

DRaT
Development of the Ravelling Test

a research project of the
cross-border funded joint research programme

“CEDR Call 2014: Asset Management and Maintenance”

1) Introduction

This trans-national research programme was launched by the Conference of European Directors of Roads (CEDR). CEDR is an organisation which brings together the road directors of 25 European countries. The funding partners of this cross-border funded Joint Research Programme are the National Road Administrations (NRA) of Belgium-Flanders, Finland, Germany, Ireland, Norway, the Netherlands, Sweden, United Kingdom and Austria. As in previous collaborative research programmes, the participating members have established a Programme Executive Board (PEB) made up of experts in the topics to be covered. The research budget is jointly provided by the NRAs who provide participants to the PEB as listed above.

2) Project Facts

Duration: 01/09/2015 – 31/08/2017

Budget: EUR 531.956

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3) Project Description

Ravelling is a common mode of early failure for many types of asphalt pavement. The potential causes for this loss of aggregate particles include lack of sufficient binder; inappropriate aggregate grading; poor adhesion between the binder and the aggregate; errors during compacting; aggressive scuffing by the traffic; ageing; and effect of climatic conditions. The number of different causes and their interdependence makes it difficult to assess the theoretical potential to ravel of an asphalt mixture in the design stage. This is contrary to the general progression towards the design of asphalt mixtures to be resistant to the other principal modes of failure.

Highway authorities need to specify against all the modes of failure that can foreseeably occur. Currently, ravelling is generally attempted to be curtailed by specifying minimum binder content, aggregate grading envelopes and aggregate/binder affinity, but these are indirect assessments that have also been used to counter other aspects of asphalt performance. Recently several simulative laboratory tests have been developed that claim to give an indication of that potential. These tests use scuffing machines that repeatedly apply a scuffing action to slab or core samples to replicate in service loading. The test methods for four such scuffing machines have been written up as a draft technical specification by Comité Européen de Normalisation (CEN) as prCEN/TS 12697-50: Resistance to scuffing. However, these methods need to be culled or combined so that there is only one test method for this one property before the technical specification can be converted into a test standard.

There is a need for a direct scuffing test to assess the resistance to ravelling of asphalt mixtures, but this method needs to be a single measure that is validated against site performance and has good precision.

4) Expected Results

This project will look at the methods of test and the results produced for the four scuffing machines in order to identify:

- The extent to which sample preparation needs to be standardised, such as compaction level, evenness, storage conditions and age when tested.
- The most effective method of measurement in terms of extent of differentiation, validity as a measure of ravelling and practicality.
- Whether the results from one or more scuffing machines can be validated from experience on site.
- Whether the results from different scuffing machines can be converted to a common measure.
- Estimates of the precision of the results with each scuffing machine or, if the results can be converted to a common measure, of the common measure.
- Whether the results from either pair of similar machines are comparable and their results are reproducible.
- A procedure to identify if other scuffing machines can be used for the standard test.

The overall objective is to provide advice on how to refine prCEN/TS 12697-50 to be an acceptable standard with a draft incorporating that advice.