Optimisation of trackbed design and maintenance

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BACKGROUND OF THE PROBLEM

BALLAST RELATED PROBLEMS:
- Fast tendency to settle and deteriorate
- Frequent maintenance is needed to restore geometry
- High costs and material consumption
- Relatively low trackbed durability

RE-THink RAILway SUBstrucTure TO IMPROVE Trackbed RESistance TO PERMANENT DEFORMATION AND DURABILITY

GOAL: DEVELOP A MORE SUSTAINABLE TRACKBED

- Literature review on ballasted track main problems and current technologies proposed to mitigate them
- Identification of ballast testing methods which reflect field performance
- Evaluation of the effectiveness of current routine maintenance operations to restore track geometry
- Study of bitumen emulsion as ballast stabilisation method for newly constructed or exiting track (during a maintenance task)

HIGHLIGHTS

- PUMA tests showed that bitumen stabilisation has the potential for increasing resistance to accumulation of permanent deformation and deformation rate, especially increasing the dosage
- Stabilisation process increased also the capacity of ballast to dissipate energy, highly desirable for damping dynamic loads
- Comparing different bitumen emulsions by an optimisation method showed that scenarios with higher dosage of bitumen emulsion having higher viscosity, quicker setting behaviour, and harder base bitumen seems to be the most desirable to achieve enhanced in-field performance
- With respect to conventional ballast, this technology, by reducing stress transmitted to the sublayers and the degradation of ballast particles, has shown also the potential of increasing trackbed durability problems

Dissemination

- G. D’Angelo, M. Sol-Sanchez, F. Moreno-Navares, D. Lo Presti, N. Thom, Use of bitumen stabilised ballast for improving the effectiveness of conventional maintenance processes. Article submitted to Geotechnique

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