

Design of Super-T girders with Ultra High Performance Concrete (UHPC) for rail loadings to replace steel girder superstructure for rail bridges.

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Significant advances have taken place in the application of ultra-high-performance concrete (UHPC) over the years. It is the ‘future’ material with the potential to be a viable solution for improving the durability and sustainability of bridges. Initially, widespread application of UHPC was limited due to its high cost and control of supply of material by a handful of suppliers. This no longer seems to be the case. This paper aims to provide a fundamental introduction to UHPC and guidance for the development of generic UHPC formulations which will facilitate in increasing its market share in Australia at a more competitive cost. A generic UHPC formulation will give rise to a material with improved mechanical and durability performance leading to an increased lifespan of bridges with very high compressive strength and non-brittle behaviour.

Super-T girder types are still the preferred superstructure for bridge construction in Australia. The deepest Super-T girders, as a simply supported structure, can only span up to about 34m for 300LA rail loading. For longer simply supported span rail bridges, it is typical to adopt a steel girder superstructure for up to about 50m. This paper aims to discuss the design of super-T girders for 300LA rail loading for a simply supported structure using UHPC to demonstrate the inherent benefit of this material to span longer distances to replace the need for steel girder superstructures in bridges.

The main objective of this paper is to expand the Bridge Engineer’s awareness and understanding of UHPC and gain acceptance amongst the designers, constructors and authorities.