Zittau Viaduct - Germany

Project Description:

The railway viaduct was built in 1859. It crosses the Polish-German border nearby the town of Zittau. A spacious lowering of the groundwater level led to a pier foundation settling and that caused in wide cracks, appearing at the superstructure above the piers.

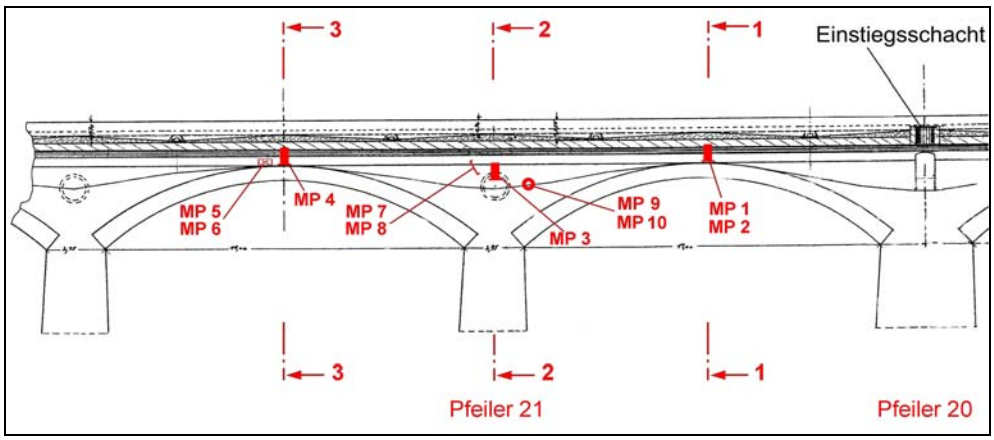
Railway viaduct Zittau, Germany

Quick Facts:

- **Name and Location:** Neisse viaduct, Zittau, Germany/Poland
- **Owner:** German Rail
- **Structure category:** Masonry arch bridge
- **Spans:** 34 archs: each between 17 and 23 m
- **Structural system:** Arch bridge on masonry piers
- **Start of SHM:** November, 2000
- **Number of sensors installed:** 12
- **Instrumentation design by:** BAM, Division Buildings and Structures, Germany

Description of Structure:

The Neisse viaduct is a natural stone masonry arc bridge. It is 750 m long and between 3 and 25 m high. The width of the superstructure is 8 m. The bridge is used for public railway transport. The structure was strengthened in the past by a concrete construction.



Distribution of sensors within the superstructure

Purpose of Inspection:

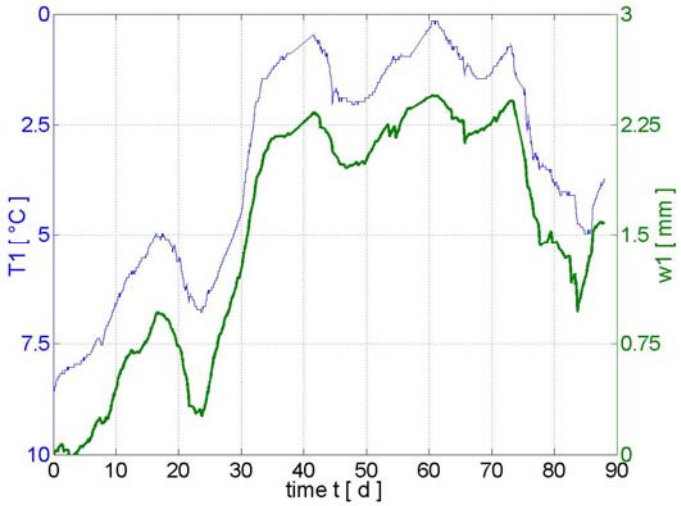
It was observed by visual inspection, that the existing cracks still opened. Through structural health monitoring the cause for the additional crack movement ought to be found out and it was also intended to assess, in which degree the bearing capacity of the structure was affected.

Sensor Details*:

Type	Number	Location
Velocity transducers	4	all sensors are fixed at the superstructure of the bridge (see figure above)
Crack sensors	2	
Strain gauges	2	
Pt 100	2	

Examples of Outcomes:

The long-term monitoring of the crack width together with other monitored parameters showed that the whole cross section of the superstructure was cracked. The crack widths change with the temperature course of structure (see results). The progressive foundation settlings as much as the traffic have obviously no irreversible influence on the crack evolution.



Crack width via structural temperature measured by SHM

Benefits of using SHM technologies in the project:

Only because of the simultaneous measurement of the different crack movement influencing parameters over a long period a cause and effect relation could be found. The effect of the cracks on the bearing capacity of the structure is determined by the measurement of strain and of dynamic parameters.

References:

W. Ruecker, R.G.Rohrmann, S.Said, W. Schmid, "Dynamic approaches used for the safety observation of bridges, Proc. Symposium Actual problems in the dynamic behaviour of bridges, D-A-CH, Zurich, 2003 (in German)

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