Shaft torque sensors prove vital for success of hydraulics projects

Innovative TorqSense wireless sensors from **Sensor Technology** are playing an important role in new product development for Hydraulic Projects Limited (Hy-Pro), one of the UK's leading developers and suppliers of hydraulic drive units for marine steering and autopilot systems

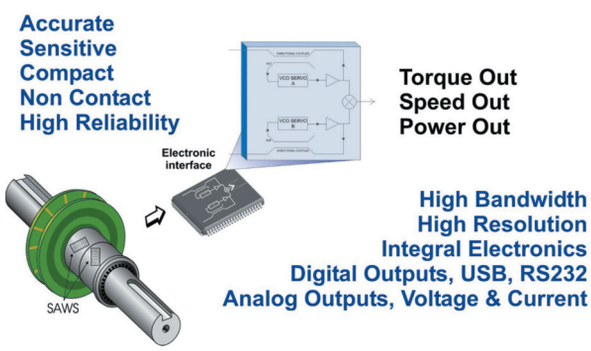
The sensors, which accurately measure shaft torque in rotary drive systems, are providing the essential data that Hy-Pro needs to refine the design of the electrically powered pump assemblies used in the high-performance hydraulic steering systems that the company supplies for use in yachts and other small pleasure craft.

Developing suitable pump assemblies for these marine applications in small vessels is challenging. The motors must operate economically as electrical power is usually derived from 12V or 24V storage batteries with limited capacity, yet the pump systems must be able to supply high power when called upon to do so, to ensure that the steering systems continue to operate reliably in heavy seas and bad weather.

To ensure that its products offer the best possible performance in relation to these seemingly conflicting requirements, Hy-Pro is constantly evaluating potential improvements to its pump drive systems. A crucial part of the evaluation process is accurately measuring the torque delivered by the electric drive motor to the pump, under varying load conditions and over a wide range of speeds, in a purpose-built test rig.

"We considered various ways of measuring the torque in the motor shaft on the test rig," says Barry Wynn, senior design engineer at Hy-Pro, "but all were either inconvenient or were incapable of delivering the accuracy and fast response we needed. Then we looked at TorqSense sensors from Sensor Technology, and realised that they offered a reliable, easy-to-use and cost-effective solution that would meet all of our requirements."

TorqSense sensors, which are covered by patents, depend for their operation on surface acoustic wave (SAW) transducers. These transducers comprise two thin metal electrodes, in the form of interlocking 'fingers', on a piezoelectric substrate such as quartz. When an RF signal of the correct frequency is applied to the transducer, surface acoustic waves are set up, and the transducer behaves as a resonant circuit. The key feature, however, is that if the substrate is deformed, the resonant frequency changes. When the transducer is attached to a drive shaft, the deformation of the substrate and hence the change in resonant frequency will be related to the torque applied to the shaft. In other words, the transducer, in effect, becomes a frequency-dependent strain gauge. Since the transducers operate at radio frequencies, it is easy to couple signals to them wirelessly. Hence, the TorqSense sensors incorporating the SAW transducer technology can be used on rotating shafts, and can provide data continuously without the need for the inherently unreliable brushes and slip rings that are often found in traditional torque measurement systems.



TorqSense wireless sensors are providing data needed to refine the design or electrically powered pump assemblies for high performance hydraulic steering systems used in small pleasure craft

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In the Hy-Pro application, a TorqSense sensor is used to measure the torque applied to the pump over the critical speed range of 500 to 4,000 rpm. The results are displayed in real time, so that the progress of tests can be readily monitored, and are also captured and stored for more detailed analysis later with Labview software.

"The TorqSense sensor has proved to be completely dependable and very accurate," says Barry Wynn. "The data it has provided us with has played an important role in helping us to refine our systems by ensuring an optimum match between the characteristics of the pump and motor over the full operating range."

"In fact, the insights we've gained during tests have enabled us to further enhance the performance and reliability of our steering and autopilot systems, which, of course, means big benefits for our customers and a very useful boost to our own competitive position."

Wireless sensor for dry contact applications

Banner Engineering's SureCross Q45 Remote Device (RD) model, is the latest addition to the company's line of wireless sensors. The Q45 RD model is capable of interfacing with isolated dry contacts or PNP outputs, allowing the RD to interface with almost any digital sensor. It also features a mode where it interfaces directly with NAMUR inductive proximity sensors.

In addition to flexibility, the RD model delivers the longest lifetime of all Q45 sensors. The Q45 RD model operates on less than 100uA of current, allowing the battery to last up to five or more years depending on the application.

"The RD model extends the flexibility of our SureCross Q45 wireless sensor family even further," says Bob Gardner, senior product manager at Banner Engineering. "With the ability to interface with any PNP or dry contact outputs, the RD model provides our customers with the flexibility to solve diverse industrial control applications. This is the ideal solution for call for parts or call for service applications."

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