



Spotlight on Pavement Uniformity: Minnesota Department of Transportation Status and Next Steps With the Paver-Mounted Thermal Profiler

FHWA-HIF-22-061

Overview of PMTP Use in Minnesota

The Minnesota Department of Transportation (MnDOT) is continuing to explore further adjustments to the use of and applications for the Paver-Mounted Thermal Profiler (PMTP), a tool that has been fully deployed into practice for MnDOT asphalt paving projects since 2018. The agency had studied the tool for several years and saw the PMTP's benefits in assessing asphalt uniformity, an indicator of long-term pavement performance.

PMTPs uses temperature sensors to continuously read surface temperatures of the newly placed asphalt mat immediately behind the trailing edge of the paver screed during placement operations. These readings can indicate temperature differentials, usually referred to as thermal segregation. This data can be converted into a visual representation of the temperatures on the roadway, such as maps or graphs.

MnDOT is leading a national transportation pooled fund study to enhance Veta¹, software that manages and standardizes data imported from the PMTP and other intelligent construction technologies to perform viewing, filtering, and analysis. Veta is funded by Transportation Pooled Fund Study TPF-5(354) and is free to download. The software is moving to a web-based platform, and Rebecca Embacher, MnDOT Advanced Materials and Technology Engineer, says that should make it easier for State construction staffers to look at data in real time while in the field.

Status and Next Steps for the PMTP

MnDOT specifies that the device is used on paving projects where the contract net length is 2 miles or more, and that the data be submitted via the Veta software. PMTPs are applied to about 90 highway paving projects in Minnesota each year, according to MnDOT. Staff turnover at MnDOT and among State paving professionals is a challenge to consistent application of PMTPs, says Embacher.

MnDOT describes these other goals for the PMTP:

- Continue moving toward requiring use of high accuracy positioning (less than 2 inches) of the Global Navigation Satellite System (GNSS).
- Provide further training and refresher courses for personnel, including on any updated software. Create an archive of thermal information to benefit future projects.
- Integrate data collected by the Material Delivery Management System (an expanded form of electronic ticketing) with PMTP and other intelligent construction data.
- Develop agency procedures for verifying contractor-furnished surface temperature readings from the PMTP. This is a requirement for Federal-aid highway projects on the National Highway System when using contractor quality control data as part of the acceptance decision (23 CFR 637.207(a)(1)(ii)(B)).

MnDOT's Suggestions for Other Agencies

Considering implementation of the PMTP? MnDOT shares these strategies:

- Design the pilot stage to be low-risk for paving partners.
- Phase in deployment and be transparent with the local paving industry about the plan and timeline. MnDOT shared and received feedback on its implementation plan during periodic meetings with Minnesota Asphalt Pavement Association (MAPA) members. MnDOT also shared sample "report cards" with project contractors of how thermal profiles would be measured, and how incentives or disincentives would be calculated. This was instrumental in helping contractors understand their risk when bidding projects.
- Provide ongoing training and hands-on support.
- Stay flexible during early stages of implementation; challenges will almost certainly arise in the field.

¹Veta is a data management and analysis software tool for intelligent construction; it is a map-based tool for viewing and analyzing geospatial data.

Except for any statutes and regulations cited, the contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity regarding existing requirements under the law or agency policies.



PMTP scans a highway paving job in Minnesota.
Photo: MnDOT

For more information on PMTPs and related technology, contact Stephen Cooper, Pavements & Materials Engineer, FHWA Resource Center, stephen.j.cooper@dot.gov

This equipment and more are available for loan by the MATC. Learn more at <https://www.fhwa.dot.gov/pavement/asphalt/trailer/testing.cfm>

The PMTP series shares information on pavement testing programs. To access the full series, visit <https://www.fhwa.dot.gov/pavement/asphalt/trailer/construction.cfm>