Asphalt in trackbed design

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Conventional all granular trackbed has been in use around the world for many years, presenting good results although requiring a certain level of ongoing maintenance. Increasing traffic loads and volumes and particularly the introduction of high-speed trains in the last few decades, have resulted in the need for new approaches. To reduce train load-induced stresses in the track subgrade, one approach that has been introduced is the use of a Hot Mix Asphalt (HMA) layer as a partial or full replacement of the granular sub-ballast.

During the past few decades the use of HMA as a sub-ballast layer within the track structure has steadily increased until it has become standard practice in many countries around the world (USA, Japan, Germany, Italy etc.). The HMA mix is designed similarly to the base layer of highway pavements. Specifically, it is designed to be a medium modulus, flexible, low voids, fatigue resistant layer that will accommodate high tensile strains without cracking.

This paper provides a review of the potential use of an asphalt layer to replace the granular sub-ballast during the railway trackbed design. A literature review of the use of asphalt in trackbed construction and a parametric analysis have been carried out to compare traditional ‘all granular’ and more recent asphalt layer solutions for different subgrade stiffnesses.

Results indicate various advantages of the use of asphalt in the trackbed; improving trackbed performance and decreasing the overall cost and environmental impact.