

## Structural health monitoring

**Industries:** Geodesy / Construction  
**Application type:** Monitoring

### Description

A civil engineering company had a unique request: to develop a new system for structural health monitoring. This was used to measure sub-millimeter displacements in three axes. They wanted to develop new towers in a busy sports complex, only a few feet away from three existing bridge piers. The developer needed to ensure no shift of the existing bridge structure occurred during the excavation and construction periods. The owner of the structure wanted to ensure a high-precision measurement system was in place prior to excavation to detect any anomalies during the excavation and construction period.



Fig 1: Commercial/Residential development

They combined three heated Dimetix laser sensors and a specialized, high-precision two-dimensional laser position target detector. The IP65-rated laser sensors were equipped with heater units to withstand temperature variations and harsh external conditions, while measuring transversal displacement from the bridge piers to the sports arena, as the detectors measured transversal and vertical displacement.

The systems were deployed in July 2014 and have been collecting readings 24 hours a day, seven days a week ever since. Careful data collection and monitoring have allowed the sports complex to remain operational throughout the excavation and construction period, as the adjacent buildings and infrastructure were protected against damage in the high-density construction area.



Fig 2: Construction site

### Customer advantage

- Easy installation thanks to visible laser beam
- Easy configuration thanks to the free software
- Operation in the largest temperature range (-40°C to +60°C) possible
- Measuring ranges up to 100 m on natural surfaces
- Measuring ranges up to 500 m on reflective foil
- Accuracy  $\pm 1\text{mm}$
- Repeatability  $\pm 0.3\text{ mm}$
- Maintenance-free operation



**DIMETIX APPLICATION EXAMPLE**
**AE-0511**
**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.

	<b>DPE-10-500</b>	<b>DPE-30-500</b>	<b>DEN-10-500</b>	<b>DEH-30-500</b>
<b>PARTNUMBER</b>	500630	500636	500637	500638
<b>SPECIFICATION</b>				
Typical accuracy $\cong \pm 2\sigma$	$\pm 1 \text{ mm}$	$\pm 3 \text{ mm}$	$\pm 1 \text{ mm}$	$\pm 3 \text{ mm}$
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	50 Hz	50 Hz
Operating temperature	-40...+60°C	-40...+60°C	-10...+50°C	-10... +60°C

	<b>DAE-10-050</b>	<b>DAN-10-150</b>	<b>DAN-30-150</b>	<b>DBN-50-050</b>
<b>PARTNUMBER</b>	500633	500632	500634	500635
<b>SPECIFICATION</b>				
Typical accuracy $\cong \pm 2\sigma$	$\pm 1 \text{ mm}$	$\pm 1 \text{ mm}$	$\pm 3 \text{ mm}$	$\pm 5 \text{ mm}$
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	50 Hz	50 Hz	50 Hz	10 Hz
Operating temperature	-40...+60°C	-10...+50°C	-10...+50°C	-10...+50°C

