

# Warm Mix Asphalt in MN

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With the United States Clean Air Act passing into law in 1970, environmental responsibility has been a major priority to U.S. Industries and abroad. The hot-mix asphalt (HMA) industry is no exception and has taken great initiatives to be leaders in these initiatives. Today, the production and placement of HMA pavements consumes less fuel and produces lower levels of greenhouse gases. According to a recent study, HMA pavements require about 20 percent less energy to produce and construct than other pavements. Less fuel consumption means less production of carbon dioxide and other greenhouse gases. Also, since 1970, the asphalt industry has decreased total emissions from HMA plants by 97 percent while increasing production by 250 percent. Emissions from asphalt plants are so low, the EPA considers them as only minor sources of industrial pollution. Currently there are initiatives for reducing the temperature at which HMA is produced and placed and thus further reducing emissions and energy used, as well as many other benefits.

**Warm Mix Asphalt (WMA) technology** allows the mixing, laydown, and compaction of asphalt mixes at significantly lower temperatures compared to HMA. The technology can reduce production temperatures 35°F to 100°F lower than conventional HMA. A scanning committee in the U.S. was formed in 2002 to investigate the European technology and pursue research and development work necessary for implementation. Today there are a countless number of successful WMA projects throughout the nation.

The number of WMA technologies is expanding. They involve designing the mix with either a chemical additive, an organic additive, or by a foaming mechanism. Each of the technologies available are discussed at a web site dedicated to WMA information at [www.warmmixasphalt.com](http://www.warmmixasphalt.com).

To date, there have been five projects in Minnesota with WMA technology. In 2007, Goodhue County State Aid Highway 11 (537 tons placed in 4,200 feet of the eastbound lane) and Olmsted County Road 104 (5 miles) were constructed using a chemical additive called Revix that was developed by Mathy Technology and Engineering Services, Inc. A variety of surfactants, waxes, processing aids, polymers, acids and other materials are used in Revix to reduce the internal friction at reduced temperatures of 60 to 80°F below typical conditions. MnROAD contains warm mix asphalt in several of the new test sections using the same additive.

In 2008, Crow Wing County Road 108 (3,250 tons of WMA and 3,250 tons of HMA over approximately 2 miles) and a trail in northwestern Minnesota were paved on separate dates by Anderson Brothers



Construction Co. Evotherm was used which is a non-proprietary technology developed especially for WMA by MeadWestvaco Asphalt Innovations in the United States. It is based on a chemistry package that includes additives to improve coating and workability, adhesion promoters, and emulsification agents.

There were little to no changes in operations with the use of warm mix asphalt. Evotherm G3 was included in the delivered asphalt cement (PG 58-28) and the asphalt cement-Evotherm G3 mixture was added at the plant to produce WMA per normal plant operations. The temperature at which the mix was produced was reduced from 280°F by increments of 20°F with the lowest temperature at 225°F. The same rolling pattern were used between the HMA and WMA pavements. Very successful density was accomplished for both the HMA and WMA.



The Minnesota Department of Transportation (Mn/DOT) allows the use of Recycled Asphalt Pavement (RAP) and shingles in asphalt pavements as per the combined 2350/2360 Specification and should not be precluded with the use of WMA. Recycled materials have been used in the WMA projects with success, including Crow Wing County Road 108. In fact, it is another benefit of WMA technology that allows for higher percentages of RAP by allowing for better compaction and decreasing the aging of the asphalt binder, both of which can increase the pavement service life and lead to cost savings for the taxpayer/owner of the pavement.

Other examples of successfully using WMA in the Midwest are Wisconsin and Ohio. Warm mix asphalt has been successfully used in Milwaukee since 2006. One of the first projects was on Ryan Road (SR 100) in Milwaukee. The contractor produced approximately 1,000 tons of WMA using Sasobit and 1,000 tons using Evotherm for paving operations. The Sasobit-produced asphalt was laid at about 230°F, and the Evotherm warm-mix was laid at about 215°F. Attendees at the open house heard technical presentations about the technologies and saw them being used in paving operations and being compacted. A traditional mix was used for one lane, allowing side-by-side comparisons of warm mix and hot mix. “Both warm-mix products performed well,” said Len Makowski, regional engineering services supervisor at Wisconsin DOT. “We have wanted to examine how the warm-mix process works, because we are interested in testing environmentally friendly technologies.” Revix has also been used in Wisconsin.

Also in 2006, the Ohio DOT, FHWA, Flexible Pavements of Ohio, and the Asphalt Pavement Alliance sponsored a one-day Open House in conjunction with a field trial of three WMA technologies, at Cambridge, Ohio. A morning educational program was followed by afternoon field trips to the asphalt plant and paving site. A 12-mile project was constructed in four sections, one each for three warm-mix technologies – Aspha-min, Evotherm, and Sasobit – and one for a control section. In a joint effort by academia, industry and ODOT, all the laboratory and field testing identified by the Warm Mix Asphalt Technical Working Group (WMA-TWG) will be conducted for Flexible Pavements of Ohio by the National Asphalt Lab at Ohio University.

**For more information on Warm-Mix Asphalt technology, see [www.warmmixasphalt.com](http://www.warmmixasphalt.com)**

