

UNIVERSITI TEKNOLOGI MARA

**STRIPPING PERFORMANCE OF HOT MIX
ASPHALT (HMA) USING POLYMER AND
HYDRATED LIME AS ADDITIVES**

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ABSTRACT

Stripping is one of the common type of pavement failure found in asphaltic pavements. Besides high traffic impact stress, climatic factor such as temperature and moisture also have profound effect on the durability of hot mix asphalt (HMA) pavements. The objective of this research is to evaluate and compare the stripping performance of unmodified and rubber-polymer modified binder mixes with and without anti-stripping additives in Superpave mix design (AASHTO TP4) procedure.

The study investigates four different dense graded Superpave HMA mixes. The first mixture was a control specimen that contained no hydrated lime and unmodified binder. The second mixture contained hydrated lime with unmodified binder. The third mixture contained no hydrated lime but with rubber-polymer modified binder and the fourth mixture contained hydrated lime with rubber-polymer modified binder. The hydrated lime was used as anti-stripping additive. The addition of 40-mesh tyre crumbs and polymer Ethylene-Vinyl-Acetate (EVA) into binder was used to prepare rubber-polymer modified binder. The optimum percentage of rubber crumb and EVA polymer was selected based on the previous research done by Ibrahim, (2005). The boiling water test, the modified Lottman's test, and the indirect tensile resilient modulus test were used to evaluate the stripping performance in these mixes. This study also documents the effect of different temperature on tensile strength ratio (TSR) and resilient modulus ratio (RMR) on the HMA mixtures. Comparison of the physical conditions such as strength or resilient modulus of the conditioned and unconditioned samples were used as a measure to evaluate the stripping potential in HMA pavement. Statistical analysis was then carried out to evaluate the significance of rubber polymer and hydrated lime on the stripping performance of HMA mix.


Finding from this research work showed that rubber-polymer modified binder mixes were found to exhibit better resistance to moisture damage compared to unmodified binder mixes. The results also showed that the addition of hydrated lime as antistripping additive is effective in all mixes, however greater resistance to moisture damage with rubber-polymer modified binder as compared to unmodified binder mixes. In addition, it could be noted that temperature significantly affects the performance of the hot mix asphalt. Statistical analysis of TSR and RMR results show there are significant different for mix with the addition of hydrated lime and demonstrates a higher potential for stripping resistance.

Candidate's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree of qualification.

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