A testing time for valve actuators

Robust non-contact transducers from **Sensor Technology** have been used on a rig designed to test the motors used in valve actuators

Actuators are found in applications in power generation, water and sewage, industrial processes, subsea, marine, HVAC, incinerators and cement plants, where they face challenging environmental conditions, as well as high costs associated with downtime. As a manufacturer of electric, pneumatic and hydraulic valve actuators, control systems and other products, Rotork Controls therefore needs to ensure its products are robust and reliable to meet requirements.

The company's electric valve division, for example, offers an electrical solution to industrial valve control and actuation applications of virtually any size, description and complexity. Taking an oil line as an example, any failure of the valve actuator could potentially cost millions of dollars per day. Absolute reliability is essential, so testing is vital.

Actuators are used in a range of applications where they face tough environmental challenges

Motor testing

Rotork Controls' custom actuator designs are built around motorised gearboxes, using non-standard open frame motors. A variety of motors are used depending on the particular application, including DC motors, single-phase motors and three-phase motors. But, the company does not rely on off-the-shelf products, instead using open frame motors that it integrates directly into its own systems.

Commenting on the need for testing, Geoff Beeho, chief development engineer, said: "The duty cycle is atypical – our motors are not in continuous use, only running intermittently and for short periods. What is important to us is the short term ratings, and this data isn't always readily available. We have to have performance data that will tell us exactly what we need to know about the motors in these most demanding applications."

To meet requirements, the company built a motor test rig using non-contact TorqSense transducers from Sensor Technology.

A non-contact solution

TorqSense transducers are robust non-contact devices that operate using surface acoustic wave (SAW) principles. In the transducer, surface waves are produced by passing an alternating voltage across the terminals of two interleaved comb-shaped arrays, laid onto one end of a piezoelectric substrate. A receiving array at the other end of the transducer converts the wave into an electric signal.

The frequency is dependent upon the spacing of the teeth in the array and as the direction of wave propagation is at right angles to the teeth, any change in its length alters the spacing of the teeth and hence the operating frequency. Tension in the transducer reduces the operating frequency while compression increases it. To measure the torque in a rotating shaft, two SAW sensors are bonded to a shaft at 45° to the axis of rotation. When the shaft is subjected to torque, a signal is produced which is transmitted to a stationary pick up via a capacitive couple comprising two discs, one of which rotates with the shaft, the other being static.

The common practices of over-specifying a motor to guarantee reliable operation in standard applications simply doesn't apply in valve actuation, explained Beeho. "If we put in a motor that is too big, then we can risk damaging the valve. We can use motors that appear to be under-rated, but because our duty-cycle is so short we can get better performance from the motor. But the performance data to support this sort of motor use isn't always available, or isn't always reliable, so we need to perform our own tests. We also need to know how our motors will handle extremes of temperature in given applications so that reliability is never compromised. The TorqSense transducers allow us to make all the required tests."

Of benefit in the test rig, the transducers provide both analogue and digital outputs. This enables the company to use one output to check the calibration of the other, and also means it has the flexibility to use both outputs when performing different tests.

Beeho explains: "For example, we might use the analogue output to feed torque and speed data into the power analyser during a performance test, and then use the digital output for a temperature test. Here, we run the motor for 15 minutes at constant torque and see how hot it gets. The output from the TorqSense transducer allows us to close the loop so that we can keep the torque constant."

With its comprehensive testing procedures built around the TorqSense transducers, Rotork Controls has the confidence that its electrically operated valve actuators will always meet the application requirements.

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Automatically measuring concrete blocks

A fully automatic in-process inspection system has been developed by R&W Industrieautomation of Germany to measure and record the height of concrete blocks during production.

The system uses Micro-Epsilon's optoNCDT 1700-500 laser displacement sensors. These non-contact sensors incorporate the company's patented 'Real Time Surface Compensation' (RTSC) technology and remote software programming, but also offers excellent linearity and resolution, it explains. Integrated conditioning electronics enables the sensor to have a compact design. For this application, the sensor was customised in a double width enclosure, and needed to be robust, with a measuring range up to 500mm and resolution down to 30µm.

The measurement system is placed as close as possible behind the concrete block making machine, above the transport conveyor for the baseboards. The blocks running below the device are scanned by the sensor and measured to an accuracy of ±0.5mm. At the same time, the blocks' baseboards represent the reference distance.

R&W integrates a powerful micro-controller with an Ethernet interface into the sensor, as well as digital I/Os. This complete automated measurement system enables complex evaluations of sensor data, communication with master control devices, as well as graphical data visualisation via web servers.

As well as precise measurement, the sensors are also used for tolerance or limit monitoring.

Micro-Epsilon **T: 0151 355 6070** **www.micro-epsilon.co.uk** **Enter 665**