillary systems and waste heat recovery.

The company develops powertrain improvement solutions for a wide range of electric and hybrid vehicle applications, including high performance passenger cars, heavy duty buses and trucks, as well as motorsport vehicles and off highway machinery. Its high efficiency electric motor and power electronics technology is said to deliver class-leading electrified powertrains and propulsion systems.

In order to test and characterise the high performance electric motors used in electric and hybrid powertrains, the company designed and built a test rig, central to which is a wireless rotary torque measurement device from Sensor Technology.

The non-contact surface wave acoustic (SAW) transducers are robust and highly accurate. TorqSense torque sensors use two tiny SAW devices made of ceramic

piezoelectric material containing frequency resonating combs. These are glued onto the drive shaft at 90° to one another. As the torque increases the combs expand or contract proportionally to the torque being applied. In effect the combs act similarly to strain gauges but measure changes in resonant frequency.

The adjacent RF pickup emits radio waves towards the SAWs, which are then reflected back. The change in frequency of the reflected waves identifies the current torque. This arrangement means there is no need to supply power to the SAWs, so the sensor is non-contact and wireless.

As a result of this, the transducers are ideal for use in the stepper drive test rig.

Jordan Taylor, AVID Technology sales director, commented: "The TorqSense transducer was chosen as it allowed us to use a fixed pedestal load motor and eliminate frictional losses and parallax errors from the load installation in the measurements. This allows AVID 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.

Sensor Technology
www.sensors.co.uk

The SAW device has performed flawlessly in the application to date. As a result, AVID Technology is confident that its test rig will be key in enabling it to provide even smarter powertrain electrification, delivering on its vision of a cleaner, greener world



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