

# EXPLORING CONCEPTS FOR UHPFRC BENDING-ACTIVE FOOTBRIDGES

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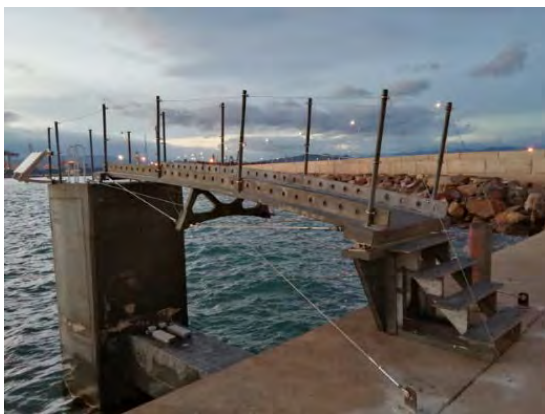
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## Summary

This contribution describes two concepts for lightweight bending-active footbridges, and the corresponding experimental prototypes made of ultra-high-performance concrete (UHPFRC). The first prototype (bending-active bow-string concept) has a span length of 5.4 m and is composed of a thin UHPFRC prestressed slab, a UHPFRC deviator and stainless-steel tensioning cables (Fig. 1, left). The second prototype (bending-active lenticular beam concept) has a span length of 6.2 m and is composed of two lateral lenticular beams and thin deck plates, all made of UHPFRC elements (Fig. 2, right). In both prototypes, the upper structural members (the deck in the first one and the top chords of the lenticular beams in the second one) have been bent in the longitudinal direction to achieve the desired structural configuration. This kind of structure is referred to as bending-active in the literature; it combines the advantages of easy manufacturing (flat components) and lightweight (thin members) with an increased stiffness through the final curved geometry achieved through bending. The prototypes take advantage of the capacity of UHPFRC to resist traction and bending with microcracking in service conditions. To the authors' knowledge, these experimental footbridges are the first application of UHPFRC for bending-active structural members, demonstrating the possibility to use this material as an alternative to timber or FRP to build lightweight structures with low consumption of material resources that can be easily manufactured and assembled.



*Fig. 1. (left) Bending-active UHPFRC bow-string prototype, and (right) bending-active UHPFRC lenticular beam prototype*

**Keywords:** structural concepts; active bending; ultra-high performance fibre reinforced concrete (UHPFRC); experimental footbridge