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## The *Luitpold* suspension bridge over the Danube River in Passau - renovation of a 70-year-old suspension bridge under special boundary conditions

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### Abstract

Obvious corrosion damage on load-bearing steel and concrete elements made a general renovation of the bridge superstructure necessary. In particular a renewal of the anti-corrosion coating of the steel components as well as a complete renewal of the concrete deck slab have been unavoidable.

A variety of restrictive constraints in terms of cargo and passenger shipping, the necessity of a permanent pedestrian path on the bridge and numerous non-removable service pipes complicated the maintenance work dramatically and required a detailed reconstruction concept especially considering static, structural and economic aspects.

A major challenge was also the development of a computational model describing the real structural behavior with sufficient accuracy during and after renovation. Due to the lack of inventory documents an experimental validation and in addition an on-site monitoring had to be carried out.

As is often the case for existing buildings, the total extent of necessary reconstruction work became apparent only after the first deck slab sections were removed. The remains of lead-containing coating layers, which also came to light during the course of reconstruction, made the abrasive blast clearing even more difficult.

**Keywords:** suspension bridge, maintenance, total renewal of the deck slab, experimental validation

### 1 Introduction

As one of three inner-city Danube crossings, the *Luitpold* bridge represents an important connection between the city center of Passau and the northern bank of the Danube River. The current bridge construction was built in the years 1948/49, after the former bridge from 1910 was completely destroyed at the end of World War II.

Due to an asymmetrical stretch of the anchoring of the suspension cables, it perfectly fits to the topographical conditions of the steep cliffs of the so called *Oberhausberg* north of the Danube River

and has become an indispensable part of the picturesque silhouette of Passau's old town. Together with the old town buildings, the *Luitpold* Bridge is a listed historic monument, which among others is why the preservation and maintenance of the bridge have been without alternative.

Due to obvious corrosion damage on load-bearing steel components as well as usual surface deterioration, *bulicek + ingenieure gmbh* was initially mandated with the conceptual design and subsequently also with the execution planning and the site supervision and management of the general renovation by the city authority of Passau.