Durability of Highway Steel Bridges in the Czech Republic

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Summary

Research at the Department of Steel and Timber Structures of the Faculty of Civil Engineering of the CTU in Prague is focused on steel and steel-concrete highway bridge durability. The paper summarizes the frequent failures of the existing steel highway bridges, discusses failure causes and extended service life effect of bridge maintenance or refurbishment. The thick bridge deck is a typical short span defect. The difference between actual behaviour and numerical model is highlighted. The employed solution is outlined.

Keywords: Steelwork, Steel Bridge, Composite Steel-Concrete Bridge, Service Life, Durability,

1. Introduction

In the Czech Republic, the total number of existing bridges in a different service life and an assorted structural system reaches approximately 16 thousand. Only a small part was assembled with superstructure system made of steel or steel-concrete. According to Government's statistic only 2 percents of the steel bridges have to be reconstructed or refurbished. The acceptable condition of steel and steel-concrete composite bridges can be clearly declared. In spite of the statistic point of view both structural condition and bridge durability have to be improved.

Knowledge of the actual residual service life is an important base for providing the maintenance/reconstruction decision and the new bridge assembling discussion as well. According to the standards, the bridge durability with sufficient reliability in both limit states is supposed to be 100 years in Czech Republic. Actually, the providing of extensive maintenance to prevent the serious structural member defect, which usually reduces the expected service life time, increases the structural costs and has to be considered in a new assembly decision. In the past, some bridge superstructures were reconstructed before the half time of their supposed service time period because of significant failure appearance. Particularly, prestressed concrete bridges built in the Czech Republic during last decades of past century. On the other hand bridges with the steel or steel-concrete superstructures involved are in a much better condition. The appropriate coatings, structural details and the maintenance are necessary.

1.1 Research project and bridge inspections

The older bridges are more susceptible to problems of aging such as corrosion and fatigue. The periodic inspections in ordinary as well as extraordinary terms provide the condition supervision. The following well-timed maintenance avoids the defect creep and increases the durability of the assembled bridges. Due to more efficient maintenance, the centralized Bridge Management System was developed. The inspections are performed in two stages. The first inspection survey includes a visual examination of the bridge steelwork with potentially reinforced concrete deck and the belongings such as expansion joints and bearings. Considering the conclusions of the first stage

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