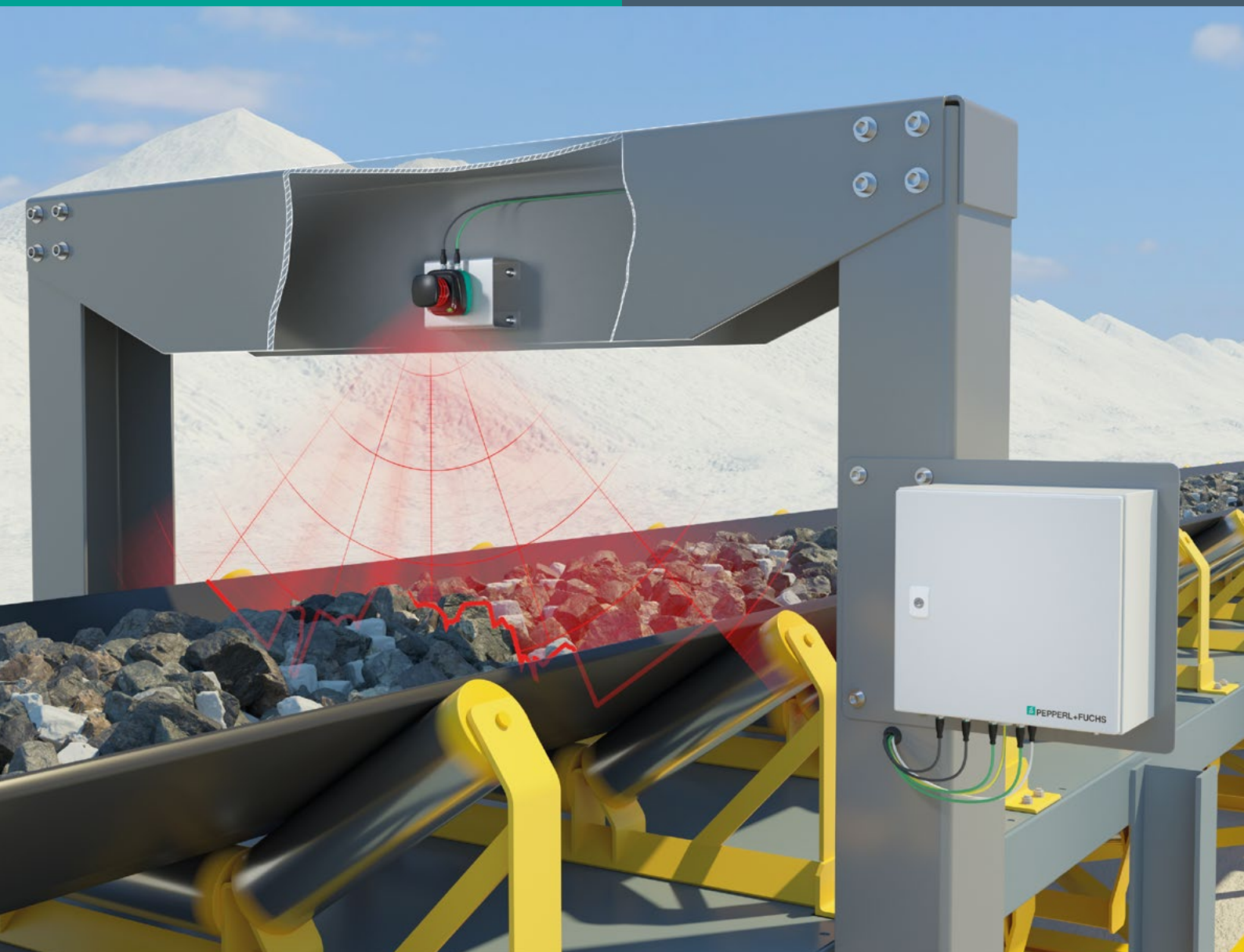


# 3-D Volume Measurements on Conveyor Belts

Volume3D Volume Acquisition System Enables Noncontact and Reliable Volume Measurements

## At a Glance

- Volume3D volume acquisition system for precise and highly dynamic measuring tasks
- Particularly cost-efficient volume measurement with only a single LiDAR sensor
- Reliable measurement results due to highest angular resolution of 0.042° and scan rate of up to 50 Hz
- Integrated lens contamination monitor (LCM) to detect contamination on the lens
- Minimal installation effort of only three system components without significant adjustments to the machine



## The Application

In mining, a wide variety of bulk materials, such as different types of ore and soil, are transported over long distances by conveyor belts to loading silos and other areas of the plant. It is necessary to calculate the material volume with dynamic measurement systems along the routes. The control of produced material is carried out by these systems at strategic points along the conveyor belt. Knowing how much ore has been extracted and handled is directly related to the company's profits. The harsh environmental conditions pose a particular challenge for the sensor solution used.

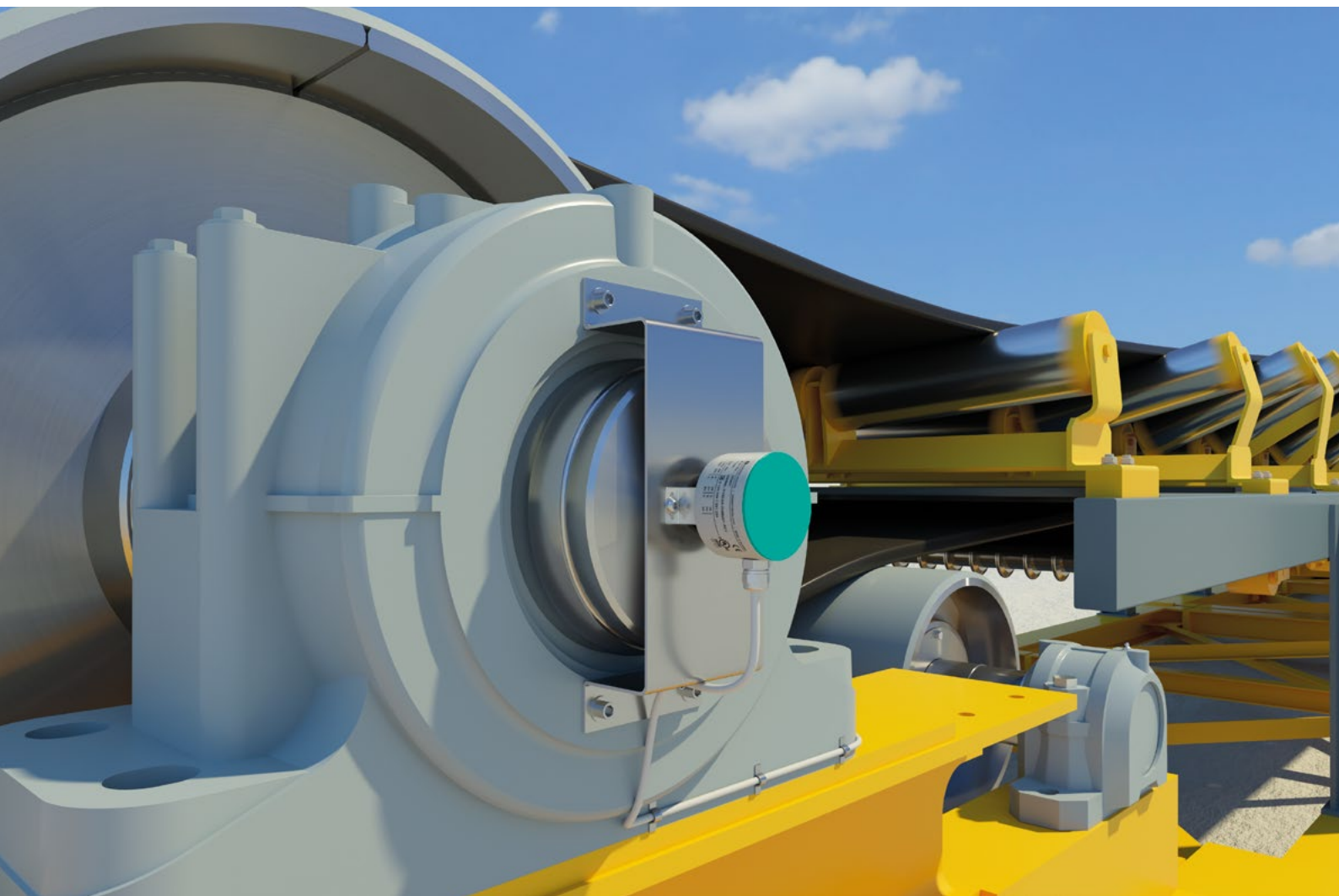
## The Goal

The challenge is to measure the volume of material on the conveyor belt without coming into physical contact with the material. In addition, a device that performs reliable measurements and requires less maintenance compared to conventional volume measurement systems is required. The corresponding sensor solution must have a range of more than five meters, be equipped with software filters that make it possible to filter the environmental influences on the measuring data, and also

provide information about the presence of dirt on the lens. Communication with an industrial PC via an Ethernet switch would enable the product to be operated with different types of controllers.

## The Solution

The Volume3D volume acquisition system, consisting of an R2000 2-D LiDAR sensor, a multiscan evaluation unit (MSEU), an ENI581L incremental rotary encoder, and all the required connection cables, is the ideal solution for this application. Equipped with a flexible measurement data filter, the R2000 is positioned on a gantry facing the conveyor belt and can measure the volume without coming into contact with the ore. The ENI581L incremental rotary encoder with BlueBeam precisely captures the speed and direction of the conveyor belt, while the MSEU processes the sensor data and allows the volumetric scan data to be transmitted directly to other controllers to obtain variables such as flow rate. In addition, the maximum and mean height of the loaded materials on the conveyor can be output.



## The Benefits

The Volume3D volume acquisition system offers the most efficient solution on the market for this application: the minimal installation effort and fast commissioning make the sensor system a particularly economical solution for conveyor technology. The noncontact concept also contributes directly to a reduction in maintenance costs in terms of the time required for maintenance and the avoidance of unexpected downtimes. The R2000 2-D LiDAR sensor guarantees maximum precision through a very high angular resolution of 0.042° and a scan rate of up to 50 Hz. The intelligent software,

which is integrated into the multiscan evaluation unit (MSEU) of the volume acquisition system, subsequently filters out invalid scan points and therefore ensures correct measurement results. During operation, the Volume3D volume acquisition system outputs the volume in m<sup>3</sup>, the flow in m<sup>3</sup>/s, a height profile along the belt's width, as well as the length, width, and height dimensions for separated and aligned objects. In addition, measurement filters can be created and data on the presence of dirt on the lens is received to enable timely cleaning.

### Technical Features R2000

- Easy mounting above the conveyor belt without major adjustments to the system
- Precise monitoring of wide belts with a width of over 5 meters through high angular resolution
- Integrated lens contamination monitor (LCM) evaluates the degree of contamination of the lens
- Pulse Ranging Technology (PRT) for measurement precision
- Highly accurate contour detection with a high angular resolution of 0.042° and a scan rate up to 50 Hz

### Technical Features ENI581L

- BlueBeam technology for high measuring quality
- Reliable and durable: interlocked bearings withstand high loads
- Special EMC circuit protection prevents damage from electromagnetic interference
- Rotational speeds of up to 12,000 rpm
- Blue emitter LED
- High shock and vibration resistance

### Technical Features Multiscan Evaluation Unit (MSEU)

- Robust IP66 housing with integrated industrial PC
- Easy integration due to easy-to-use data output
- Intuitive Windows software for commissioning and monitoring
- Simple commissioning in three steps: installation, configuration, and initialization
- Application-specific adaptations possible due to own flexible software platform

