

Refurbishment of orthotropic steel bridge decks by bolted solutions

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1 Abstract

An increasing number of steel road bridges in Germany, but also in Europe and North America, show severe fatigue damages induced by the increase in heavy traffic loads. In addition, these road bridges from the 1960s to the 1980s were executed with fatigue-critical details, which are no longer state of the art today. Longitudinal stiffeners of orthotropic steel bridge decks, fitted between the cross girders are an example. Due to the particular importance of these bridges, e.g. crossing the Rhine, for the regional infrastructure network, the refurbishment has to be realized under consideration of the running traffic. Thus, refurbishment solutions are needed that are robust and durable with the least possible intervention in the current traffic. Bolted bearing-type shear connections are particularly suitable in this context, as they can usually be classified in higher fatigue detail categories than welds. However, for longitudinal stiffeners with a closed cross section such as a Y-shape or a trough shape normal bolting is not applicable. Therefore, the development of a refurbishment solution using mechanical fasteners and considering the only one-sided accessibility of stiffeners with a closed section by the use of blind rivets was the focus of two German research projects [1], [2]. In this paper, this innovative refurbishment solution by means of mechanical fasteners including blind rivets is presented. Fatigue tests on large-scale components consisting of longitudinal stiffeners butted up to a cross girder web with and without repair measure as well as small size fatigue tests on blind rivets were realized. First results of the currently still ongoing research [1] are presented.

Keywords: refurbishment technique, orthotropic steel bridge decks, blind-rivets; fatigue assessment.

2 Introduction

Orthotropic bridge decks of many German steel bridges built in the 1960's to 1980's show serious damages and fatigue cracks, often induced by heavy traffic loads. Due to their particular importance for the respective position in the regional traffic net,

the refurbishment has to be realized under consideration of the running traffic. Thus, refurbishment solutions are needed that are robust and durable with the least possible intervention in the current traffic. In a German research project [2][4] methods