Advanced versatility

A NEW CABLE EXTENSION SENSOR TECHNOLOGY HAS BEEN DEVELOPED TO THRIVE IN HARSH ENVIRONMENTS

Who hasn't measured distances between two points with a tape measure? This is the basic principle of how cable extension sensors, also known as draw-wire sensors or pull-wire sensors, work to measure displacement. This technology has been used for over 60 years in varying degrees of development and has become well proven in many different applications. But where is this technology today – and is it qualified for applications in extreme harsh environments such as mobile machines and industrial vehicles?

Versatile technology

Cable extension sensors determine linear position by unrolling a measuring cable. The measuring cable is coiled onto a drum and uncoiled against the retraction force of a tensator spring system. The unwinding process converts the linear movement into an angular movement. This is detected by an angle sensor element and converted into an electrical output signal. Several advantages make these sensors so versatile: compact sensor housings, measuring lengths up to 60,000mm and a simple and space-saving installation process.

Optical encoders prone to fail under harsh conditions

Applications in harsh environments, such as in excavators, cranes, forestry machines or wind power turbines, expose sensors to a lot of everyday issues: shocks, vibrations, moisture as well as extreme temperature differences and dirt. Conventional cable-extension sensors generally use potentiometers or optical encoders to detect the angular movement of the cable uncoiling from the drum.

The core of an optical encoder is a coding disk made of glass, plastic or etched metal structures with light/dark coded fields or etched slot structures in metal disks. However, under harsh environmental conditions optical encoders quickly reach their limits due to their sensitive design. Moisture or water can penetrate the sensor housing through capillary effects, causing damage to cables and ultimately lead to corrosion of the electronics. Inadequate sealing of the housing can also lead to contamination of the encoder disk with dust and oil and ultimately to sensor failure.

ABOVE: **ASM Sensor's Posiwire absolute encoder group of cable extension sensors**

New encoders prevent early failure

ASM Sensors has developed a new generation of cable extension sensors made for harsh environments. Instead of sensitive optical encoders or potentiometers these sensors are equipped with a magnetic non-contact multihall technology. In contrast to optical encoders, magnetic encoders work on the basis of ferromagnetic measuring standards and modulate a magnetic field. The modulation of the magnetic field is detected and evaluated by hall or multi-hall sensors. They are connected to a microprocessor, which calculates the absolute angle by basing its computations on the proportions of all the hall elements.

Unlike optical encoders which have fragile and breakable code discs, the new magnetic encoder technology is resistant to high shocks and impacts. The new generation Posiwire cable extension sensors is furthermore designed with completely encapsulated electronics. Thus, temperature fluctuations, vibrations, shocks and any kind of contamination such as dust or moisture cannot damage the magnetic encoder. Compared with optical encoders, magnetic encoders are able to tolerate harsh environmental conditions.

Equipped for tough conditions

Conventional cable extension sensors often reach their limits when used in harsh environments. The new generation of Posiwire sensors uses a new robust magnetic encoder technology. The non-contact magnetic multi-hall encoder technology is able to reliably detect measuring data even if the sensor housing is filled with water or oil. Combined with encapsulated electronics and rugged housings the new sensor generation is significantly more robust than conventional cable sensors.

Posiwire sensors with magnetic absolute encoders are therefore able to provide a superior solution for linear position measurement in outdoor applications such as mobile machines or industrial vehicles. The sensors measure linear position up to 40,000 mm. They reach a protection class of up to IP69, depending on the sensor model. Digital (CAN, CANopen or SAE J1939) or analog outputs (voltage or current, U2, U8, I1) are available. For safety applications, the sensors can be equipped with redundant channels. **iVT**

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