

Inspection and retrofitting of Danube bridge – Ruse – Giurgiu – challenges and innovative approaches

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Abstract

The current article would summarize the activities related with the inspection and retrofitting of a bridge between Bulgaria and Romania across the Danube river, which connects the cities of Ruse (Bulgaria) and Giurgiu (Romania).

The structure is built in the period 1952 - 1954. The main part of the bridge is a steel double deck truss with 160m and 80m spans and it combines 2 types of transport - road and railway traffic. There is a moving part of the superstructure which could be lifted when there is a high-water level, and the ships has to pass. The approaches part consists of steel 2T beams united with reinforced concrete prefab elements. The foundation type used for that structure is caissons. The total length of the bridge is approximately 2,2km. There is a combination of issues which compromise the road deck - heavy and intense traffic, poor maintenance, sultry weather conditions and that leads to the need of repair and rehabilitation of the bridge. Some challenges and new approaches would be described in the following paper.

Keywords: Bridge retrofitting, Inspection methods, Digital twin.

1 Introduction

The Danube Bridge also known as the “Friendship Bridge” is a steel bridge over the Danube River connecting the Bulgarian bank to the south with the Romanian bank to the north and the cities of Ruse and Giurgiu respectively. It is one of only two bridges connecting Romania and Bulgaria, the other one being the “New Europe Bridge” between the cities of Vidin and Calafat Figure 1.

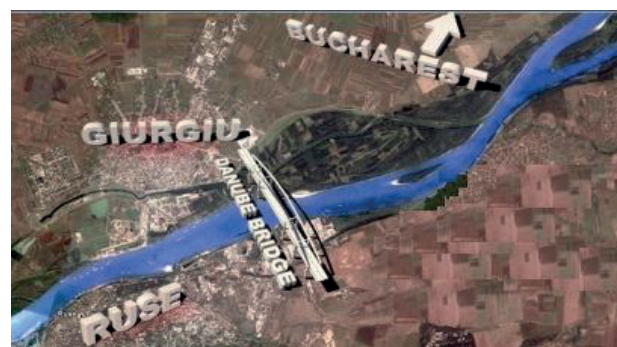


Figure 1. Location of the bridge

The bridge was built according to a Soviet project and was put into exploitation in 1954. Since the fall of the communist regimes in both countries, the bridge got the more functional name of “Danube bridge”. The structure is a double deck steel truss – upper level for road traffic and pedestrians and lower level with a one-track railway line. The central part of the bridge is mobile and can be lifted for oversized boats passage.