Distance measurement for rammed clay production

Industries: Geodesy / Construction
Application type: Level measurement

Description

Fig 1: Position of the Dimetix sensor for measuring the height of the tamped clay

More than a third of the world's population lives in houses built entirely or partly of clay and up to 40 different earth building techniques are used. As different as the local soil deposits are, so are the corresponding methods in soil construction.

The company Lehm Ton Erde Baukunst GmbH in Schlins, Austria, produces rammed clay walls with natural products, the production of which is monitored with Dimetix sensors.

Civil engineering

Rammed clay construction (also called Pisé technique) is a widespread and millennia old building technique.

Fig 2: External numeric display

Fragile earth-moist and relatively lean clay mass is poured into the formwork in layers and compacted by tamping. One advantage of the rammed earth technique is that the mixture of clay, sand and gravel that often occurs in nature is ideally suited for this type of construction. Rammed clay is very solid, its density corresponds to that of concrete and its specific weight is 1.8 to 2.2 tons per cubic meter, depending on the mixture and its occurrence. It can also be used for heat storage walls in glass houses or in connection with heating systems in a technically and creatively enriching way.

At the company Lehm Ton Erde Baukunst GmbH, soil is continuously poured into the formwork in horizontal layers. The mass is poured in layers of 15 cm and compacted with compressed air rammers and vibratory rollers. A working formwork section is approx. 40 m long and max. 1.3 m high. The wall thicknesses are between 6 cm and max. 75 cm.

Measuring task

In order to find out how much earth-moist mass has to be poured in order to obtain an always even layer after compressed air ramming, a Dimetix laser sensor DAN-30-150 with an external numeric display is used to find out how much soil moisture has to be added.

This means that the available height can be read directly without having to install a laptop or other output device on site, which could be damaged in very dusty environment.

The challenge

There are three general challenges in this measurement task:

- Strong vibration due to compressed air ramming
- Harsh and dusty environment
- Measurement on different surfaces, as the clay as a natural product can have the most varied shades

All these challenges have no issue for the Dimetix sensors and the "tamped" wall height can be read with millimeter accuracy at any time.

Dimetix Sensors – the solution for applications with high precision requirements

Thanks to the clearly arranged product portfolio the evaluation of a suitable Dimetix distance laser sensor is simple and uncomplicated.

Dimetix sensors offer numerous features, which are integrated in each and every device as standard, including, among others, various interfaces like SSI, RS-422/485, RS-232 and 2 digital outputs.
Optionally, the Industrial Ethernet interfaces PROFINET, EtherNET/IP and EtherCAT are also available. Furthermore, all devices are IP65-protected and impress with a weight of less than 500 grams!

Particularly noteworthy, however, is the accurate measurement of 1 millimeter over distances of up to 500 meters, even under the most extreme conditions. This is possible with the sensors of the types DPE, DEN and DEH.

No less interesting are sensors of types DAE, DAN and DBN. Preferably, they can be used for projects which do not require a range over 500 meters or are cost-sensitive.

	DPE-10-500	**DPE-30-500**	**DEN-10-500**	**DEH-30-500**
PARTNUMBER	500630	500636	500637	500638
SPECIFICATION				
Typical accuracy ≅ ± 2σ	± 1 mm	± 3 mm	± 1 mm	± 3 mm
Mensurierung range on natural surfaces	0.05…~100 m	0.05…~100 m	0.05…~100 m	0.05…~100 m
Measuring range on reflective foil	~0.5…500 m	~0.5…500 m	~0.5…500 m	~0.5…500 m
Max. measuring rate	250 Hz	250 Hz	100 Hz	100 Hz
Operating temperature	-40…+60°C	-40…+60°C	-10…+50°C	-10… +60°C

	DAE-10-050	**DAN-10-150**	**DAN-30-150**	**DBN-50-050**
PARTNUMBER	500633	500632	500634	500635
SPECIFICATION				
Typical accuracy ≅ ± 2σ	± 1 mm	± 1 mm	± 3 mm	± 5 mm
Mensurierung range on natural surfaces	0.05…~50 m	0.05…~100 m	0.05…~100 m	0.05…~50m
Measuring range on reflective foil	~40…50 m	~40…150 m	~40…150 m	
Max. measuring rate	100 Hz	100 Hz	100 Hz	10 Hz
Operating temperature	-40…+60°C	-10…+50°C	-10…+50°C	-10…+50°C