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Colorado Asphalt Pavement Association

WARM MIX ASPHALT (WMA)

Placement of Warm Mix Asphalt (WMA) occurring at night on Interstate - 70 near the Eisenhower/ Johnson Tunnels

Today's economy has put a strain on the asphalt industry. With the rising costs of energy, and higher crude oil prices the need to reduce costs wherever possible are great. Warm Mix Asphalt is one technology that can play a role in the reduction of those costs without sacrificing the quality or performance we strive to achieve. Warm Mix Asphalt or (WMA) was first introduced in Europe about a decade ago to reduce emissions, and fuel usage while also allowing for longer haul distances, paving in cooler weather while still obtaining the required density criteria, and the increased use of Recycled Asphalt Pavement (RAP). Five years ago this technology was brought to the United States for the same benefits the Europeans observed.

Warm Mix Asphalt differs only slightly than that of its counterpart Hot Mix Asphalt. Aggregate properties,

WMA Additives

Aspha-Min® is a manufactured synthetic zeolite product of Eurovia Services GmbH, of Bottrop, Germany.

WAM-Foam® (Warm Asphalt Mix Foam) is a joint venture product between Shell International Petroleum Ltd., London, UK and Kolo-Veidekke of Oslo, Norway.

Sasobit® is a wax obtained during the gasification of coal.

The Asphalt RAP

PAVE GREEN - Pave with Asphalt America's Most Recycled Product

"The Asphalt RAP" is a publication of the Colorado Asphalt Pavement Association

A publication of the Colorado Asphalt Pavement Association

ASPHALT 100% RECYCLABLE

ASPHALT
THE SMOOTH QUIET RIDE

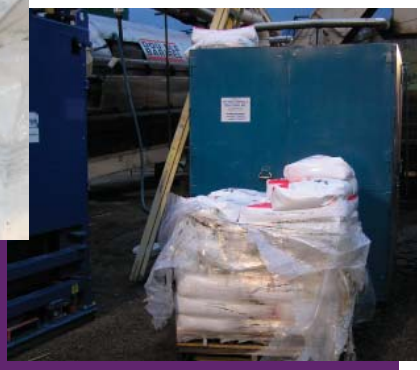
WARM MIX ASPHALT (WMA)

as well as initial binder properties are the equivalent for both types of mixtures; however WMA utilizes various technologies that reduce the viscosity of the liquid binder allowing for the reduction of temperatures during production. There are a number of technologies in use today, however these technologies can be classified into two major categories: a process which utilizes water creating a foaming effect and processes that utilize wax-like additives. The processes utilizing water rely on the fact that water, once heated, changes to steam creating a volume expansion of it and of the asphalt binder it is blended with. The wax-like additives act as a modifier or "asphalt flow improver" for the binder. Both categories allow for the increased workability and aggregate coating at lower temperatures. A few examples of such technologies being utilized in the United States are Aspha-Min®, WAM-Foam®, and Sasobit®, though there are many other technologies on the market.

Aspha-Min® is a manufactured synthetic zeolite product of Eurovia Services GmbH, of Bottrop, Germany. The zeolite, a Sodium Aluminum Silicate that has been hydro thermally crystallized, contains approximately 21 percent water by mass and is released when heated between 185° - 360° Fahrenheit. By

Inspection of the Warm Mix Asphalt (WMA) as it is placed on a CDOT project on Interstate 70.

adding 0.3 percent by mass of the mix at the same time as the binder, a fine water spray is created thus allowing for the volume expansion of the binder that results in a foaming action ultimately lowering the viscosity of the binder.



Advera (aka Aspha-min) is very fine corn starch-type material added to the raw materials like fibers.

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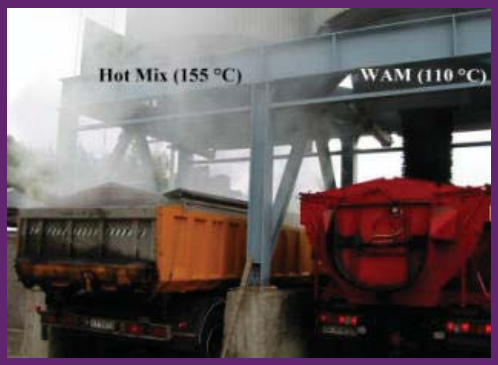
WAM-Foam® (Warm Asphalt Mix Foam) is a joint venture product between Shell International Petroleum Ltd., London, UK and Kolo-Veidekke of Oslo, Norway. This product is a two part system composed of separating the binder into two separate components, a soft binder and a hard binder in foam form. In the first stage, the soft binder component is mixed with the aggregate at approximately 230° F making sure to achieve full aggregate coverage. The second stage comprises of injecting cold water into the heated hard binder creating rapid evaporation which produces a large volume of foam then combines with the soft binder achieving the desired composition and properties.



WAM-Foam reduces visible emissions

Sasobit is similar to wax beads. The material is added like fibers.

The processes utilizing a wax-like additive, such as ***Sasobit®*** is a wax obtained during the gasification of coal. Sasobit®, a product of Sasol Wax of South Africa, is a fine crystalline, long chain aliphatic hydrocarbon. The Sasobit product is injected into the liquid asphalt binder during production of the asphalt mixture in the form of pellets the size of a BB, or on request in flakes or powdered form to be blended at the plant using a stirrer. The recommended dosage is 3 to 4 percent by weight of the mix, which allows a formation of a lattice structure in the binder, effectively reducing the viscosity. The melting point of this product is approximately 210° F and is completely soluble at temperatures above 240° F allowing production temperature to be reduced significantly depending on type of binder being utilized.

Regardless of the technology selected to produce WMA, benefits can be realized by:

- **Reduced plant emissions**
- **Lower operating temperatures**
- **Resulting in reduced fuel consumption**
- **Extended paving temperature**
- **Reduction in fumes/odors**
- **Less plant wear**

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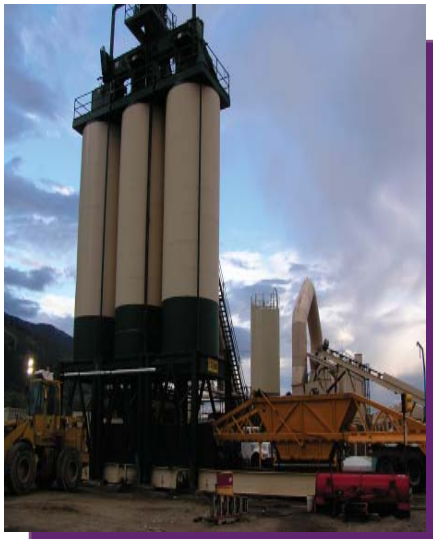
Selection of technologies in which to produce WMA should be carefully considered. Each technology has its own processes and plant modifications that enable the successful production of the mix. Actual temperature reductions also depend on the type of technology chosen. The type of plant, cost of modifications and materials, and logistics of the technologies should be evaluated independently for each contractor before the selection is made.

Regardless of the technology selected to produce WMA, benefits can be realized in reduced plant emissions with the ability to run at lower temperatures, also resulting in reduced fuel consumption. Lower mixture temperatures allow for the ability to have longer haul distances, or pave in colder weather. Studies have shown compaction in WMA is achieved as easily as HMA, and some suppliers of these technologies have reported improved compactibility with the same effort applied to unmodified asphalts. Utilizing WMA also helps in increasing RAP percentages. Typically, high RAP percentage mixes have a stiffening affect on binder properties. The WMA technologies that reduce the viscosity of the binder counters this affect allowing for more RAP utilization. This also helps control bag house temperatures, by alleviating the need to superheat the aggregates to offset the lack of temperature in the RAP. Increased RAP represents cost savings in reduced liquid binder and aggregate consumption. In all, Warm Mix Asphalt is a viable option when considering avenues of cost savings.



This article was authored by Jarrett Welch, Quality Control Manager, Brannan Sand and Gravel Company. More information is available by contacting CAPA at Office@co-asphalt.com, 303-741-6150.

For additional information from another article authored by Mr. Dave Newcomb from NAPA visit http://www.hotmix.org/PDFs/WarmMix.pdf

The Europeans have begun using technologies to lower mix temperatures, and the results have been very promising so far.

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