





## Timber-concrete composite bridges: Three case studies

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### Summary:

During the last years, timber-concrete composite (TCC) structures have been extensively used in Europe both in new and existing buildings. Generally speaking, a composite structure combines the advantages of both materials employed: the strength and stiffness of the concrete in compression and the tensile strength, lightweight, low embodied energy, and aesthetical appearance of the timber. The concrete slab provides protection of the timber beams from direct contact with water, which is crucial to ensure the durability of the timber beams, particularly when used for bridges. Different types of connectors can be used to provide force exchange between the concrete slab and the timber beam. The choice of a structurally effective yet cheap shear connection between the concrete topping and the timber joist is crucial to make the TCC structures a viable solution that can compete with reinforced concrete and steel structures. In this paper, the possibilities offered by TCC structures for short-span bridge decks are discussed. The technology of TCC structures and the general design rules are illustrated. Three case studies are reported, including a short-span bridge tested in Colorado, USA, with the timber layer being constructed from recycled utility poles and notch connection; a TCC bridge with glulam beams and triangular notches with epoxy-glued rebar connectors built in Portugal; and a TCC bridge with glulam beams and rectangular notches built in Germany. All the solutions were found to be structurally effective and aesthetically pleasing. They can all provide a sustainable option for short-span bridges.

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