

The use of a new slab track system in the renovation of the Vierendeel railway bridges in Mechelen

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Abstract

The existing ballastless track with wooden sleepers on the Vierendeel bridges in Mechelen will be replaced by a new slab track system with continuously welded rails across the bridge. Additionally, the rails will be positioned eccentrically on the stringers due to track optimization. This paper describes the design and implementation of this new modular track system that consists of prefabricated fully welded steel frames that are bolted onto the existing superstructure. During the design stage, focus was on the required load transfer via the steel frame to the bridge superstructure, on the large difference in steel characteristics between the old and new material and on the position of joints and fastenings. Lateral and longitudinal stiffness of the track was tested on a prototype and the final solution was already installed and successfully implemented on one bridge. In addition, field tests in relation to rail-bridge interaction have started.

Keywords: riveted steel railway bridge; slab track; rail-bridge interaction; industrial heritage.

1 Introduction

Mechelen Station is a major public transport interchange located at the border of the province of Antwerp and the province of Flemish Brabant. To meet the challenges of the future at a national and international level, the railway infrastructure in and around the city of Mechelen is subjected to a severe transformation. Firstly, a new double-track bypass across the city was constructed in order to complete the high-speed network in Belgium on the Brussels-Antwerp connection and to connect with the Diabolo link between Brussels Airport and the major domestic railway lines.

In an initial phase the new track and platforms of the bypass will be used to create extra capacity, allowing the renewal and optimization of the rest of the railway infrastructure and track configuration at Mechelen Station.

The optimization of the track configuration is, at both sides of the station, highly determined by the presence of four steel Vierendeel railway bridges with ballastless track.

In a first stage, the two Vierendeel bridges hosting the Brussels – Antwerp railway line (line 27) and Dendermonde – Leuven railway line (line 53) are renovated. These bridges were constructed in the