



Using the Paver-Mounted Thermal Profiler (PMTP) for Asphalt Uniformity

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Background

In-place density is an important indicator of pavement durability of hot mix asphalt (HMA) mixtures. Non-uniform zones of mix, called "segregation," are typically lower in density than the rest of the HMA mat and appear as common defects in road construction. These locations can fail prematurely, causing poorer ride quality for the traveling public and a burden of unplanned maintenance costs for the agency.

Many State Departments of Transportation (DOTs), therefore, check for segregation and density levels in their quality assurance (QA) programs. Traditional segregation check procedures are conducted visually or through sample cores from spots or streaks on the mat. However, it can be difficult to see concentrated, problematic areas, especially at night when paving often occurs. Testing through sample cores may not represent an entire project.

How PMTPs Work

Developments in infrared (IR) thermography give DOTs and paving contractors a new tool for detecting thermal segregation: the Paver-Mounted Thermal Profiler (PMTP).

The PMTP system sits on the paver and provides two-dimensional IR thermal maps, showing the temperature differentials of the surface of the mat. Depending on the magnitude of the temperature differential, segregated areas show up colder than the surrounding compacted HMA mat. These cold spots can result in low-density areas and exhibit coarser gradation and lower asphalt cement content, which make them more susceptible to raveling and cracking. Trained crews can immediately analyze the maps or export them for viewing later. Some systems use software that uploads data automatically to the storage cloud. This allows paving contractors, plant managers, and DOT engineering staff to review data virtually after each upload and respond to conditions in real time.

The system consists of an IR mast base, mast extension, and mast arm; the IR scanner itself; the monitor; a distance measuring instrument; a combined wireless communication and GPS unit; wiring; and various connection bolts and materials. Most of the accessories fit into a case that one person can carry. Initial setup takes about 2 hours, while each daily setup can be completed in 20 minutes.

Potential Benefits

- Provides quantitative, full-coverage monitoring and evaluation of HMA mats.
- Provides immediate feedback to paving crews.
- Allows for troubleshooting low or non-uniform mat density areas. Crews can adjust for such factors as paving speed, loading, hauling times, and the number of stops.
- Results in more continuous testing than with sample cores.
- Useful in training new operators or experienced crews.

Considering PMTP? Technology demonstrations are available to State DOTs and from the Federal Highway Administration (FHWA) through the Mobile Asphalt Technology Center (MATC) or FHWA Resource Center.

The contents of this document do not have the force and effect of law and are not meant to bind the States in any way. This document is intended only to provide information regarding existing requirements under the law or agency policies.

For more information on PMTP and related technology, contact
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This equipment and more are available on loan at the MATC.
<https://www.fhwa.dot.gov/pavement/asphalt/matc/equipment-loan-program.cfm>

The PMTP series shares information on pavement testing programs.

To access the full series, visit
<https://www.fhwa.dot.gov/pavement/asphalt/matc/technical-documents.cfm>



PMTP back view (above). On-site display during night paving (below). Photos: FHWA

