

## ABSTRACT

Hydrated lime has traditionally been used as filler primarily for its ability to improve the moisture resistance of bituminous mixes. Addition of hydrated lime (HL) is also known to improve overall performance of bituminous mixes. Hydrated lime can be added to bituminous mixes either by dry method in which it is added to the aggregates or by wet method (modification of bitumen with lime). However, very few studies have been reported on the beneficial effect of lime on different performance parameters other than moisture resistance. The literature available on the comparison of the addition of lime in wet or dry process is very limited. In view of the limited data available on the performance of lime modified mixes, a detailed study was taken up on the use of hydrated lime in bituminous mixes in wet and dry methods.

Performance of different bituminous mixes modified with hydrated lime by wet as well as dry methods was evaluated in terms of rutting, fatigue cracking and moisture damage. In the dry process, filler was replaced with hydrated lime (1.5% and 2.0% by weight of aggregate). Lime (20%, 30% by weight of bitumen) was added to bitumen in the wet method. Two viscosity grade binders VG30 and VG40 were used for modification by addition of 20% and 30% hydrated lime and for preparing control mixes (without lime) and mixes in which lime was added by dry process. PMB70 and CRMB55, two modified binders commonly used in India, were also considered in the investigation for comparing their performance with that of lime modified mixes.

Mixes prepared with wet method of lime addition have higher rutting resistance measured in terms of  $E^*/\sin\phi$ , flow number and accumulated strain values compared to control mixes and the mixes prepared dry lime addition method. Fatigue lives of a typical highway pavement section estimated using the elastic moduli and fatigue relations obtained for different mixes from the present investigation suggested that lime addition will be beneficial in improving the fatigue life of the pavement. Results of TSR,  $E^*$  ratio,  $E^*/\sin\phi$  ratio and increase in dynamic creep strain due to moisture conditioning showed that lime modification yields significant improvement in the moisture resistance of the mixes. The effect of lime addition in wet process is not significantly different from that noted in the mixes produced by dry process.  $E^*$  ratio and  $E^*/\sin\phi$  ratio reflect the sensitivity of mixes to moisture damage much better compared to the TSR parameter.

*Key words:* bituminous mixes, hydrated lime, wet and dry methods, rutting, fatigue cracking, moisture resistance, aging, dynamic modulus, flow number test, dynamic creep test, control strain fatigue test .