Efficient reconstruction of bridges with small and medium spans

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Summary

The traffic density is growing during the last decades. As a consequence numerous new roads and railway lines were built or are planned to be realized in the near future. On the other hand existing bridges must carry the increased traffic. Most of these bridges were not originally designed for the high service loads and the amount of traffic of today. Many of the structures are aged and, depending on the maintenance and repair carried out, do not longer suit the purpose. Further the demand for increased capacity requires often a deck widening for the carried traffic, or a longer span for traffic underneath. Most situations mentioned finally need the reconstruction of the bridge or replacement of the deck. According to statistics short span bridges are the most frequent category.

This paper discusses the potential for composite bridges with short and medium spans for the reconstruction of old bridges, considering the specific requirements resulting from the existing environment and by severe constraints for site work. Via case studies structural systems with hot-rolled beams and appropriate construction methods matching special site restrictions are analysed. In this regard the variety of structural systems and dimensional flexibility is shown, particularly if available construction depth is restricted. The paper is also focused on decreasing the traffic disturbances by using prefabrication and an appropriate erection method.

Keywords: Bridges, Steel, Composite, Reconstruction, Sustainability

1. Introduction

1.1 Road bridges

Road bridges are the most important carrier for the transport of people and goods. In the consequence of the stepwise enlargement of the EU also the infrastructure has to be adapted. These adjustments do not only affect the new members of the European Union, also countries, e.g. Germany becoming a transit country, are facing new demands in the frame of the new European configuration. Until 2015 the long-distance goods traffic on German motorways will increase about 60%, the passenger transportation at least 20% [1].

As a consequence numerous new roads have been built or are planned to be realised in the near future. On the other hand existing bridges must carry the amplified traffic. The realization of the development and upgrading of the existing infrastructure is, in respect to the required financial resources, a difficult task. Political priorities have been set with the consequence, that the demand of maintenance has been increased to avoid any further decay leading to restrictions of the traffic.

In the mean time the significance of maintenance has been recognized with the consequence, that it is rated higher than building new respectively develop existing infrastructure. This results in a decrease of building new constructions; e.g. in Germany 900 bridges have been built in the year 2000 whereas only 600 have been built in 2006 [1].

Most of the existing bridges were not originally designed for the high service loads and the amount of traffic, which are applicable today. Many of the structures are aged and, depending on maintenance and repair carried out, do no longer suit the purpose. Especially the structures of the

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