Integral VFT-RS composite bridges - Efficient standard highway overpasses

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Abstract

Starting from Germany, the VFT® bridge girder technology (prefabricated composite beam) has spread in several European countries in the last decades as further development of the standard steel-concrete composite solution. Its configuration fits perfectly to integral frame bridges built over existing infrastructure with the scope to minimize the traffic disturbance. In this paper a further development with the focus on cost efficiency in span ranges of 40-55 m is proposed: the VFT-RS technology. The change consists in using standard rolled sections by adapting them into the integral frame bridge configuration, further enhancing the structural efficiency with the benefits of high-steel strength. The constructive details to achieve the polygonal form have been studied to allow easy fabrication and a maximal clearance height over highway traffic lanes. The VFT-RS solution is conceived as the economic option of standard highway overpasses, with the aim of an overall construction cost reduction of 5%.

Keywords: Composite bridge, integral bridges, highway overpass, hot-rolled sections, overpass, weathering steel, galvanized steel

1 Introduction

Roads overpassing highways or expressways are a rather common case, as such bridges occur on average every 2 km on highways in densely populated areas. Due to their high number and similar boundary conditions, the design and realization tends to be standardized and repetitive. The total bridge length ranges mostly between 40 and 55 m, which are achieved either by a double span with a pillar between the lanes (solution very common in the past decades) or by a single span (solution which is preferred in later years). The construction height is often a limiting factor since minimum clearance heights must be guaranteed both for safety as well as for driving comfort (see Figure 1). The choice of construction material for such bridges strongly depends on the boundary conditions [1]. Reinforced concrete and prestressed concrete frame bridges are built on