

Temperature Susceptibility of Multigrade Bitumen Asphalt and an Approach to Account for Temperature Variation through Deep Pavements

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Abstract : Multigrade bitumen asphalt is a quality asphalt product that is not utilised in many places globally. Multigrade bitumen is believed to be less sensitive to temperature, which gives it an advantage over conventional binders. Previous testing has shown that asphalt temperature changes greatly with depth, but currently the industry standard is to nominate a single temperature for design. For detailed design of asphalt roads, perhaps asphalt layers should be divided into nominal layer depths and different modulus and fatigue equations/values should be used to reflect the temperatures of each respective layer. A collaboration of previous laboratory testing conducted on multigrade bitumen asphalt beams under a range of temperatures and loading conditions was analysed. The samples tested included 0% or 15% recycled asphalt pavement (RAP) to determine what impact the recycled material has on the fatigue life and stiffness of the pavement. This paper investigated the temperature susceptibility of multigrade bitumen asphalt pavements compared to conventional binders by combining previous testing that included conducting a sweep of fatigue tests, developing complex modulus master curves for each mix and a study on how pavement temperature changes through pavement depth. This investigation found that the final design of the pavement is greatly affected by the nominated pavement temperature and respective material properties. This paper has outlined a potential revision to the current design approach for asphalt pavements and proposes that further investigation is needed into pavement temperature and its incorporation into design.

Keywords : asphalt, complex modulus, fatigue life, flexural stiffness, four point bending, multigrade bitumen, recycled asphalt pavement

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