Continuous Condition Monitoring for Indoor Crane Motors

Vibration Sensor Detects Wear and Critical Deviations

At a Glance

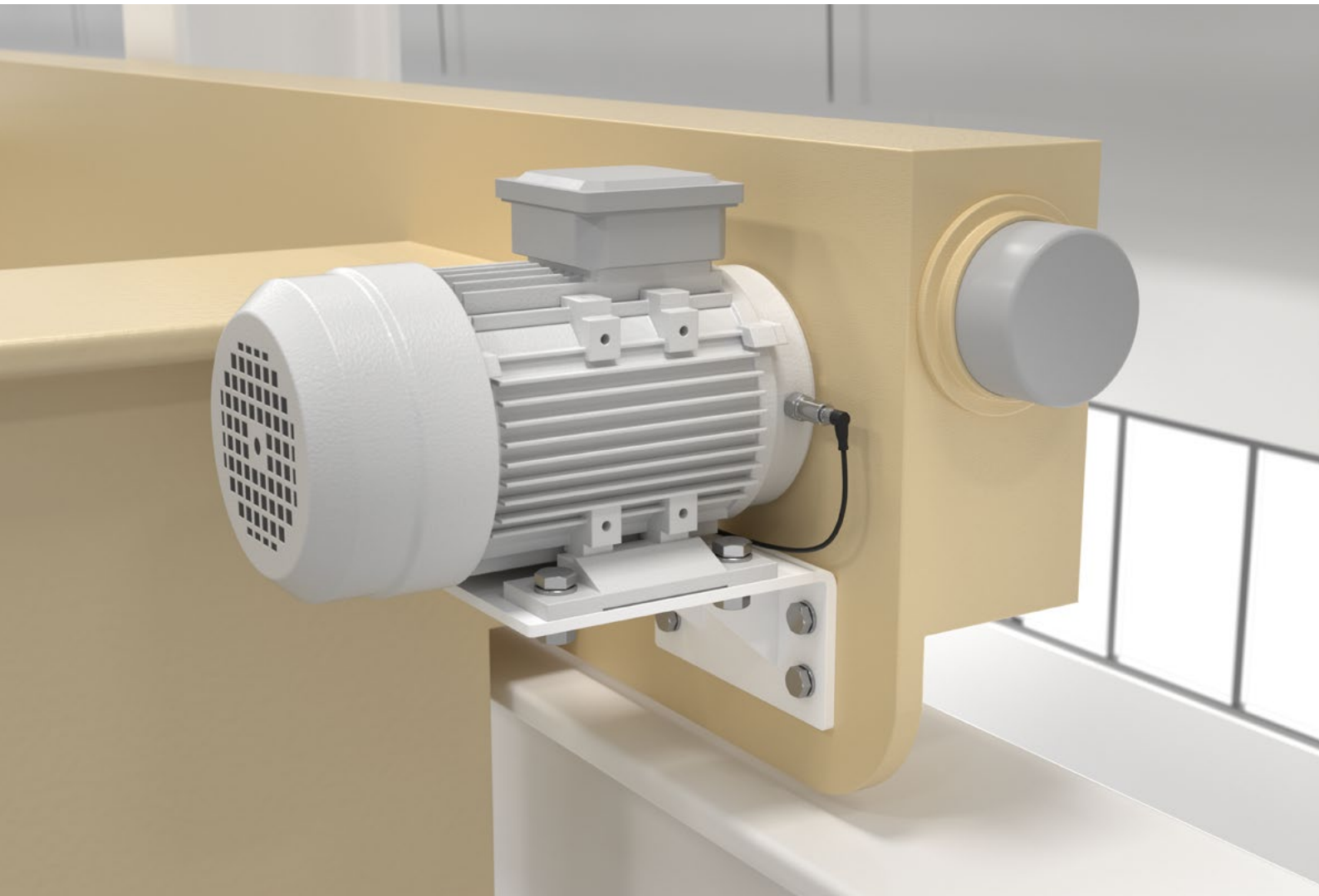
- Real-time condition monitoring of motors with maintenance-free MEMS sensor technology
- Sensor delivers vibration velocity compatible with ISO 20816
- ISO 20816 specifies critical vibration limits
- Compact design, rugged stainless steel housing
- Functional safety up to SIL 2 and PL d, explosion protection up to Zone 1/21 (Division 2)

The Application

Indoor cranes move heavy loads and therefore play a central role in production logistics in numerous industries. Among other things, they are used in the metal industry, for example in a plant for aluminum fused-salt electrolysis. The heavy loads are transported there by large indoor cranes, each equipped with 20 motors for positioning, lifting, hydraulics, and a compressor.

The Goal

The proper functioning of all crane motors is an essential prerequisite for smooth processes; any unplanned interruption could cause high consequential costs. The condition of the motors should therefore be continuously monitored to detect any maintenance required at an early stage and to be able to carry out the necessary maintenance during a planned plant downtime as a precaution.



The Solution

The VIM3 vibration sensor is attached to the motors either by a screw thread or using a magnetic adapter. Based on capacitive MEMS sensor technology, the device detects both the speed and the acceleration caused by vibration motion. The sensor sends the measured data to the controller either as an analog 4 ... 20 mA signal or via IO-Link communication. This reliably displays imbalances, bearing damage, and resonances. A trend analysis shows changes caused by wear in detail. Alarm limit values can be defined for predictive maintenance. The devices are also suitable for use in hazardous areas up to Zone 1/21 (Division 2) and are certified in accordance with SIL 2 and PL d with regard to functional safety.

The Benefits

The VIM3 vibration sensor features measured variables that are compatible with the vibration standard ISO 10816/20816. This means that both the vibration velocity (mm/s) and vibration acceleration (g) are calculated as rms values using the RMS method in the sensor. In addition, vibration data is provided in the frequency range of 10–1000 Hz. This makes the ISO 10816/20816 directly applicable and critical vibration limits (e.g., 11 mm/s RMS) can be directly adopted. There is no need for in-depth frequency analysis or a complex test procedure. The vibration behavior of the motor can be clearly categorized as good or bad via the output measured variable.

The device is available with an analog or an IO-Link interface. The latter allows several measured values to be collected simultaneously for sustainable condition monitoring and enables web-based remote maintenance. The VIM3 offers a wide temperature range, degree of protection up to IP67, and globally valid approvals that facilitate the certification of crane systems.

Technical Features

- Frequency range 10–1000 Hz
- Vibration velocity up to 128 mm/s, vibration acceleration up to 10 g rms
- Optional IO-Link interface
- Switching output and analog current output can be parameterized
- Rugged stainless steel housing, IP66/IP67 degree of protection
- Temperature range: –40 °C to +85 °C
- UL approved, cULus Listed, Class III

For more information, visit: **pepperl-fuchs.com/px-vim**