

Economical and Ecological Analysis of a Pedestrian Bridge made of Textile-Reinforced Concrete

Christian KULAS
Research Engineer
RWTH Aachen University
Germany
ckulas@imb.rwth-aachen.de

Josef HEGGER
Professor
RWTH Aachen University
Germany
imb@imb.rwth-aachen.de

Claus GORALSKI
Structural Engineer
H+P Ingenieure GmbH &
Co. KG, Aachen, Germany
cgoralski@huping.de

Roland KARLE
Assistant to the Executive Board
Groz-Beckert KG
Albstadt, Germany
roland.karle@groz-beckert.com

Summary

Textile-reinforced concrete (TRC) is an innovative composite material consisting of mesh-like textile reinforcements and fine-grained concrete. Since the textiles do not corrode, it is possible to minimize the concrete covers to some millimetres. The results are slender concrete constructions, which not only meet the needs of modern architecture but also have economical and ecological advantages.

On the example of a 97 m long TRC pedestrian bridge, which was built in Albstadt, Germany, this paper shows briefly the design and construction of the TRC superstructure. Furthermore, details on the sustainability are presented: The emission of carbon-dioxide in the production process can be reduced and due to the low maintenance, costs can be decreased allowing for an economic construction.

Keywords: TRC, pedestrian bridge, slender, light-weight, sustainability, economic, ecologic

1. Introduction

Existing pedestrian bridges made of steel-reinforced concrete often show damages induced by the corrosion of the reinforcement. The concrete covers of those constructions were designed in accordance to former standards, but are too small with regard to the required corrosion protection of steel reinforcement against carbonation and chloride ingress. The corrosion of the steel reinforcement leads to cracks and spalling of the concrete. These damages cause optical detractions on the one hand, and a reduced load-bearing capacity of the construction on the other. The

consequence is that these structures have to be improved by cost-intensive actions or replaced by new structures. One example of an older pedestrian bridge, which is damaged by corrosion of the reinforcement, is the pedestrian bridge over a state road in Albstadt, Germany. Due to the immense corrosion damages, this bridge had to be torn down and was replaced by a new bridge, Fig. 1.

The superstructure of the new bridge is made of textile-reinforced concrete (TRC) fulfilling demands on a frost-resistant construction. The main advantage by using technical textiles like alkali-resistant glass (AR-glass), is the possibility of reducing concrete covers to a minimum, because the corrosion protection as it is known for steel reinforcement is not required here. The



Fig. 1: Pedestrian bridge in Albstadt, Germany