



State Transportation Innovation Council (STIC)

2015 Fact Sheet



Warm-Mix Asphalt

**Pavement produced at lower temperatures:
Safer for workers, good for the environment**

Warm-mix asphalt is a relatively new technology that allows hot-mix asphalt producers to mix pavement materials up to 120 degrees Fahrenheit cooler than traditional mixing at an asphalt plant. The change in temperature may seem insignificant, but the benefits are quite the opposite. Benefits include both environmental and performance. One immediate environmental benefit is the reduced amount of energy needed to heat the asphalt mixture, which can lead to a savings in fuel consumption. In addition, production at lower temperatures means less smoke and a noticeable lack of fumes, which makes it safer for workers at a job site.

Performance benefits include less effort to mix and compact warm-mix asphalt, thus increasing production efficiency during the mixing, paving, and rolling operations. Less effort to compact during cooler weather ensures the rolling operation is still able to achieve good compaction. In addition, lower mixing temperatures at the asphalt plant lessens the aging of the liquid asphalt cement as it is mixed, thus allowing for a longer pavement lifespan. Because warm-mix asphalt technologies result in less effort to compact the mix, they are typically referred to as compaction aids. Better compaction increases performance of asphalt pavements.

Why does it work?

Warm-mix asphalt is produced at the mixing plant using various technologies. Mechanical water injection systems connected to the mixing plant add a small amount of water, approximately 2 percent, to the liquid asphalt cement. The injected water immediately boils to expand the volume of liquid asphalt by creating air bubbles or foamed liquid asphalt. The expanded or foamed asphalt is easier to mix with the coarse and fine aggregate at the plant and makes the asphalt easier to compact in the field. Other technologies add chemicals or organic waxes as a form of lubrication that makes it easier to mix and compact the asphalt. Because these technologies result in asphalt that is easier to mix and compact, the temperature of the warm-mix asphalt can be reduced. Of the more than 20 different warm-mix asphalt technologies commercially available, PennDOT has approved 12 for use in Pennsylvania.

What are the benefits?

- Provides improved asphalt compaction, especially during cooler weather.
- Results in improved working conditions by reducing exposure to fuel emissions, fumes, and odors.
- Allows haulers to travel further distances without compromising the integrity of the mix, and this could result in increased competition.



The State Transportation Innovation Council (STIC) has selected warm-mix asphalt as an innovative alternative for paving, especially on low-volume roadways. The Federal Highway Administration has also included warm-mix asphalt as part of its Every Day Counts program, which is an initiative designed to identify and deploy innovation that shortens project delivery, enhances safety, and protects the environment.

Warm-Mix Asphalt in Pennsylvania

PennDOT has incorporated the use of warm-mix asphalt statewide and has included specifications in Publication 408. In 2014, PennDOT used warm mix on about 37 percent of all asphalt projects and expects to use even more warm-mix asphalt in 2015 since several PennDOT districts have decided to go to 100 percent warm-mix asphalt. PennDOT is also working with local governments and municipal partners to educate and encourage the use of this beneficial alternative to paving standards.



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