



Swiss Bridge, Visible World-wide

by Agnes Zeiner

A bridge over the Rhine near the village of Diepoldsau, not far from the headquarters of Leica Geosystems AG, is one of the most thoroughly monitored bridges in the whole of Switzerland. However, it is not about to collapse at any moment. The reason for this is the cantonal highways department gave Leica Geosystems permission to install any number of sensors and convert the cable-stayed bridge into a “test structure”. The canton benefits from this arrangement, as do (potential) customers, university students and last but not least, the Leica Geosystems product specialists.

“There is nothing more boring than monitoring a completely stable structure, even for testing purposes,” says Michael Rutschmann, Product Manager Structural Monitoring at Leica Geosystems, who is delighted that he and his team are allowed to treat the bridge at Diepoldsau as a “research structure”. “This 250-meter bridge (820ft) is not far from our

main office and crossed by around 20,000 vehicles every day, which makes it ideal for us.”

Over the last few months, the monitoring team supporting Michael Rutschmann has come up with a detailed concept involving not only a wide range of sensors but also energy supplies, communications and data processing systems. Geotechnical sensors (Leica Nivel220 inclinometers), Leica GMX902 GNSS receivers and AR10 GNSS antennas were installed in the first phase to measure the movements of the bridge and their influence on the bridge piers. Meteorological sensors inform us of the weather conditions, thermal sensors measure the cable temperatures, ultrasonics are used to record water levels. “The highways department engineers were sure that we would not detect any movement of the lower part of the piers, but the high-precision measurement capabilities of the Leica Nivel220 have surprised them,” smiles a delighted Rutschmann.

Further GNSS antennas and receivers will be attached to both piers in a second phase. The monitoring spe-



cialists are expecting to be able to measure substantial movements there, above all due to the effects of wind and temperature fluctuations. A Leica TM30 total station and prisms will be installed at a later date.

The data obtained from the various sensors and the full range of Leica monitoring software from GeoMoS to GNSS Spider, allow the engineers to see the movements of the bridge in context. "Our idea was to install the entire Leica Geosystems Monitoring product portfolio on this bridge, encompassing everything from hardware and software to communications and energy-generating equipment," explains Rutschmann. We can also test alternative energy supplies.

The customers benefit firstly from the opportunity to take a look for themselves at the monitoring solution on the bridge at Diepoldsau in action and secondly from all the possibilities offered by immediate access to the data through the Leica Geosystems support engineers all over the world, who can view the data over Leica GeoMoS Web, live and in real time. Rutschmann comments: "We can show the potential of our solutions and how simply they can be tailored to a customer's particular requirements."

Leica GeoMoS Web can be found at <http://geomos.leica-geosystems.com>. If you are interested, please ask your Leica Geosystems sales advisor for a free user login ID and password. ■



Monitoring Concept for Rhine Bridge, Diepoldsau

Sensors:

- TPS:
 - Leica TM30 total station and prisms
- GNSS:
 - Leica AR10 GNSS antennas and
 - Leica GMX902 GNSS receivers
- Geotechnical:
 - Leica Nivel220 inclinometers, extensometers
- Other:
 - Meteorological, wind and temperature sensors,
 - ultrasonics, webcams, data loggers

Software:

- Leica GeoMoS (monitoring software)
- Leica GeoMoS Adjustment (data analysis)
- Leica GeoMoS Web (visualisation)
- Leica GeoMoS HiSpeed (high frequency deformation analysis)
- Leica GNSS Spider (reference stations)
- Leica CrossCheck (deformation monitoring)
- Customer Care Packages (CCP)

Communication:

- Leica ComBox20