

## New-generation vibration sensors produced

SCHALK BURGER | FEATURES REPORTER

**A** new generation of piezoelectric vibration sensors, produced by vibration analysis hardware company Connection Technology Center, are highly robust and come with a lifelong guarantee.

The product is used in rotation vibration monitoring systems and certain models are for general plant use, but there are also sensor and cable ranges that are intrinsically safe for use in areas that might have dangerous gases in process plants and in mines, says vibration monitoring solutions company Engineering Dynamics MD **Christo van der Walt**.

A vibration monitoring system analyses the pattern of vibrations from rotating parts in machines, coupled with the specific placement of the monitors on the machines, to read particular vibrations from certain parts of the machine.

These analyses can then be used to determine whether the vibrations are caused by a bent shaft, misaligned shafts, broken teeth on gears, cavitation or turbulence in pumps, and a range of other problems that cause premature machine failure, he explains.

This means that the system can be used to accurately assess what fault will lead to machine failure, such as broken teeth on gears or worn bearings, and to do predictive maintenance or repairs on machines, reducing failures and enabling increased intervals after each maintenance, he says.

"Instrumentation can play a very important role in assisting mechanical engineers to maintain their equipment more easily by using meaningful technical data," he states.

### Applications

The systems have a number of applications, which include use in trackless mining operations in coal mines, moni-

toring the vibrations from fridge plants and ventilation fans on all mines, and in process and beneficiation plants to monitor the rotating machine parts, including drives, pulleys, gearboxes and bearings.

The sensors have a ring of piezoelectric crystal inside each sensor. This crystal is grown in a laboratory and creates

minuscule electric charges when compressed.

This charge is converted inside the sensor into a voltage that can be sent to the monitoring equipment.

Because there are no moving parts, the sensor does not change calibration during operations.

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### INTRINSICALLY SAFE

Both the sensor and its cables are intrinsically safe for use in areas where flammable gases are present, such as hydrogen gases in modern battery rooms

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The only specialist part of the sensor's installation is its precise positioning on equipment to read different vibrations, such as the vibrations of the bearings or the gears in the gearbox.

Engineering Dynamics often manages the placement and the drilling and tapping of the sensor to provide accurate readings for clients, says Van der Walt.

"Some equipment on mines can take between three and six months to replace or to source spare parts, especially older or purpose-designed equipment pieces.

"This means that vibration monitoring can be of significant value in mines and mine process plants.

"Specifically, platinum and coal mines in South Africa use on-site condition monitoring on large numbers of machines, but the system has applications in all mines," he says.

#### Maintenance

The sensors have no moving parts and are very robust, need-

#### Remote Monitoring

By using a communications device and a modem, an operator can dial into the system and use fast Fourier transforms, or vibration spectrums, time waveforms and overlaying fault frequencies, to pinpoint the vibration problem. Engineering Dynamics' Emonitor software must reside on a server where the operator can access it, if permitted by the company's firewall restrictions. Further, if the plant's PLC system supports DeviceNet, then four bands of data can be extracted that are pertinent to areas of interest, such as the pinion gearmesh frequency and others, as single values to be trended in the Scada system.

The moment one gives close attention to anything, even a blade of grass, it becomes a mysterious, awesome, indescribably magnificent world in itself.



#### PIEZOELECTRIC CRYSTAL SENSOR

The piezoelectric crystal is grown in a laboratory and creates minuscule electric charges when compressed

ing no maintenance except for routine inspections.

The units are drilled and tapped into a machine, with the sensor surface fastened tightly to the machine's surface using a mounting stud or adhesive mounting pad. The company also inspects sensors for output and correct operation, he explains.

"Vibration protection is affordable and easy to integrate into installations. The systems are robust, can make maintenance work easier and also provide additional information to the operator," Van der Walt says:

For example, it was accidentally discovered that the piezoelectric crystal has a linear increase in charge output as temperature increases, which means that it can also be used to accurately sense temperature.

The dual temperature and vibration sensor is currently popular in Australian plants and monitoring applications and is available in South Africa, he concludes.

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