CANopen condition-monitoring sensor for mobile machines

The VMB sensor monitors vibrations in three spatial directions (Source: ifm electronic)

Mobile machines are frequently subjected to harsh working conditions and environments, so smooth operation is crucial. For this reason, it is essential to monitor both the process and the condition of critical machine parts. CiA member ifm electronic (Germany) has launched the VMB sensor with CANopen connectivity, to monitor mobile machine parts.

Vibrations and temperature changes are key characteristics that can provide an early warning of issues such as damage to rolling bearings, dirt deposits on rotating components, and inadequate lubrication. Due to the CANopen protocol, the introduced VMB vibration sensor has been specially designed for mobile machines. It can help recognize costly machine downtime at an early stage and reliably prevent it.

The condition monitoring sensor can detect vibrations continuously in all three spatial directions. From the measured values recorded, the sensor calculates indicators to evaluate the machine condition: information on fatigue (v-RMS), mechanical friction (a-RMS), shocks (a-Peak), early detection of bearing wear (crest factor), real-time bearing analysis (bearing-scout) and dynamic unbalance analysis at the speed of the driven machine. As an additional wear indicator, the surface temperature is also transmitted.

Communication with a higher-level host controller is possible via the CANopen interface. The supplier also ▷

Accelerometers and inclinometers with CAN

(Source: Althen)

Althen (Germany) introduced the Ruby series of the MEMS accelerometers and inclinometers. The IP67-rated devices with 9-pin D-Sub or M12 connectors are dedicated for demanding environments. Designed to replace the predecessor JMA, JMI, AMH, AMI, AML, and AMS series, these sensors provide higher performance and expanded connectivity e.g., for CAN and EIA-485. The products are available with single or dual power inputs and output options of 0 V to 5 V, +5 V, or 4 mA to 20 mA. Possible applications include buildings and infrastructure, railway and transportation, aerospace and defense, industrial automation as well as geotechnical and seismic monitoring.

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Dynamic inclinometer

(Source: Signalquest)

CiA member Signalquest (U.S.A.) offers the Gravitygyro inclinometer, coming with a CANopen or a J1939 interface. It provides three-axis orientation (pitch, roll, and yaw) even in the presence of high shock, magnetic interference, acceleration, and vibration. The SQ-GIX-2150 sensor employs a stability temperature-compensated ceramic-packaged MEMS (micro electro-mechanical system) accelerometers and gyroscopes for long-term performance and reliability. The complexity of multi-axis inertial calibrations, quaternion angles, Kalman filters, and dynamic adaptive sensor fusion is handled by the device itself. It is a drop-in upgrade for legacy inclinometers and magnetic AHRS (attitude and heating reference system) devices. *hz*

offers CANopen products, enabling communication between machines and a cloud solution and allowing data to be sent directly from remote machines to the cloud. The sensor can also communicate with CANopen devices from other manufacturers.

The VMB sensor can withstand harsh environmental conditions. The measuring cell operates at ambient temperatures ranging from -40 °C to +80 °C, and meets the stringent protection ratings of IP6K7, IP6K8, and IP6K9K. The product has also been granted E1 vehicle approval.

Typical applications

The autonomous operation of mobile machines in sectors such as agriculture, municipal technology, and construction is becoming practice. This improves cost efficiency and precision while reducing the operator's workload. There is no longer a machine operator on site, who could recognize sudden error states or unexpected events at an early stage. Innovative drive concepts, such as electric or hydrogen drives, also require more intelligent machines. These drive technologies are more sensitive to shocks and vibrations than robust diesel engines and should therefore be observed with a condition monitoring system.

Business models, such as renting out machines or offering machine performance as an 'as-a-service' model, also require fleet management and continuous remote access in real time. The launched condition monitoring sensor acts as the service technician's watchful eye on site.

The new VMB makes condition monitoring of mobile machines possible and is used in numerous industries and sectors. The range extends from self-propelled mowers for the municipal sector to pumps used as rental equipment in mines worldwide and rail-mounted stacker cranes in harbor facilities. ◀

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