



Obstacle recognition on climbing robots

The Institute for Technology and Management in Construction at KIT has developed the climbing robot "MANOLA", which is intended to be used for dismantling contaminated buildings. The robot will climb up facades, detect contaminated areas using a detector and remove them layer by layer. In order not to hit any obstacles and damage the sensitive detector, two additional laser profile scanners from Micro-Epsilon were integrated.

The scanCONTROL 2600 sensors used form a barrier above or below the detector depending on the climbing direction. Due to the detector size, a correspondingly large measuring range of 100 mm in the X and Z directions is required. The sensors are placed directly on the robot arm near the detector. This is made possible by the compact sensor housing and the low weight of only 380 grams. In addition, the laser profile scanners from Micro-Epsilon are resistant to the changing environmental conditions to which the climbing robot is exposed in outdoor use. The measuring system is almost insensitive to falling dust and dirt when removing the masonry as well as to water, moisture, vibrations and shocks. A manual laser switch-off provides additional safety when handling the robot.

Obstacles are measured from a width of 156 μm and a height of 12 μm . The different materials and surface properties of the facades have no influence on the measurement result. For evaluation and further processing, the sensor transmits generated raw data via Ethernet to the customer's software. The scanCONTROL sensors thus provide an extremely stable and process-safe solution for protecting the detector.

The main focus in this application is on process reliability. At the same time, the laser profile scanners from Micro-Epsilon are ideally suited to extremely precise measurements.

The wide range of applications in combination with the large model variety of the Micro-Epsilon portfolio make scanCONTROL sensors a universal tool for 2D/3D measurement tasks.

Requirements for the measurement system

- Large measuring range of 100 mm in X and Z
- Process reliability on diverse surfaces
- Small and lightweight sensor
- Robust against dirt, dust and water
- Manual laser switch-off

Ambient conditions

- Use in outdoor areas
- Dust, dirt and temperature fluctuations
- Slight vibrations and shocks

System design

- Sensors: 2 x LLT 2600-100 with 100 mm measuring range
- Data transmission: raw data output per Ethernet
- Evaluation: software and processing on customer side

Advantages

- Easy integration due to compact housing and low weight
- Raw data provider for stand-alone evaluation
- Fully automatic and reliable solution