**HEIDENHAIN and LEINE & LINDE: new ESR strain sensors bring digitalization to the monitoring of building structures and large equipment**

*Bridges, wind turbines, cranes, and other similar large structures are subjected to particularly high loads. That’s why safe operation requires extensive monitoring. For this purpose, HEIDENHAIN and LEINE & LINDE will be introducing a new encoder series at the SENSOR+TEST 2019 trade show: the ESR strain sensors provide highly accurate digital measurement signals and are particularly easy to install.*

The ESR strain sensors from HEIDENHAIN and LEINE & LINDE open up new possibilities for short-term, recurring, or permanent strain and load measurement. These sensors are a highly accurate, rugged, and reusable alternative to conventional systems for the monitoring of large structures. The use of an electro-optical rotary encoder for strain measurement and the output of digital measurement signals make the ESR sensors truly innovative.

**Proven technology in a new application**

Rotary encoders are the industrial standard for position and speed measurement on motors. They have been used in this role for decades in production and automation systems, as well as in wind turbines and elevators. The ESR strain sensors employ this rugged and well-proven rotary encoder technology for the measurement of length changes between two points. These two points are attached to the object under test at a distance of 200 mm from each other. One measuring point lies directly below the axis of the rotary encoder shaft, and the other is located at the end of a connecting bar. Any length change in the loaded object of test relative to the unloaded connecting bar (parallel to the object of test) causes an angular change within the encoder, which is used to detect tensile and compressive movements.

Based on the selected geometries, one increment on the rotary encoder is equivalent to a length change of 5 nm, or 0.025 µε of strain. Considering that the measuring range is ±5000 µε, this yields an available resolution of ±200 000 values, or over 18 bits. That is roughly five times more measurement data than is provided in conventional installations using foil strain gauges. What’s more, the ESR strain sensors do not fatigue during operation and, thanks to their high scanning frequency, are well-suited to measuring tasks in dynamic applications. Featuring an IP66 rating and a permissible application temperature of –40° C to +100° C, the rotary encoder is well protected from environmental factors and is optimally designed for outdoor applications.

Because the connecting bar material can be selected based on the material in the object under test, the ESR strain sensors offer built-in, passive temperature compensation. When the connecting bar and the object under test have the same coefficients of thermal expansion, thermal strain is not measured.

**High-value digital data**

Thanks to the highly integrated optical scanning technology of the rotary encoder, the ESR strain sensors provide highly accurate digital measurement signals featuring extremely low noise. The sensor’s EnDat 2.2 digital interface transmits the measurement signals to the subsequent electronics without loss or interference. It can also autonomously provide additional data such as the ambient temperature at the strain sensor, as well as data for encoder diagnostics and status monitoring.

For the collection and conversion of the digital encoder signal, the market offers a wide range of subsequent electronics. Possible subsequent electronics include the direct system control, a data logger, or a fieldbus converter that collects the signals from multiple encoders and makes them available in a streamlined network structure.

**Easy installation and universal deployability**

Special attention was given to speed and process reliability for the installation of the ESR strain sensors. That’s why various mounting variants are available depending on the intended use:

* ESR 125 and ESR 225 as adhesively bonded variants for permanent installation
* ESR 325 as a screw-fastened variant, enabling rapid installation for recurring measurements on the same object under test
* ESR 425 for installation via magnets, for short-term measurements and reuse of the sensor as often as needed

**HEIDENHAIN and LEINE & LINDE at SENSOR+TEST 2019 in Nuremberg, Germany:**

**Hall 1, Booth 1-122**

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|  | *Thanks to its digital measurement signals, the new ESR strain sensors from HEIDENHAIN and LEINE & LINDE offer clear added value for the monitoring of buildings and large structures.* |

***For more information, visit:***

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