

## Fire of Steel Plate Girder Bridge With an Orthotropic Deck

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## Summary

A huge fire on Lazienkowski Bridge across Vistula River - one of the most important bridges in the center of Warsaw – capitol of Poland occurred on 14 of February 2015. The bridge was built in 1972-74 as full steel structure with three wooden service decks between girders. It consisted of five four girders continuous spans 76,5+90,0+90,0+90,0+76,5 m. The fire started during the exchanging of these wooden elements under the first span. It started in the afternoon and was extinguished next day in the morning. During that time three spans were under fire. Extensive investigation and analysis were done during next 6 weeks including material investigation, geometrical verification of steel superstructure and FEM model analysis to determine the behavior of bridge during thermal overloads. Following results are presented in the paper i.e. local deformation of the deck and webs of the girders, global rotation of the outer girders and global displacement of the all four girders (also due to bearing and expansion joints behavior).

**Keywords:** fire of bridges, structural and material effects in steel structure at elevated temperature

## 1. Introduction

A huge fire on bridge across Vistula river in the center of Warsaw became a multifactorial problem for public. It was necessary to answer very quickly what to do with this structure: repair or remove?

Very extensive investigation was done including material testing in situ and in laboratory. Geometrical and land surveying measurement were realized too.

Material investigation consists of determination of chemical composition, microstructure and mechanical properties checking (tension, hardness, impact strength). The samples were taken from orthotropic deck and plate girders (mostly webs).

Geometrical measurements included checking of local deformations of girder webs and orthotropic deck were done. Land surveying measurements consisted of precise surveying of deck plate and lower chords of plate girders, measurement of verticality of outside girders. Additionally, scanning of upper and lower surface of the structure was done.