

Testing time for vacuum cleaner maker

A company that designs and builds custom test equipment for the manufacturing and research industries has developed a cost-saving sub-system that allows eight dynamometer test rigs to share a single calibration unit based on a digital TorqSense transducer from **Sensor Technology**

The company, 1st Pass of Westbury in Wiltshire, started out as a regional systems integrator for National Instruments' LabVIEW software packages. However, it quickly realised that there was a considerable need for a wider service encompassing all aspects of test rig design and build.

Founder and managing director, Chris Turner, explains: "Engineers involved in either research or quality control need test rigs, but designing them is not their forte. They tend to focus only on the immediate requirements so tend towards inflexible, mono-functional designs. Six months later when new requirements emerge, they have to build another rig.

"We saw this as a gap in the market and decided to offer the full package whereby we would interview the engineers to establish likely future requirements, then design and build a test rig or test station that addresses all of these. This includes electrical and mechanical design, software, firmware, and support systems. We will also install, calibrate and maintain the rigs."

Eight separate rigs required

Recently Turner was asked to visit a major West Country manufacturer to assess its needs for life testing electric motors. The company has a sizeable research and development function and it was decided that no fewer than eight separate rigs were required. These were to be based on the well-proven concept of the test motors driving against a brake, with dynamic performance data collected from around the rig and analysed using LabVIEW.

With the rigs' workload expected to be high, it was sensible to go for a solid design that would last through many

years of punishing duty. However, this stretched the budget so Turner applied some lateral thinking and came up with a solution.

He says: "We needed to be able to calibrate and recalibrate the rigs on a regular basis, and we wanted the calibration process to be as simple as possible. I was able to use a TorqSense with an RS232 output for this, a sensor that can monitor the torque in a rotating shaft without actually touching it, as it opened up the potential for fool-proof, robust yet sensitive calibration."

TorqSense technology uses a radio frequency (RF) transmission link. This picks up resonant frequency signals from two piezo ceramic combs, surface acoustic waves (SAWs), fixed onto the shaft, which vary their frequency as the combs deflect under the effects of applied rotational torque. So as torque increases the combs change their

resonant frequency proportionally to the change in applied torque caused by the rotating shaft.

Turner says: "The SAWs function very much like strain gauges and the RF coupling used to supply power to the SAW devices - being piezo based they need less than one milliwatt of power - is transmittable as a radio frequency and eliminates interference.

"Initially we assumed that each rig would have its own on-board calibration unit, but as they were only used at



TorqSense's non-contact operation and lack of flying leads make demountable installations an attractive possibility

the beginning of each test run and would actually be idle the vast majority of the time, I began to wonder about developing a demountable unit that could be shared around all the rigs."

TorqSense's non-contact operation and lack of flying leads make demountable installations an attractive possibility, so Turner knew he had to come up with an easy way of achieving accuracy of the transducer's positioning. He called Sensor Technology and arranged a brainstorming session, where sliding

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the TorqSense unit up against end stops was identified as the best solution.

"To do this we had to find a way to move the brake away from the motor so that we had room to slip the calibrator in," he says. "It was fairly obvious to mount the brake on a slide too; this was a simple solution that required little re-designing of our original concept."

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