



A study on the influence of track discontinuities on the degradation of the geometric quality supported by GPR

Andre Paixao (1), Simona Fontul (1), Tânia Salcedas (2), and Margarida Marques (2)

(1) National Laboratory for Civil Engineering (LNEC), Lisbon, Portugal {apaixao;simona}@lnec.pt, (2) NOVA University of Lisbon – Faculty of Science and Technology (FCT-UNL), Monte da Caparica, Portugal {t.salcedas;am.marques}@campus.fct.unl.pt

It is known that locations in the track denoting sudden structural changes induce dynamic amplifications in the train-track interaction, thus leading to higher impact loads from trains, which in turn promote a faster development of track defects and increase the degradation of components. Consequently, a reduction in the quality of service can be expected at such discontinuities in the track, inducing higher maintenance costs and decreasing the life-cycle of components.

To finding actual evidences on how track discontinuities influence the degradation of the geometric quality, a 50-km long railway section is used as case study. The track geometry data obtained with a recording car is firstly characterized according to the European standard series EN 13848. Then, the results of successive surveys are analysed, making use of various tools such as the standard deviation with moving windows of different sizes and calculating degradation rates. The GPR data was also analysed at the locations corresponding to track discontinuities aiming at better identifying situations where sudden changes occur regarding either the structural characteristics or the track behaviour over the years.

The results indicate that the geometric quality degrades faster at locations denoting discontinuities in the track, such as changes in track components, approaches to bridges, tunnels, etc. This behaviour suggests that these sites should be monitored more carefully in the scope of asset management activities in order to maximize the life-cycle of the track and its components.

This work is a contribution to COST (European COoperation on Science and Technology) Action TU1208 "Civil Engineering Applications of Ground Penetrating Radar".