



The Ortho-Composite-Slab of the Elbebridge Wittenberge

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Summary

The main Bridge of the Elbebridge Wittenberge is a 3-span continuous beam steel bridge with a wave-like curved upper chord between the two carriageways. With spans of 126 - 160 - 126m and a slenderness of 32, the superstructure requires a light but fatigue resistant roadway slab. These requirements are fulfilled by an "ortho-composite" slab which consists of a reduced orthotropic steel deck and a 15cm thin in-situ concrete layer, connected by shear studs. The advantages of the ortho-composite slab compared to orthotropic steel decks are; the reduction of steel and welding effort, a much better fatigue resistance and no hazard of freezing rain. Compared to standard reinforced concrete slabs on steel girders, troughs or boxes, it is much lighter, easier and faster to build and gives a better stability during construction stages. As this construction type is not covered by German DIN-codes and German road authority contract conditions a single case approval is necessary. Large scale construction type tests have been performed for FLS, SLS and ULS truck loads. Additionally extensive FEM calculations have been carried out. The results show a massive reduction of stresses in the steel members compared to standard orthotropic steel decks and a huge load bearing reserve. All-in-all the ortho-composite-slab has proven to be the most economic and sustainable construction type for the Elbebridge Wittenberge.

Keywords: steel bridge, roadway slab, fatigue, orthotropic deck, ortho-composite

1. The Elbebridge Wittenberge

The Bridge over the Elbe River is located in north-eastern Germany crossing the border of the states of Brandenburg and Saxony-Anhalt close to the city of Wittenberge. It will be part of the autobahn



Fig. 1: Visualisation of the Elbebridge Wittenberge

between the parapets of 30.40m. The upper chord of the cross-section is wave-like curved and

BAB A14 connecting the cities of Magdeburg and Schwerin. A design competition was held in 2008. The winning draft was designed by Leonhardt, Andrä und Partner, Dresden and Jean-Jacques Zimmermann, Darmstadt, Germany. The preliminary design was finished in 2012.

The bridge consists of a 696m long prestressed concrete approach bridge and a 412m long main bridge. The total length between the abutments is 1110.5m.

The main bridge is a 3-span continuous beam with spans of 126m - 160m - 126m. The cross-section is a 3-cell box girder with cantilever wings and a total width