



## RSV-150 Remote Sensing Vibrometer – The Acid Test

The 110 year-old Müngsten bridge near Solingen, the highest railroad bridge in Germany, was the site of intensive measurements undertaken by German railways operator Deutsche Bahn (DB) alongside Polytec in September 2010.

DB's Bridge Measuring Group in Magdeburg is responsible for the condition assessment of their railroad bridges. Laser vibrometers have proven for many years to be the method of choice for measuring structural displacements required for this purpose. However in September 2010, the Bridge Measuring Group encountered an especially difficult challenge. The Müngsten Bridge near Solingen, at 107 meters

high, became the site of the latest measurement-based condition assessment.

During the measurements in September (fig. 1), a prototype of the new RSV-150 Remote Sensing Vibrometer, which was specially developed for measurements over long distances, was used alongside the OFV-505 vibrometer measurement heads. The vibrometers were used to measure the lowering of the crown as well as the horizontal buttress head displacement. The RSV-150 was used to measure this displacement and the bridge abutment was used as a fixed reference point.

To be able to measure the horizontal movement of the buttress head under load at over 135 m, the Bridge Measuring Group attached a projecting structure with a reflector to it in order to ensure optical visibility. Already installed was an OFV 505/-5000 vibrometer measuring system (fig. 2), which the Bridge Measuring Group of Deutsche Bahn has successfully used for

Fig. 2: OFV-505 used for bridge measurements.



Fig. 1: The Bridge Measuring Group's measurement set-up.

several years. To provide mechanical excitation, three diesel locomotives coupled together as a unit (approximately 240 tonnes of moving weight) were driven over the bridge with and without braking.

The displacement measurements had to be carried out under these conditions with the maximum possible accuracy. In a direct comparison between the two systems, the RSV-150 Remote Sensing Vibrometer was able to play to its strengths. Even at large distances and with unfavorable weather conditions such as rain and mist (fig. 3), the measurement results were still reliable. In contrast, operation of the OFV-505 required an experienced

technician to take a critical look at the measurement results to determine if the system was still within its range of use.

In view of the adverse conditions, the conclusion of the Bridge Measuring Group was: "If we hadn't had your (RSV) system, we would not have been able to measure the buttress head so accurately."

Based on this positive experience the Measuring Group has purchased two RSV-150 systems. Thus, the Deutsche Bahn "Track Measurement Centre" now has the latest most advanced laser optical kit for its measurements and will use it to maintain the safety of rail traffic.

More Info: [www.polytec.com/rsv](http://www.polytec.com/rsv)

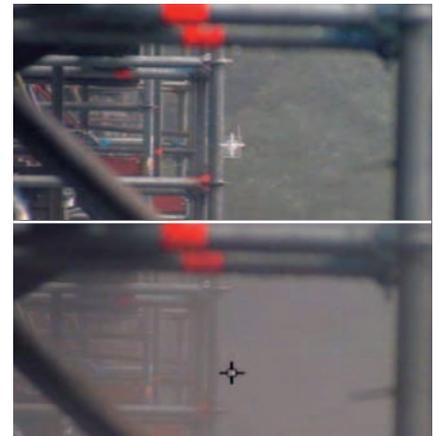


fig. 3: The measurement point for the OFV-505 and RSV-150 in good (above) and poor visibility (below).

**Apology:** In the InFocus issue of 1/2011 we provisionally reported about the September 2010 measurements and at that time wrote "The results led to the bridge being closed to rail traffic, however in the coming five years it should be completely restored." This statement does not accurately reflect the facts and is consequently revoked.

## RSV-150 Remote Sensing Vibrometer

### Remote Detection of Vibrations on Large and Distant Structures

Vibration and displacements on structures, machine parts and buildings can now be detected quickly and effortlessly even over long distances. The RSV-150 is designed for condition monitoring and testing of dynamics of structures from a remote distance with a simple point-and-shoot operation. Its advanced laser Doppler interferometer technology saves time by avoiding contact sensor installations and it's ready-to-use for trouble shooting for any vibrational issue.

#### The Complete Solution

The RSV-150 from Polytec provides a full solution for vibrational analysis: An interferometric optical sensor equipped with long range lens and an in-line video camera for targeting. A green targeting laser allows precise targeting on short and medium distances. The image of the video camera shows precisely the measurement spot at any distance. The RSV-150 is shipped with a rigid tripod system fea-

turing coarse adjustment with a 3-way geared head and additional fine adjustment for precise targeting on remote objects. The controller converts the sensor signals into a voltage output for velocity and displacement that can be used with any data acquisition system or data logger.

#### Benefits

- High range >100 m depending on the surface reflectivity and the amplitude – allows for remote access to hazardous areas, e.g. explosion hazard or electric hazard for high-voltage electrical power supply components
- $\mu\text{m}$  resolution – reveals also slightest displacements
- True 0 Hz capabilities with mHz resolution – low frequency response and displacement measurements on civil structures
- Wide bandwidth up to 25 kHz – enables condition monitoring e.g. of gearboxes

- Class 2 laser – safe operation without laser safety restrictions
- Easy setup in minutes and point-and-shoot operation – no cabling or measurement point preparation
- Works for nearly all surface properties – even on encrusted and dirty locations and also on hot surfaces like furnaces, pipes etc.

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