Project Capsule

25-1B

October 2024

Assessment of the PaveScan RDM for Continuous Density Measurements in Louisiana

PROBLEM

Asphalt pavements play a significant role in the transportation of products and services in the American economy. The long-term performance of these pavements depends heavily on the quality of materials and the construction technique used, as well as the density of the asphalt mats and joints. Road agencies across the US have utilized various techniques to enhance the density of asphalt mats and joints to improve long-term performance.

Despite these efforts, producing consistently high-quality asphalt mats and joints remains a challenge. Problems such as insufficient compaction, segregation, and improper construction methods continue to negatively affect pavement performance. Poorly constructed asphalt mats and longitudinal joints typically exhibit lower densities and increased water infiltration, ultimately compromising the structural capacity of the asphalt pavements.

Recent advancements in Continuous Full Coverage (CFC) testing methods offer promising solutions for constructing pavements to specified densities with limited defects. CFC techniques typically used by road agencies include intelligent compaction (IC), pavement infrared scanning (PaveIR), and ground penetrating radar (PaveScan) technologies. These technologies provide road agencies with real-time data regarding temperature distribution, compaction levels, and potential defects, enabling proactive adjustments and improved quality control and assurance. Notably, infrared technology has proven effective in detecting temperature segregation, a significant factor impacting density and performance. Furthermore, the PaveScan rolling density meter (RDM) takes continuous dielectric readings of a compacted asphalt mat to determine its density per square foot. The PaveScan technology has the potential to produce asphalt pavements with minimal defects through continuous density measurements. It can also assist road agencies in establishing appropriate incentive and disincentive guidelines, as well as corrective actions.

Figure 1 shows a typical three-antenna PaveScan RDM capable of scanning a 6-foot-wide pavement section per run. Recognizing the potential of CFC technologies, this study proposes to assess the potential use of the PaveScan RDM for continuous asphalt mat and joint density measurement in Louisiana.

Figure 1. PaveScan RDM

Start Date
July 22, 2024

Duration
18 months

Funding
SPR: TT-Fed/TT-Reg - 6

Principal Investigator
Moses Akentuna, Ph.D., P.E.
Asphalt Research Manager
225-767-9151

Administrative Contact
Tyson Rupnow, Ph.D., P.E.
Associate Director, Research
225-767-9124

Technical Contact
Samuel B. Cooper, III, Ph.D., P.E.
Materials Research Administator
225-767-9164

4101 GOURRIER AVE.
BATON ROUGE, LA 70808

Read capsule online:
www.ltrc.lsu.edu/publications.html

OBJECTIVE

The objectives of this research are twofold.

- Evaluate the PaveScan rolling density meter (RDM) for continuous asphalt mat and joint density measurements.
- Propose a framework for the quality control and/or assurance of asphalt mats and longitudinal joint construction through the use of continuous density measurements.

METHODOLOGY

To fulfill the objectives of this research, the team will employ several methods, beginning with a literature review on continuous asphalt density measurements. To complement the literature review, the research team will conduct a survey to collect information from DOTD district engineers and contractors about techniques for enhancing and measuring asphalt mat and joint density, as well as the drawbacks and advantages associated with these techniques. The research team will then develop an experimental test plan, which involves the selection of field projects, followed by the collection of field density data. For each selected project, the research team will use the continuous density device on a minimum of two lots for both the binder and wearing course layers (where applicable). Additionally, a minimum of four cores will be extracted from each evaluated lot to calibrate the device. Finally, the density data obtained from cores taken for acceptance and quality control purposes will be compiled for analysis.

Following the above tasks, the team will analyze the field density data measured on the pavement sections considered in the study. The research team will propose a framework for continuous density measurements for asphalt pavement quality control and assurance during construction. Finally, the team will prepare a final report documenting the findings of this study.

IMPLEMENTATION POTENTIAL

The research team anticipates proposing guidelines for continuous density measurement for asphalt pavement quality control and/or assurance during construction. These guidelines will assist Louisiana in efficiently monitoring pavement density during construction, resulting in pavement sections with limited defects and longer service life.