

A Review of Behaviour of Prestressed Concrete Sleepers

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ABSTRACT: Prestressed concrete sleepers (PCSs) are the most commonly used type of sleepers. They play an essential role in track performance, behaviour and safety. The focus of the published literature on PCSs has primarily been on quantification of dynamic load and resulting structural behaviour of sleepers, interaction with other components of track and failure mechanisms. While structural performance of PCSs is very important and researched as reflected by the large volume of published literature, concrete sleepers also need to meet the durability requirements. It is known that only a small percentage of concrete sleepers remain in service when reaching their intended design life, resulting in heavy maintenance and replacement costs. This paper reports a summary of the review of literature conducted as part of a broader investigation undertaken at the University of Melbourne. The aim of the investigation is to establish the material requirements of the concrete sleepers in order to meet the structural and durability requirements. A summary of the latest works on dynamic responses (including natural frequencies and mode shapes, damping, bending moments and strain rates), failure modes, fatigue and durability aspects of PCSs are presented. Moreover, design approach and dynamic loads are discussed briefly. It is established that a comprehensive research with a focus on material characterisation for concrete sleepers is currently lacking.

Keywords: Railway Concrete Sleepers, Strain Rate, High Performance Concrete