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Replacement of the Schwelmetal Viaduct in Germany – Use of BIM

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1 Abstract

The Schwelmetal Viaduct is part of the federal highway A1 near Wuppertal, Germany. It spans over a major railway line, another federal and local road, as well as the Schwelme River. The scope includes the demolition of the existing 207 m long viaduct built in the 1960s while all traffic on and below the bridge must keep flowing. Moreover, the highly confined space allows for minimal tolerances and basically no extra construction space.

A very elaborate demolition and erection scheme has been developed to minimize traffic interruption. BIM has been chosen as planning tool to make sure the strict geometric restraints are not violated and a safe construction can be ensured. The whole design and construction process is BIM supported - including the use of BIM for all progress meetings with the client DEGES. This is the first time BIM is used for the construction of a major highway bridge in Germany.

This paper describes the developed demolition and erection sequence and shows the practical issues arising when using BIM as a planning tool and how the process can be optimized in the future.

Keywords: bridge replacement, demolition, composite bridge, BIM

2 Introduction

In western Europe for some time the engineering focus has been shifting from designing new infrastructure to maintaining and improving the existing one. Increasing traffic demand and aging structures require widening and replacement of existing highway bridges. To minimize disruption to flowing traffic Engineers need to develop efficient methodologies for bridge replacement which include the demolition process and the construction of new bridges.

The Schwelmetal Viaduct near Wuppertal carries the federal highway A1 over railway lines, roads and a river. It was built in the 1960s with two separate superstructures which were later flanked by two additional superstructures on either side. The inner two structures show structural deficiencies and need to be replaced, whilst traffic along the A1 remains flowing as well as on the major railway line und road underneath. The scheme design envisages a combined demolition and erection sequence which will reflect the tight spatial constraints as well as the demand for uninterrupted traffic.

The ultimate client DEGES, a state-owned project management institution procuring road infrastructure on behalf of the German government, had decided to introduce BIM as a planning tool for the detailed design of this project for the first time in Germany. BIM was already used

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