

## Effects of Wax Based WMA Additive on Laboratory Performance of Polymer Modified Binder

Aniket V. Kataware<sup>1</sup>, Dharamveer Singh<sup>2</sup>

### Abstract

Hot mix asphalt concrete (HMA) is being widely used to construct flexible pavements. The HMA technology requires temperature in range of 150 to 190°C, which could cause many environmental and health issues. Moreover, high temperature oxidizes bitumen and reduces its design life and long-term performance of pavements. Researchers have reported that warm mix asphalt (WMA) technology can help in reduction of mixing and compaction temperatures by 20 to 40°C, and consequently promotes environmental and energy efficient technology for construction of pavements. There are different types of warm mix additives as organic, wax, chemical and water based. These additives are mixed with virgin binders to reduce the viscosity of asphalt binder and facilitate good working conditions by reducing temperature, emissions and increasing workability. However, concerns have been raised to evaluate moisture, rutting and fatigue performance of WMA mixes. The less mixing temperature in plant may reduce aging of a binder, which may result in high amount of rutting in the field. However, limited studies are available on performance of binders modified with WMA additives. Keeping the sustainability and energy saving requirements in view, current study aims to evaluate laboratory performance of polymer modified binder (PMB 40) modified with a wax based additives. Rutting performance using Superpave rutting parameters ( $G^*/\text{Sin}\delta$ ), and multi-stress creep recovery tests (MSCR) were evaluated in the laboratory for WMA modified and PMB 40 binders. It was found that addition of wax additive enhances high temperature grade of a binder. Also, modification showed improvement in rutting parameter (non-recoverable creep compliance) of a binder estimated from MSCR test. Overall, it was seen that addition of a wax based WMA additive results in improving rutting performance.

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1. Ph.D. Student, Department of Civil Engineering, Indian Institute of Technology, Bombay, India

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2. Assistant Professor, Department of Civil Engineering, Indian Institute of Technology, Bombay, India (Corresponding author), E-mail: [dvsingh@iitb.ac.in](mailto:dvsingh@iitb.ac.in); Phone: +91-22-2576-7304.