



TECH BRIEF 2011-6

The Many Benefits of Warm Mix Asphalt

You've heard of cold mix and hot mix. Now with the advent of warm mix, we are able to gain the full benefit of hot mix but at a reduced production and placement temperature. There are many benefits to reducing the production and placement temperatures while maintaining the quality of the asphalt pavement. Here's information about why FHWA is promoting this technology and some examples of its use in Connecticut.

Warm Mix Asphalt (WMA) is the generic term for a variety of technologies that allow producers of Hot Mix Asphalt (HMA) pavement material to lower temperatures at which the material is mixed and placed on the road. It is a proven technology that can:

- Reduce paving costs.
- Extend the paving season.
- Improve asphalt compaction.
- Allow asphalt mix to be hauled longer distances.
- Improve working conditions by reducing exposure to fuel emissions, fumes, and heat.

Lower temperatures, shorter project times, lower costs



WMA production methods use temperatures 30 to 120 degrees Fahrenheit lower than traditional hot-mix asphalt. Because less energy is needed to heat the asphalt mix, less fuel is needed to produce WMA. Fuel consumption during WMA manufacturing is typically reduced by 20 percent.

In paving projects, the greater the temperature difference between the asphalt mix and the outside temperature, the faster the mix cools. Since faster cooling effects durability, cold ambient temperatures adversely affect hot-mix asphalt. In contrast, WMA cools

more slowly allowing WMA to be used successfully in lower temperatures. As a result, WMA extends the paving season. It also makes paving more feasible during cooler nighttime temperatures.

Warm mix asphalt saves time and money in other ways, too. Because WMA may make compaction easier, potential cost savings may be achieved by reducing time and labor compacting the mix.

How does it work? WMA technologies reduce the viscosity (the thickness) of the asphalt binder so that asphalt aggregates can be coated at lower temperatures. The key is the addition of additives (water-based, organic, chemical, or hybrids) to the asphalt mix. The additives allow the asphalt binders and asphalt aggregates to be mixed at the lower temperatures. Reducing the viscosity also makes the mixture easier to manipulate and compact at a lower temperature.

Good for workers and the environment

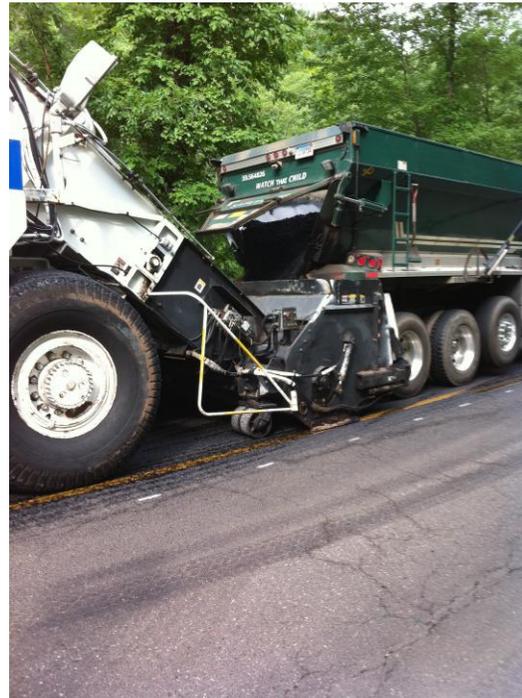
Working conditions are much healthier with WMA. Both at the production plant and on the construction site, workers inhale far less smoke and dust, and the working environment is not as hot. Comments from workers have been highly positive, per FHWA.

WMA also produces fewer emissions, making it possible for paving to be done on some days in urban areas when the air quality would typically put a halt to paving.

Better compaction, better performance

Proper compaction is critical to well-performing pavements. One indication of proper compaction is density. ConnDOT and federally-funded projects have density requirements as part of their quality control. WMA can help achieve proper density and improve pavement performance.

WMA has been used successfully in a range of pavement thicknesses. It is durable enough to withstand high traffic demands. According to FHWA, Warm Mix Asphalt has been used in all types of asphalt concrete: dense-graded, stone matrix, porous, and mastic asphalt. Multiple WMA technologies are available, so the choice can be adapted to the temperatures and materials required.



Warm Mix Asphalt has been used successfully in Europe for more than 10 years. In the United States, WMA projects are now in more than 40 States including Connecticut.

WMA use is growing in Connecticut

James Mahoney, Executive Program Director of the Connecticut Advanced Pavement Lab at the University of Connecticut reports that there is a great deal of interest in using WMA in Connecticut. Given the level of interest and potential benefits of using WMA,

Mr. Mahoney stated that he could envision WMA becoming the preferred production method for asphalt pavement mixtures within the next several years.

Currently, there have been 5 Connecticut DOT pilot projects placed using WMA additives such as Advera, Evotherm, Sasobit and Sonnewarm as well as mechanical foaming of the asphalt binder. There have also been several smaller projects where municipalities have used WMA. Connecticut's contractors have been very interested in using WMA and gaining experience with using it. The contractors have heard about the benefits from WMA and want to validate these benefits for themselves.

The experience from the 5 pilot projects done on ConnDOT projects has been very good. In most cases the WMA producers were able to reduce the production temperatures by the targeted 35-50°F as compared to similar HMA mixtures. The compaction of the WMA has generally been good, although there have been several instances where achieving proper compaction has been difficult. In most of these instances, correcting the issues causing the compaction problems has been resolved by making minor adjustments to the placement process.

For more information on Warm Mix, visit the National Asphalt Paving Association website at <http://www.warmasphalt.com>. You might want to also purchase their Best Practices guidebook on the topic (see above).

The Federal Highway Administration also has a good Web page of information at <http://www.fhwa.dot.gov/pavement/asphalt/wma.cfm>.

Like the Safety Edge, WMA is a technology promoted by the FHWA's Every Day Counts initiative.

Sources:

FHWA. Warm Mix Asphalt Introduction.

<http://www.fhwa.dot.gov/everydaycounts/technology/asphalt/intro.cfm>

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