

**Monitoring of railway tunnel**

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

**Description**

RISTAG Ingenieure AG is one of the leading engineering and surveying companies in Switzerland. During construction work at Bern Central Station RISTAG installed an automated monitoring system in a railway tunnel, to early-detect potentially hazardous deformation of the tunnel structure.

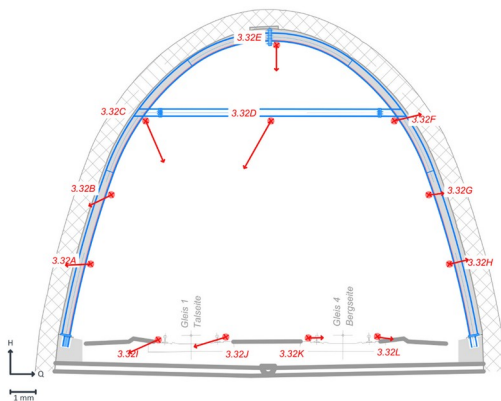


Fig 1: Tunnel cross section with deformation vectors

Therefore RISTAG implemented the following two-step measurement principle:

1. The use of Dimetix Laser Sensors to measure the distance from crossbar to tunnel ceiling.
2. The measurement of the position of the crossbars with the tachymeters.

**Project details**

- Sensor type: DAN-10-150
- Measuring surface: concrete
- Interface: RS-485
- Measurement rate: Every 10 minutes average of 10 distance measurements
- Data processing and analyzing: Onsite measurement computer, automatic e-mail and SMS notification, if security limits are violated
- Special challenges: 24h availability, limited access to tunnel, due to high traffic rate (up to one train every 2.5 minutes)

Usually for this kind of task tachymeters are used, which are permanently mounted inside the tunnel. These devices are capable of periodically measuring the position of different points of the tunnel structure. In this project, however, the visibility of the tunnel ceiling was limited by the many crossbars beneath it.

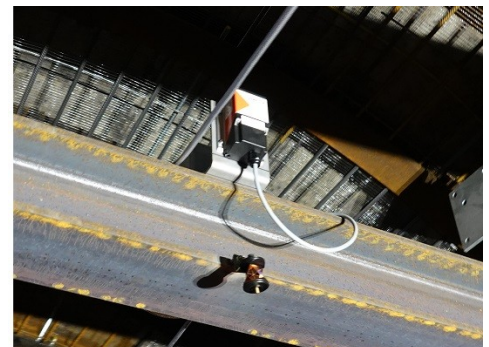


Fig 2: Dimetix D-Series Sensor mounted on crossbar

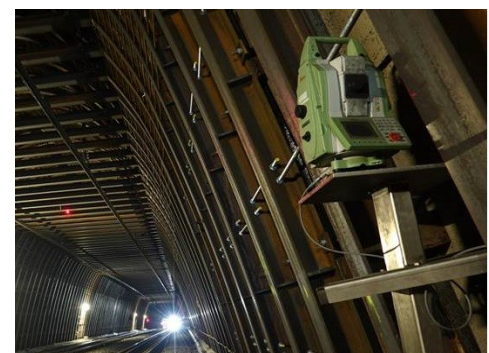


Fig 3: Tachymeter measuring position of crossbar



### **Customer advantage**

- Monitoring of 20 tunnel cross sections with only four tachymeters, despite limited visibility caused by tunnel crossbars
- Substitution of additional, expensive tachymeters with much more economical Dimetix Laser Distance Sensors
- Fast project progress due to professional support directly by sensor manufacturer Dimetix
- Optimized performance and costs by our wide range of D-Series sensors



**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 $\cong \pm 2\sigma$	$\pm 1$ mm	$\pm 3$ mm	$\pm 1$ mm	$\pm 3$ 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

	<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 $\cong \pm 2\sigma$	$\pm 1$ mm	$\pm 1$ mm	$\pm 3$ mm	$\pm 5$ 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

