

TOP-DOWN CRACKING DEPTH MONITORING USING NON-DESTRUCTIVE ULTRASONIC TESTING IN PERPETUAL ASPHALT PAVEMENTS

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ABSTRACT

Timely treatment of partial-depth surface-initiated cracks is essential to prolonging the life cycle of asphalt pavement. This paper presents the results of systematic experimental research evaluating the depth and extent of top-down cracking by means of ultrasonic techniques. It is shown that this non-destructive, inexpensive and easy-to-implement technology could avoid some of the common disadvantages of the methods typically applied to conduct crack assessments, such as coring or some other non-destructive methodologies.

For this reason, extensive laboratory tests were performed and applied to different bituminous mixtures, pavement thicknesses and crack depths. An ultrasonic low-frequency short-pulse device with dry point contact transducers was utilized, thereby avoiding the disadvantages of traditional couplant plate contact transducers and requiring no surface preparation. The one-sided self-calibrating measurement technique employed in the tests eliminates the need for local calibration, demonstrating the promising application of this technology.

Laboratory results have been compared with in situ testing and with a theoretical approach, and a calibrated model with graphic curves for routine use in pavement evaluation is proposed.

KEY WORDS: Surface-initiated cracking, long-lasting pavement, ultrasound