Monitoring of a Large Railway Arch Bridge

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Abstract

During the partially reconstruction of the Pyhrn railroad line from the Austrian Federal Railways between Linz and Selzthal instead of the old Steyrtalbridge from 1905 a new arch bridge over an storage reservoir was built in 2014. The new bridge is built in reinforced concrete with a length of about 180m. The design of the structure was determined by the rail-track-interaction as it was essential to avoid using rail expansion joints as expensive and maintenance-intensive components. For this reason, extensive measurements should provide information on the structural behavior and are compared with the assumptions and results of the structural analysis. In addition to measurements during an initial loading test the structural behaviour over the seasonal cycle should be determined by measurements. The installed monitoring system stores data since November 2014.

Keywords: Monitoring, Measurements, Arch Bridge, Railway Bridge, Deformation, Inclination

1 Introduction

For the 2014 new built railway arch Bridge named "Steyrtalbridge" in the middle of Austria, the client ordered to install a monitoring system for the observation of the significant movements and deformations taking into consideration the changes in temperature, especially the check of the resulting stresses in the rails. The system was designed according to the Austrian guidelines for Monitoring of Civil Engineering Structures RVS 13.03.01 [1].

This guideline deals with monitoring of bridges and other civil engineering structures and enlarges on the field of application of different monitoring systems and sensors. Quality assurance, control and monitoring of road bridges are described in RVS 13.03.11 [2]. These guidelines are the basis for the design of recent monitoring systems.

Experience gained in Austria over the past decade regarding monitoring has taught us that for a more widespread and successful application of this technology 3 key theses [3] must be considered which are of core significance to increase the implementation of monitoring systems in civil engineering practice:

(1) Monitoring may not replace conventional inspection. This technique should be a supplement to determine structural condition and load bearing capacity. Moreover monitoring may present a tool to determine specific load bearing conditions during construction processes or

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