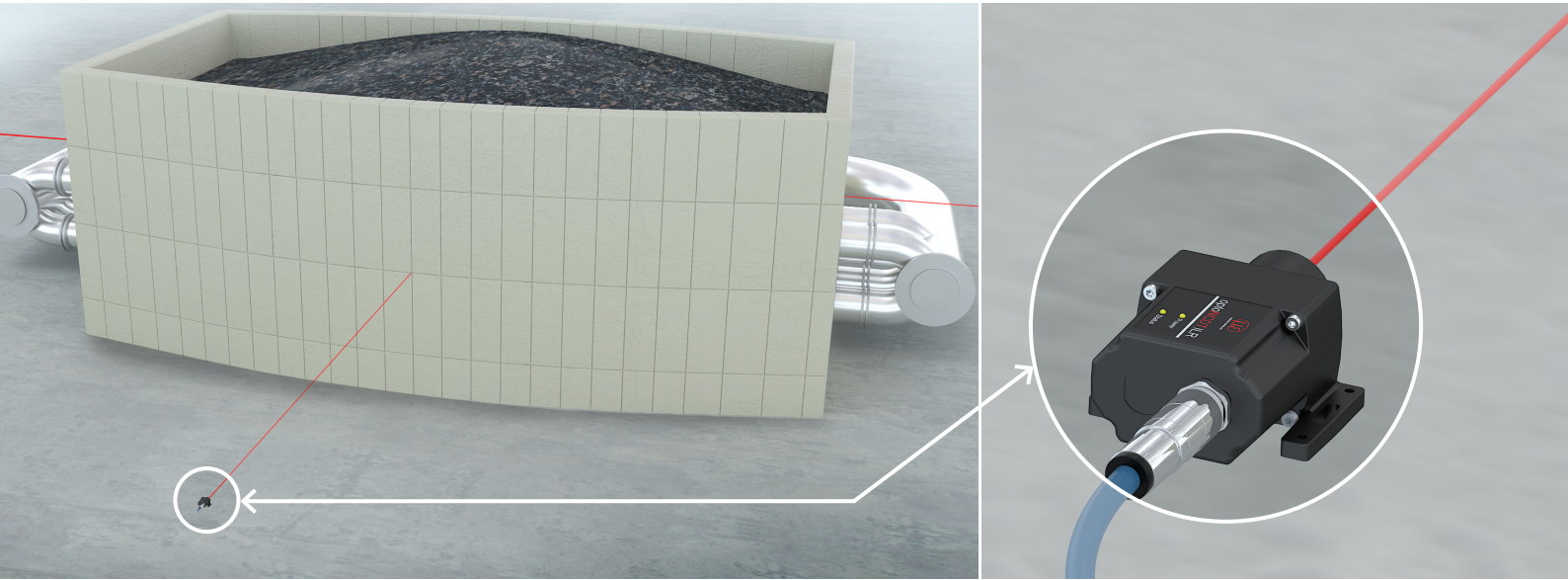




Expansion measurement on the concrete wall of an energy storage tank

According to current knowledge, the majority of future green electricity will be generated by wind and solar power plants. These feed electricity into the power grid, but not continuously and not in the same quantity. In addition, electricity production can vary and so is sometimes higher or lower than the amount of electricity required. Suitable intermediate storage facilities are therefore needed for a successful energy transition.

Among other things, lava stones are used as intermediate storage. These absorb the surplus energy in the form of heat and release it back into the power grid as required. The lava stones are filled into a container made of reinforced concrete. Due to the thermal expansion of the rock, the reinforced concrete tank must be permanently monitored when heated.

Laser distance sensors from Micro-Epsilon detect the smallest movements of the individual reinforced concrete walls. Four optoNCDT ILR3800-100 sensors continuously measure minimal movements of the rough concrete walls at a distance of 10 to 15 m. Their robust housing protects the sensors from the weather.

The measured value is transmitted to a PLC via the analog interface (4 ... 20 mA). This allows both computer-controlled process monitoring and complete documentation of the measurement values. If the setpoint is exceeded, an alarm signal is emitted and the energy supply to the stones is stopped immediately in this case. Specialist personnel additionally inspect the concrete walls for possible defects.

Thanks to the laser distance sensors from Micro-Epsilon, a continuous safety check of the container is carried out. The excellent linearity in combination with the high resolution makes the sensor ideal for this and similar applications, for example in sewage treatment plants, silos as well as steel containers. In this way, the sensors from Micro-Epsilon make a significant contribution to avoiding cases of damage and the resulting high costs.

Requirements for the measurement system

- Measuring range: 1 ... 10 m
- Resolution: 0.1 mm
- Linearity: $< \pm 1$ mm
- Measuring rate: 20 Hz
- Temperature compensation from -10 ... +50 °C

Ambient conditions

- Outdoor, solar radiation
- Weather conditions
- Incidence of light on sensor
- Fluctuating temperatures -10 ... +50 °C

System design

- 4x optoNCDT ILR3800-100 sensors
- Supply/output cable PC3800
- Protective glass ILR-PG3800

Advantages

- Non-contact and reliable monitoring of the thermal expansion of the container
- Simple implementation of the sensor and low cost solution
- Reliable measurement on rough surfaces
- Measurement through a glass sheet from an area protected from the weather
- Creation of a safety precaution as well as continuous process documentation

