Torque sensor makes sense for traceability

Total traceability extends to packaging as well as product in the world of pharmaceuticals and to this end Capcoder of Oxford has adopted a novel torque sensing system, using a product from **Sensor Technology**, for the datalogging capabilities of its bottle sealing machines

When product integrity is paramount, packaging has a key role to play. It has to be secure enough for protection in all scenarios, but has to be easy to open in high tension situations.

Hospital staff who need to use diagnostic fluids on patients will not take kindly to bottle tops that prove difficult to open but they will want them to feel secure enough that they can be confident of the fluid's sterility.

To this end specialist capping machines have been developed by Capcoder, which not only tighten bottle caps within precisely defined tolerance but also log every detail of every bottle capped.

"Our machines are simple," says Roger Brown of Capcoder. "Filled bottles are presented to a torque head, which quickly screws on a cap.

"A batch size is typically 10,000 bottles, which we have to cap at say one per second. Every cap has to be done up to the same torque, and we have to provide proof of this performance. Sterility has to be ensured – the machine may even be working in a high vacuum to ensure no bacteria or other contaminants are present. Put all this together and you end up needing a highly engineered machine."

Sensor Technology's TorqueSense provides total traceability in the world of pharmaceuticals

As the need for traceability emerged, Capcoder realised it would have to develop a standard solution. And because exports are the lifeblood of such an OEM, flexibility to meet different countries' standards had to be designed in from the outset.

Brown says: "Our philosophy is to have a simple machine design that avoids extraneous parts. This led us to the idea that we'd like the torque sensor to be wireless."

Looking at torque sensors available on the market, one, TorqSense from Sensor Technology in Banbury, stood out as meeting all criteria required.

Mark Ingham of Sensor Technology says: "We could use TorqSense 'as is' for this application; we just needed to work out mounting arrangements. Similarly, the associated software was ready to go after a bit of calibration and some front end graphics."

TorqSense is wireless in that it does not need to physically contact the bottle caps or shaft of the torque head it is monitoring. Instead sensing is achieved through a radio frequency link. Two tiny piezoelectric combs are attached to the shaft of the torque head, perpendicular to one another and at 45 degrees to the axis of the shaft. These form half of a Wheatstone bridge circuit, which is in radio contact with the other half in the main body of the TorqSense.

"When the shaft rotates a phenomenon known as Surface Affect Waves causes one comb to expand and the other to contract, changing their electrical resistance in proportion to the speed of rotation" says Ingham. "This unbalances the bridge and generates a signal indicating the torque value."

With the Capcoder project, software was required to do two things: run the torque up to 10kgcm within tolerances of 10 per cent, and record the actual value achieved. This secures the cap to the bottle at a level of tightness that ensures security and sterility, yet is at a level that can be opened easily by an adult. The logged values are saved to a hard drive to provide a permanent record for traceability purposes.

Roger explains: "Diagnostic fluids are distributed to every hospital in the country, where they may be stored for months before use. Tracing each bottle's origin would be practically impossible without full records being automatically produced and saved to a central location. We found a solution to this complex but critical problem using an out-of-the-box technology.

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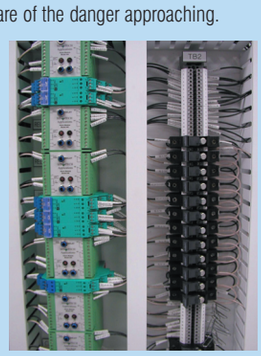
Automated trip system to prevent overfill

Sis-Tech's Automated Overfill Protection System (AOPS), a safety instrumented system (SIS), is designed to prevent dangerous overfill conditions in terminals, tank farms and process vessels. The AOPS incorporates a non-programmable logic solver that receives signals from switches or transmitters, determines if an abnormal process condition is present, and provides outputs to close isolation valves, shut down transfer pumps, or open diversion valves.

The AOPS is said to prevent overfill conditions that can result in vessel damage and release of hazardous chemicals to the environment. It can also prevent underfill conditions causing loss of suction to transfer pumps and potentially pump damage. The key problem in levels is even though a tank may be approaching a dangerous overfill condition, the steadily increasing level does not cause any alarm conditions. This makes it difficult for an operator to be aware of the danger approaching.

Automated trips may be a suitable solution as they ensure protection even when the operator is focused on other duties. The AOPS, can detect high level and prevent filling beyond the safe fill limit. The system uses independent sensors such as a switch or transmitter to detect high level, and independent final elements such as a motor control circuit or block valve to divert or terminate feed. The SIS trip action is automatically initiated at a setpoint that allows time for the action to be completed safely. Risk analysis determines the safety integrity level required to ensure that the overfill risk is addressed.

The AOPS is a low-cost, stand-alone, independent, non-PE logic solver. Rated for -30˚C to 75˚C it can be installed in the harshest process units near the tank. As compared to safety PLCs, total lifecycle costs are said to be 50 per cent less.



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