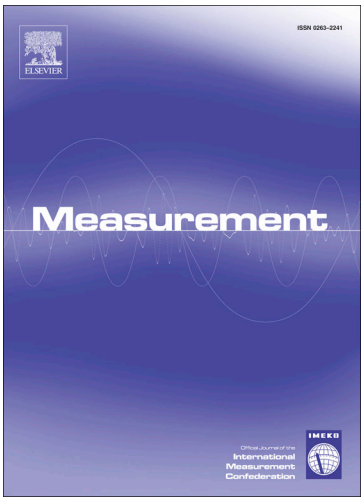

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ABSTRACT

As the use of concrete sleepers increases for heavy-haul freight railroad and rail transit applications in North America, it is becoming more critical to quantify their flexural performance under revenue service traffic in an effort to improve sleeper design and maintenance practices. The objective of improving sleeper design and performance is achieving longer service lives, lower life cycle costs, and fewer in-service failures. Presently, center cracking is one of the most common factors limiting the service life of concrete sleepers in North America, and rail seat cracking has also been documented as a performance concern. Improving the understanding of sleeper flexure can help reduce the occurrences of cracked sleepers by ensuring designs are adequate for the field conditions that are encountered. Additionally, previous laboratory research conducted at the University of Illinois at Urbana-Champaign (UIUC) found that sleeper flexure magnitude is highly dependent on support conditions. To date, few methods have been proposed to accurately quantify the in-service field bending moments of concrete sleepers and their variability due to support conditions and other factors. A method using concrete surface strain gauges has been developed, deployed, and validated by UIUC for quantification of sleeper bending moments. This method has been successfully deployed in the laboratory and in seven field locations, providing flexural demand data that can be used for the design of concrete sleepers. This paper will present the aforementioned instrumentation methodology and results from one field installation in which surface strain gauges were installed on ten concrete sleepers on a high-tonnage, heavy-haul freight railroad with the objective of quantifying sleeper-to-sleeper bending moment variability.

KEYWORDS

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