

## **Dynamic and fatigue behavior of ultra high performance concrete (UHPC) railway sleepers**

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### **ABSTRACT**

Ultra high performance concrete (UHPC) is one of the most advanced cement based construction materials, which is defined by its compressive strength with higher than 150 MPa. In addition to the superior compressive strength, UHPC has various material benefits including high ductility, durability, impact resistance, and abrasive resistance. In order to adequately utilize the merits of the advanced material, a new structural application has been introduced in the field of railway, the UHPC sleeper. The UHPC railway sleeper is designed to minimize steel reinforcements in railway sleepers based on the structural design, e.g., removed all reinforcing steel bars and reduced diameters of prestressing bars from 11.0 to 9.2 mm, which resulted in 30% reduction in prestressing force compared to the same sized sleepers with concrete strength of 60 MPa. A series of structural tests were evaluated for the design approval tests, based on the European standard, EN 13230-2, including static, dynamic and fatigue test. In this study, the dynamic and fatigue behavior of UHPC sleepers were compared with conventional concrete sleepers.

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