



## Strengthening of coupling joints on concrete bridges with fibre-reinforced plates in Germany

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### Summary

The German Federal Highway Research Institute monitors strengthening of coupling joints on concrete bridges with carbon fibre-reinforced plates (CFRP) in Germany. This type of reinforcement is suitable for bridges and other civil engineering structures administered by the road construction authorities. This type of structure is characterized by high ease of installation (very light segments). Accordingly, the reinforcement of steel and pre-stressed concrete components through bonding of CFRP (adhesive reinforcement on component surfaces) has gained steadily in significance in recent years. The remainder of this report deals exclusively with surface-bonded plates. This paper will report the experience of the German road authorities with bridge strengthening, based on CFRP. Case studies of practical applications will be presented.

### Keywords

Concrete bridge strengthening, coupling joints, fibre-reinforced plates

## 1 Introduction

In most cases prestressed concrete bridges are constructed in sections. Tendons and its anchorage are coupled "under load". Prestressed concrete bridges containing couple joints, which are constructed in Germany before 1982, often show fatigue problems due to crack movements and low fatigue strength of coupling anchorages.

Reinforcement of concrete bridges with CFRP segments in Germany requires individual approval. For the last 10 years or so, this approval has been granted by Federal Ministry of Transport, Building and Urban Affairs. The Federal Highway Research Institute monitors this type of structure scientifically in order to gather as many results and data as possible and apply them to other bridge structures.

For bridges and other civil engineering structures administered by the road construction authorities, this type of reinforcement / maintenance is suitable for

- increasing load-bearing capacity
  - rectification of incorrect design (excessively small reinforcement cross-section)