


# Warm Mix Technology

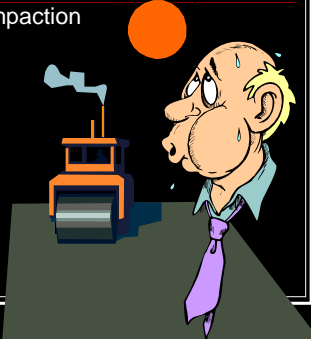
**SEAUPG**  
Nashville, Tn.

Larry L. Michael  
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# Warm Mix Technology

- Reduce Mixing and Compaction Temperature
- Reduce Fumes
- Reduce Fuel Costs
- Improve Workability
- Improve Density
- Extend Paving Window
- Improve Quality



# CONCERNS:

- Costs
- Process
- Binder Storage Tanks
- PG Binder Grade
- Long Term Performance
- DOT Acceptance
- There's No Smoke




# Available WMA Technologies

Processes include:

- WAM Foam – Shell/Kolo Veidekke
- Zeolite – Eurovia/Hubbard Construction
- Sasobit – Sasol Int./Moore and Munger
- Evotherm - MeadWestvaco
- New processes

# Sasobit®



- Fischer-Tropsch waxes
  - Different than naturally occurring asphalt waxes in structure and physical properties
  - Higher melting point
  - Lower penetration
  - Higher viscosity
  - Higher molecular weight

# Sasobit®



Frankfurt International Airport – Renovation of Runway North, Sectors 1 & 2

## Frankfurt Airport

- Old concrete runway had to be removed and replaced „under traffic“
- Work only possible in night shifts between 10:30 pm and 6:00 am
- 7 ½ hours from demolition of concrete to plane landing on new asphalt
- Any delay in construction would mean major upset in European air



## Frankfurt Airport



Asphalt mixture laid at low temperature  
Better compactability  
Increased resistance to deformation at high temperatures



## Frankfurt Airport



- Bear heaviest aircraft in 2-3 hours
- Reduced cooling, key to 300-step project



- First runway in 2001
- Second runway in 2003

- Contract was in both cases a renovation of binder course and wearing course
- The wearing course was to have lowest possible permeability
- Contract called for an SMA 0/Hamburg 11 with 1% less voids than usual
- Hamburg lies in a very wet climate, frequent freeze/thaw cycles and heavy use of deicing fluids are demanding a premium asphalt construction



## QUESTION...

Will Sasobit have a negative effect on mix quality?



## NCAT Evaluation

- Improved compact ability to 190°F
- Did not affect resilient modulus
- Did not increase rutting potential (APA)
- Cure time to open to traffic is not an issue
- Moisture damage with lower temperature may be an issue
- Anti-aging Properties

## Field Trials

1. 45% RAP 19mm Base
2. SMA 19.0mm Intermediate Base
3. 35% RAP 9.5mm Surface Mix

Added – 1.5% Sasobit by weight of total binder

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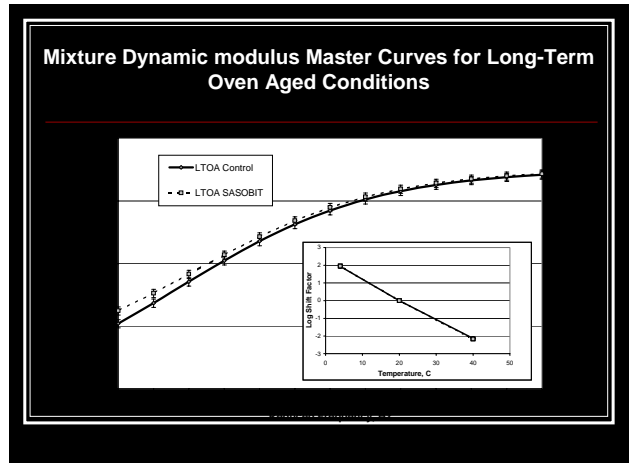
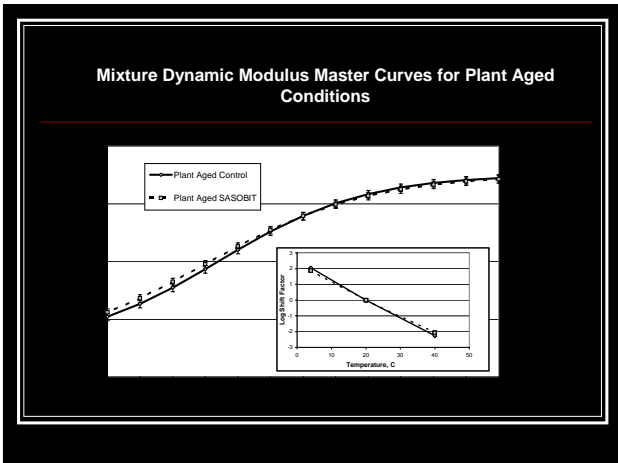
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**Performance Evaluation of High RAP Base Mixture Containing Sasobit**

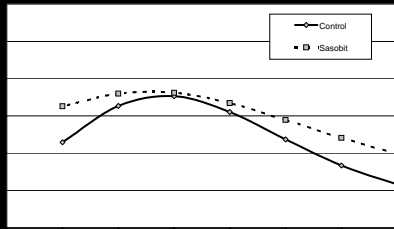
**Maryland State Highway Administration**

Advanced Asphalt Technologies, LLC  
108 Powers Court, Suite 100  
Sterling, VA 20166-9321  
(703) 444-4200  
August 19, 2005

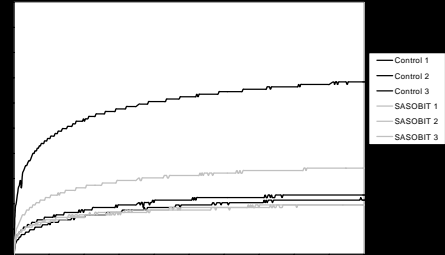


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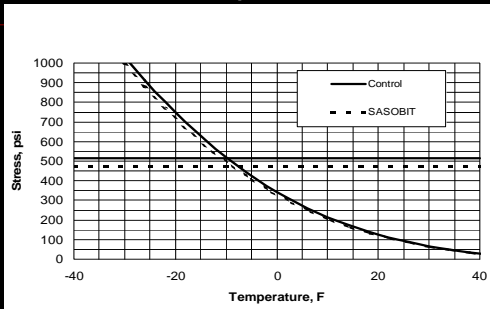
### Effect of Simulated Long-Term Aging



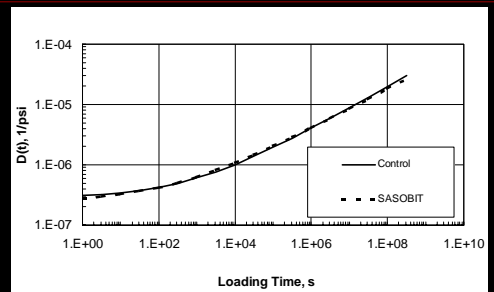
### Repeated Load Permanent Deformation Response for Control and Sasobit® Mixtures



### Estimated Thermal Stresses and Critical Cracking Temperatures



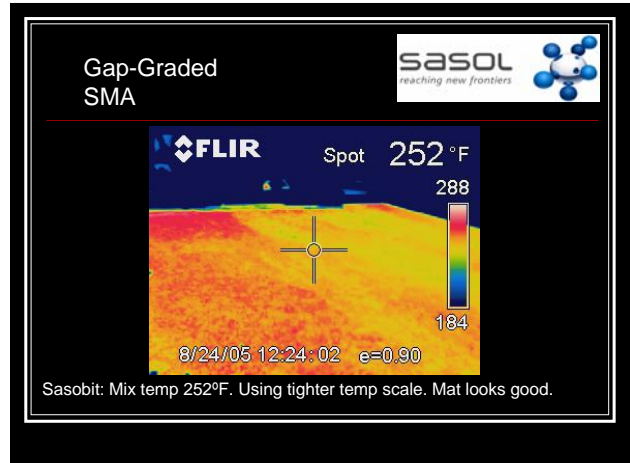
### Comparison of Master Creep Compliance Curves



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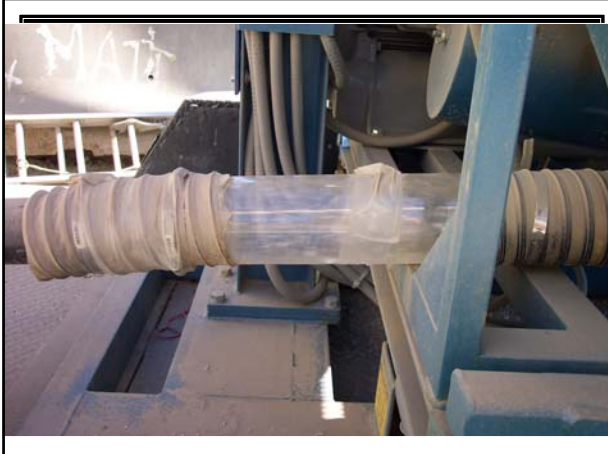
## Intelligent Compaction

- Improve Compaction Efficiency
- Improve Compaction Quality
- Real Time Information
- Identify Questionable Areas
- Improve Quality

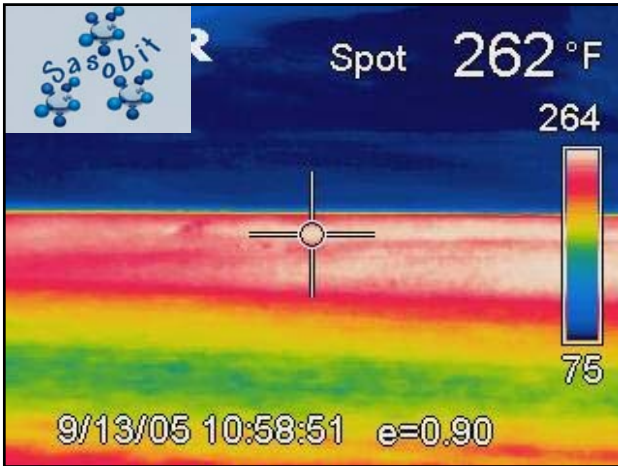
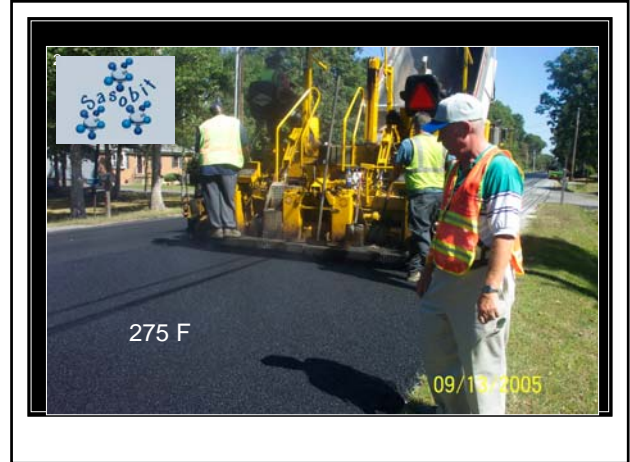


### ICC Draft Report

- Stiffness of Conventional Mix and Sasobit were statistically the same with Sasobit being placed 50°F cooler.



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## SUMMARY

*With Sasobit you can:*

- Reduce Mixing and Compaction Temperature
- Reduce Fumes
- Reduce Fuel Costs
- Improve Workability
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- Extend Paving Window
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A cartoon illustration of a man in a suit and tie looking at a steamroller. The steamroller is emitting a large plume of smoke. The Sasol logo is visible in the top right corner.

