

## Post tensioned box girder bridges made from thin-walled pre-fabricated elements

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## 1 Abstract

Nowadays large box-girder concrete bridges are either built using pre-cast segmental erection or in-situ casting of concrete. Using these methods sets limitations when it comes to construction speed or to segment length due to the weight of full-cast concrete segments. To close the gap between the two construction approaches, the Institute of Structural Engineering of the TU Wien has developed new technologies for bridge construction using thin-walled pre-fabricated elements originally used in building construction. Based on these developments, an innovative construction method has been proposed, which consists of the following steps:

- Highly automated production of thin-walled concrete elements in a pre-casting-plant
- On-site production of box-girder segments using thin-walled elements
- Connection of the segments with post-tensioning tendons to form a bridge girder
- Installation of the girder to its final position using any construction method as for example incremental launching or the balanced lift method
- Pumping of in-situ concrete, to complete the girder in the final position

The presented research shows, that this approach is advantageous for construction methods, with large differences in bending moment distribution during the construction stages and the final state. The required amount of materials cannot only be reduced, but the construction process can be accelerated as well, therefore improving the efficiency in bridge construction. Results of tests on large-scale specimens, which will be described in detail, show the potential of the new method.

**Keywords:** thin-walled elements, pre-fabrication, bridge building, lightweight girder, post-tensioning