

SASOL
reaching new frontiers



TWG – Warm Mix Asphalt

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Sasol Wax
Wax is all we do. So we do it best.



SASOBIT

- Introduction
- What is Sasobit?
- What projects have we done since the last TWG meeting?
- Questions



What is Sasobit?

- Fine crystalline long chain aliphatic hydrocarbon.
- Also known as WAX
 - *Not the wax that is naturally found in liquid asphalt*
 - *It has a melting point range of between 185 - 239 deg. F and is completely soluble in asphalt at temperatures above 239 deg. F*
- It is manufactured from natural gas using the Fisher Tropsch process of polymerization
 - *At one time we did manufacture it from coal but in 2003 Sasol invested in a \$6 billion pipe line to pipe the gas from Mozambique to Sasolburg.*
 - *We have been importing this wax into the States for 53 years. Sasol continues to do a feasibility study to possibly start a grass roots Fisher -Tropsch plant here in the USA. This plant would most likely use coal as its feed stock and be primarily run for fuels.*



What does Sasobit look like?

- *Sasobit is available in a solid form.*
 - *A prill (about 5mm in diameter)*
 - *Or a small prill (1mm in diameter)*
 - *Flaked form (3mm chips)*

- *It is packaged in 20 kg bags and 600 kg super sacks*



Prilled Sasobit





Small Prilled Sasobit





Flaked Sasobit





Is Sasobit safe to have around a plant or lab?

- Sasobit is very safe to both humans and animals.
 - *It actually carries a food grade designation of FDA175.105*
 - *Indirect food contact – hot melt adhesives for boxes*
- Sasobit can get wet, water does not harm the effectiveness of the wax. We do recommend waiting for the wax to air dry before putting it into hot asphalt



What does Sasobit do to make an asphalt a warm mix?

- Sasobit lowers the viscosity of the mix and also acts as a flow modifier.
- While in its liquid state, this modification allows the aggregate to move more freely in the binder.
- When Sasobit cools and crystallizes it forms a uniform network structure in the binder.



How is Sasobit used in a WMA?

- It is unique from the other warm mix additives in that it can be added to both the binder and the mix
- When adding it to the mix you blow it into the asphalt stream before the asphalt hits the aggregate
- Sasobit injection machine from Hi-Tech Asphalt Solutions





Sasobit shown going into the drum

- Here the Sasobit is being added directly to the drum.
- Sasobit can be added in-line with the binder in a molten state





When adding Sasobit to the binder...

- It can be mixed into the binder with a normal paddle mixer – high shear mixing is NOT needed.
- Once they are blended together the Sasobit stays homogeneous and can be kept in storage for up to several weeks or more.



How much Sasobit do you need?

- The recommended dosage is 1.5% Sasobit by weight of the binder. If the binder content of the mix is 5% then 1.5 pounds of Sasobit would treat a ton of mix.
- When adding RAP the percent of binder in the RAP would need to be calculated in the formula
- This equates to 30 pounds per ton of binder without RAP and 37.5 pounds per ton of binder with 20% RAP in the mix; figuring 5% binder in the RAP



What temperature can you run the plant?

- That depends...We target 50 degrees F below the plant temperature for the normal control mix.
- Once the plant operator is comfortable with this temperature drop we will make a second drop of an additional 10 – 25 degrees F, again depending on the mix.
- Note: No one knows the plant better than your plant operator. We are not going to ask the operator to run the plant under conditions that he doesn't feel comfortable with.



Are there any issues with the lower WMA temperatures and the bag house?

- We target the bag house temperature to be no less than 200 degrees F. Depending on air flow and water %.
- It is our opinion that temperatures lower than this might cause problems in the bag house like clogging and water vapor build up.
- This safe guard keeps the minimum plant operating temperature at 250 – 270 degrees F.



What effect does Sasobit have on the PG grading of the binder?

- The addition of Sasobit at 1.5% to 2.0% increases the upper end by 4 – 6 degrees.
- It could also increase the low end of the PG grading from 0 to about 3.0 degrees. This is offset by the lack of oxidation of the lower production temperatures.



How does this effect the cold weather cracking?

- It has been our experience that because there is less oxidation of the asphalt because the temperatures are lower in WMA there is no change in the low temperature cracking.
- There was a study done by the University of Florida in July 2006 that showed that using Sasobit at a rate of 1.5% did not have a negative effect on fracture performance



Can you use Sasobit with RAP and what are the benefits?

- The unique viscosity reducing features of Sasobit along with the internal lubricating effects allows for easier handling of RAP mixes.
- RAP usage can be increased to 35% to 45% or even higher.
- Even with high percentages of RAP you can still achieve density at lower paving temperatures. Sasobit-H8 can help with high RAP % as well.



How much asphalt has been treated with Sasobit so far?

- Over the past 11 years around the world 10 million tons of mix has been blended with Sasobit. It has been used to pave everything from airport runways and taxiways to container ports, race tracks, roads, parking lots and drive ways.
- In North America in the last 18 months, since the last TWG meeting, we have sold enough Sasobit to blend more than 250,000 tons of mix.



Some of the more demanding paving jobs

- Airports
 - *Frankfurt Airport - Frankfurt, Germany*
 - *Doha airport, Qatar*
 - *Svalbard Airport– Most northern commercial airport in the world*
 - *Logan Airport, Boston, MA*
- Container Ports
 - *Heavy duty paving in some of the worlds busiest ports*
- Race Tracks
 - *Sasobit has been trusted for use on NASCAR tracks – Talladega, Homestead and Watkins Glen*
- Extra long hauls
 - *750 kilometers (466 miles) in Australia*



Logan Airport Boston, MA- 2007





Sasobit around the world

Heavy Duty paving at container ports; Hamburg Germany





Sasobit around the world



Svalbard Airport - The northern most airport in the world.

Winter temperatures -40 deg. C; Summer temperatures 5 Deg. C



What projects have we done since the last TWG meeting?

- Ottawa, CN
- HVS test track by Caltrans and Graniterock in California
- Yellowstone National Park, WY
- Dillon, CO
- Chicago, IL
- Mt. Holey, NJ
- Open house at Tilcon in NJ
- Logan Airport in Boston, MA
- Verdel, NE
- Private work from coast to coast



Ottawa, CN – Bitumar and Tomlinson

- PG 58-34
- 15% RAP
- 257 deg. F paving temp
- 93% compaction





Chicago – Gallagher Asphalt

- Dan Ryan Express Way
- 20 % RAP
- Compacted 240 deg. F
- Compaction targets were met





Rt. 38 Mt. Holly, NJ – Trap Rock

- PG 76-22
- 15% RAP
- Compaction at 250 deg. F
- Density was met





Yellowstone - Wyoming



- HMA without Sasobit
- WMA with Sasobit
- PG 58-34
- No RAP
- Paving temp. 246 deg. F
- One hour haul time
- 92% - 94% compaction

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Colorado



Sasol Wax
Wax is all we do. So we do it best.



Colorado – night time paving

- PG 58-28
- No RAP
- Compaction at 240 - 200 deg. F
- 10,000 feet elevation
- 5% grade up hill
- 95% - 97% compaction





Logan Airport – NAPA Action News

Warm mix used at Boston's Logan Airport.



Aggregate Industries in Massachusetts completed a warm-mix project at the airport in 2006 using modified asphalt. Because of the success of this effort, Aggregate Industries was selected for another warm-mix project on the B & C alleyway, a taxi area between concourses. The area, which handles heavy-duty traffic, required about 10,000 tons of mix and was completed the week after Labor Day, 2007. Sasobit was used to produce the warm mix. "The material workability was excellent, even though the mix contained polymer, hydrated lime, and RAP," said Mark Nikitas of Aggregate. The fuel-resistant polymer used on the project usually requires elevated temperatures. By using warm mix, however, the company was able to pave at about 50 degrees lower than this mix would normally require. This allowed the area to be reopened to aircraft usage ahead of schedule. All final test results, including plant QC, compaction, grades, and smoothness met project specifications.



Nebraska – Knife River

- PG 64-28
- Compaction temp 230 – 200 deg. F
- 55 miles from plant to job site
- 92% - 94% compaction





HVS test track



- The completed test sections with all three WMA additives and the control section

Advera

Sasobit

Control

Evotherm

- PG-64-16
- Compaction at 225 - 235 deg. F
- 95% - 97% compaction



Tilcon NJ – Open house





Tilcon open house quote – NAPA Action News

- **Demos give attendees a close-up look at warm-mix asphalt.**

Recent warm-mix demonstration projects have been held in New York, New Jersey, and Texas. The warm-mix technologies being tested include Sasobit, Evotherm, and Low-Energy Asphalt. Workers at Tilcon New Jersey did a test strip at its Mt. Hope, N.J. facility and then followed with a Sasobit trial on September 20. "Our crew was thrilled with the process," said Scott Laudone, general manager of asphalt operations for Tilcon New Jersey. "The lower emissions for warm-mix asphalt will be an advantage when we do paving projects inside of tunnels."



Nashville, TN – Lo Jac open house



- PG 70-22
- Paving temperature behind the paver 241 deg. F
- 92% - 93% compaction



Projects scheduled for 2008

- Massachusetts
- New York
- Texas
- California
- South Carolina
- New Jersey
- Georgia



Thank You.....Any Questions?

