

Diagnostics and monitoring of the longest span extradosed bridge in Europe

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1 Abstract

The article presents complex diagnostic procedures applied for the purpose of behavior analysis of the extradosed bridge with the longest span in Europe that was built in 2018 in Poland. The system of health monitoring was used to: register internal forces in temporary supports, monitor concrete bonding, perform in situ diagnostics and operation tests. The bridge is a continuous four-span structure with spans theoretical lengths equaling: 132.5+206.0+206.0+132.5 m. During the construction of the bridge, two technical monitoring systems were used. As a consequence of their application, it was possible to carry out works with the lowest level of risk and therefore the work schedule was accelerated. The first of systems was designed to measure forces transferred to temporary supports during cantilever construction stages. The second system was designed to measure changes of the strength of curing concrete, after it was poured at the site, which allowed to speed up the removal of the scaffoldings and post-tension of cross section with cables. When the bridge was finished, a Structural Health Monitoring (SHM) system was installed and final acceptance tests were launched. The obtained results were used to validate theoretical assumptions done at the stage of the bridge structural design and provided insight into the complex bridge behavior.

Keywords: extradosed bridge, technical monitoring, diagnostics, SHM, load tests.

2 Introduction

The largest span length ($L_t=206$ m) in Europe extradosed bridge [1] with one external tensioning cables plane was constructed in Poland in 2018 as a part of the Ostroda city bypass in Poland (Figure 1). In order to ensure safe and efficient execution the

bridge, two technical monitoring systems were used during the cantilever construction of the main spans. The first one provided information on the actual strength of the concrete bonding inside the segment. The second one was controlling the balance of the structure during, when subsequent segments of the bridge were poured on site. The applied systems made it possible to construct the

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