# APPLICATION REPORT

# Fill Level Monitoring in Gravel Silos

## Stay informed with ultrasonic sensor series F260

In gravel silos, ultrasonic sensors are used for continuous fill level measurement.

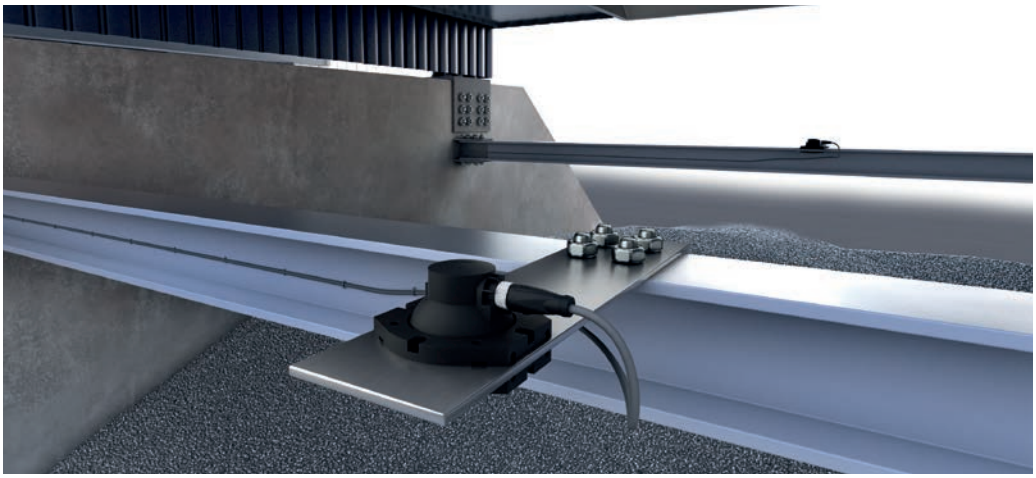
Gravel open-cast mines contain various construction materials such as sand, crushed rock, and gravel. These materials are excavated at depths of up to 50 m and must be appropriately stored until they can be transported from the site. Conveyor belts transport the construction materials to silos. Ultrasonic sensors determine when the maximum fill level of a silo is reached. The F260 series is particularly suitable for this application.

## ROBUST SENSOR TECHNOLOGY FOR LEVEL MEASUREMENT

The F260 series sensors use the echo transit time method to determine the distance from the surface of the filled material in the silo. The calculated distance is then output by the sensor as an analog value (4 mA ... 20 mA or 0 V ... 10 V). In addition to the analog output, the F260 has two digital switching outputs (NO contact or NC contact). Depending on the availability of control inputs and the complexity of the system, the silo fill level can be transferred to the control room via the analog value. When the maximum fill level is reached the controller performs appropriate actions such as turning off the conveyor belt. Alternatively, there is the option to control the silo filling via the two sensor switching outputs. In this process, the first output is used to signal „fill level within the required range.“ The second output is used to provide a „fill level range exceeded“ warning or to switch off the conveyor belt. Continuously monitoring the sensor distance information is a reliable way to avoid overfilling. The sensor detection range is up to 10 m. The sensors can monitor the continuous silo filling at all times. With its wide temperature range of -25 °C ... +70 °C, this series is ideal for outdoor use. When used in crushed rock silos that generate high amounts of dust, the maximum sensor detection range may be reduced.

## CORRECT MOUNTING OF THE ULTRASONIC SENSOR

Mount the sensor in the center of the silo to avoid false echoes from the side walls. To ensure adequate sound reflection as the fill level increases, align the sensor 1 m to 1.5 m toward the center of the material pile (where the pile height will be the tallest). When doing so, ensure that the sensor is aligned as perpendicular as possible to the pile slope. The F260 can be swiveled up to 10° in its bracket. The blind zone between the sensor head and the start of the measuring range of 0 mm to 800 mm must also be taken into account. If the fill level enters this range, errors will result. The 3RX4000-PF programming interface and „SONPROG“ software allow easy commissioning and parameterization.



## FILLING UNDER CONTROL

With continuous level measurement in the control room, plant operators stay constantly informed of the current fill level in the gravel silo. The switching output of the F260 has an overfill protection function, switches the conveyor belt off, and prevents overfilling. Safe plant operation is therefore ensured at all times.

## YOUR BENEFITS AT A GLANCE

- Extremely robust design with high excess gain
- Mounting flange with swiveling bracket for optimum sensor head alignment
- Simple commissioning via SONPROG + 3RX4000-PF
- Continuous fill status monitoring
- Reliable shutdown of the conveyor belt prevents overfilling