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Case study: Development of a new bituminous mixture “ThinGap with Reacted and Activated Rubber for Madeira Island”

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ABSTRACT: The paper intends to develop a new bituminous mixture, (ThinGap), for Madeira Island (MI), with reacted and activated rubber (RAR), using a new mix design approach, namely i-Mix Design.

The volumetric and performance properties of the ThinGap mix were predicted through i-Mix Design and compared with the results obtained by traditional tests - e.g. Marshall method, permanent deformation and fatigue tests, as well as skid resistance with British pendulum.

The results show that the use of RAR in the ThinGap allowed the development of a new bituminous mixture for MI, that has a good resistance to permanent deformation, with a fatigue resistance about 1000 times higher than a conventional bituminous mixture used in MI - not jeopardizing water resistance. Additionally, skid resistance showed to be very high, despite the fact that the mixture had 12 % of binder (60 %, bitumen; 40 % RAR). These results tend to show that the use of a higher content of crumb rubber contributes to the improvement of skid resistance by creating an effect of tire/ “tire mixture”.

The outcomes achieved were only possible due to the specific mix design used (i-Mix Design). This new mix design approach revealed to be a cost-effective guidance tool for ThinGap design, enabling to optimize the ThinGap volumetric and performance properties, in only one day, comparing to about one month required for the conventional laboratory mix design and performance assessment.

KEYWORDS: Road and airport pavements, ThinGap, RAR, Mix design, Mixture performance
