



Structural configuration of negative bending moment zone in continuous MVFT girder bridge

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Abstract

In order to apply a Modified-VFT (MVFT) steel-concrete composite girder to a continuous bridge, this paper investigates the structural configuration of the negative bending moment region of MVFT girder. Clothoid shaped composite dowels are designed in the hogging moment zone. Comparison studies were made for different geometric parameters of the connection. With the aim to increase the crack resistance of the concrete deck in the hogging moment region of the composite bridges, Ultra-High-Performance-Concrete (UHPC) is adopted. Wet joints schemes of shear studs and CL composite dowels are analysed.

Keywords: steel-concrete bridges; negative bending moment; MVFT; composite dowels; deck; UHPC.

1 Introduction

Steel-concrete composite bridges made of composite dowels have been widely employed in bridge construction in Europe due to their excellent mechanical capacity and outstanding economic features (1,2). To meet the demand of accelerated bridge construction (ABC), the authors proposed a small-span prefabricated Modified-Verbund Fertigteil Trager (MVFT) steel-concrete composite girder, in which the steel girder is made of composite dowels in previous work (3). The steel girder and the concrete slab of MVFT girder are both prefabricated in the mill, with a significantly reduced construction time on site (4,5). In order to

make the MVFT girder suitable for a continuous bridge, the structural design and its performance in the negative bending moment zone of MVFT girder is the objective of this work.

Girder-to-girder joints are the focus of attention for prefabricated bridges (6). The precast concrete connection can be classified into dry and wet connections according to the construction method (7). Dry connection uses welded plates, bolts and dowels in the connection zone (8). Compared to headed studs, composite dowels provide an increased strength. They also show a good deformation capacity even in high strength concrete (9). In addition, composite dowels have an advantageous load-bearing behavior under