



## **Sustainable Solutions of Railway Track Rehabilitation**

Paula Couto (1), Simona Fontul (2,5), Madalena Barroso (3), Maria João Falcão (4), Zuzana Dimitrovova (5,6)  
(1) LNEC, Lisboa, Portugal (pcouto@lnec.pt), (2) LNEC, Lisboa, Portugal (simona@lnec.pt), (3) LNEC, Lisboa, Portugal (mbarroso@lnec.pt), (4) LNEC, Lisboa, Portugal (mjoaofalcao@lnec.pt), (5) Faculty of Science and Technology, Nova University of Lisbon, Portugal and, (6) 3IDMEC - Institute of Engineering Mechanics of Instituto Superior Técnico of University of Lisbon, Portugal (zdim@fct.unl.pt)

Considering the economic-financial crisis faced through Europe, all the railway rehabilitation projects stakeholders are concerned with the costs required to improve the railway systems. Additionally, following recent decisions from European Union, it is becoming more urgent to conduct economic based widespread research for fundamental rehabilitation strategies. A research project, on going in Portugal, aims dealing with these gaps in an integrated way, taking advantage of previous knowledge and existing non destructive testing methods.

The rehabilitation solutions studied take into account the track condition obtained through non-destructive testing (NDT). The rehabilitation solutions are more efficient and sustainable if they address the cause of track deterioration. An important task of this study is to promote the reuse of materials existing on track and to reduce the consumption of raw geomaterials.

This paper presents, on one hand, the track condition diagnosis based on NDT performed at traffic speed and, on the other hand, the sustainable reinforcement solutions undertaken without traffic interference, based on the recycling of track materials and reinforcement with geosynthetics.

For the diagnosis process, the focus is on the use of Ground Penetrating Radar measurements and bearing capacity assessment for the evaluation of the current stage of the railway track constituents and of the adequacy of the reinforcing treatment implemented.

Three different rehabilitation solutions are addressed: the use of geogrids, an unbonded subballast layer with granite aggregate and a cement bounded subballast layer, aiming to solve the substructure deficiency in terms of stiffness and settlements. Regarding the integration of geosynthetics in the rehabilitation solutions, this solution has grown substantially along the time, such as the application of different geogrids with reinforcement and/ or stabilization functions of granular layers. This study presents a testing methodology to verify the geogrid/ballast interlock mechanism based on nondestructive tests, such as the falling weight deflectometer. The aggregates used will be mainly resulting from the reuse of existing ballast, with benefits at environmental level.

This paper presents the results achieved so far in evaluating the performance of different railway rehabilitation strategies founded on an economic feasibility study, based on Cost Benefit Analysis and/or Multicriteria Analysis.

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