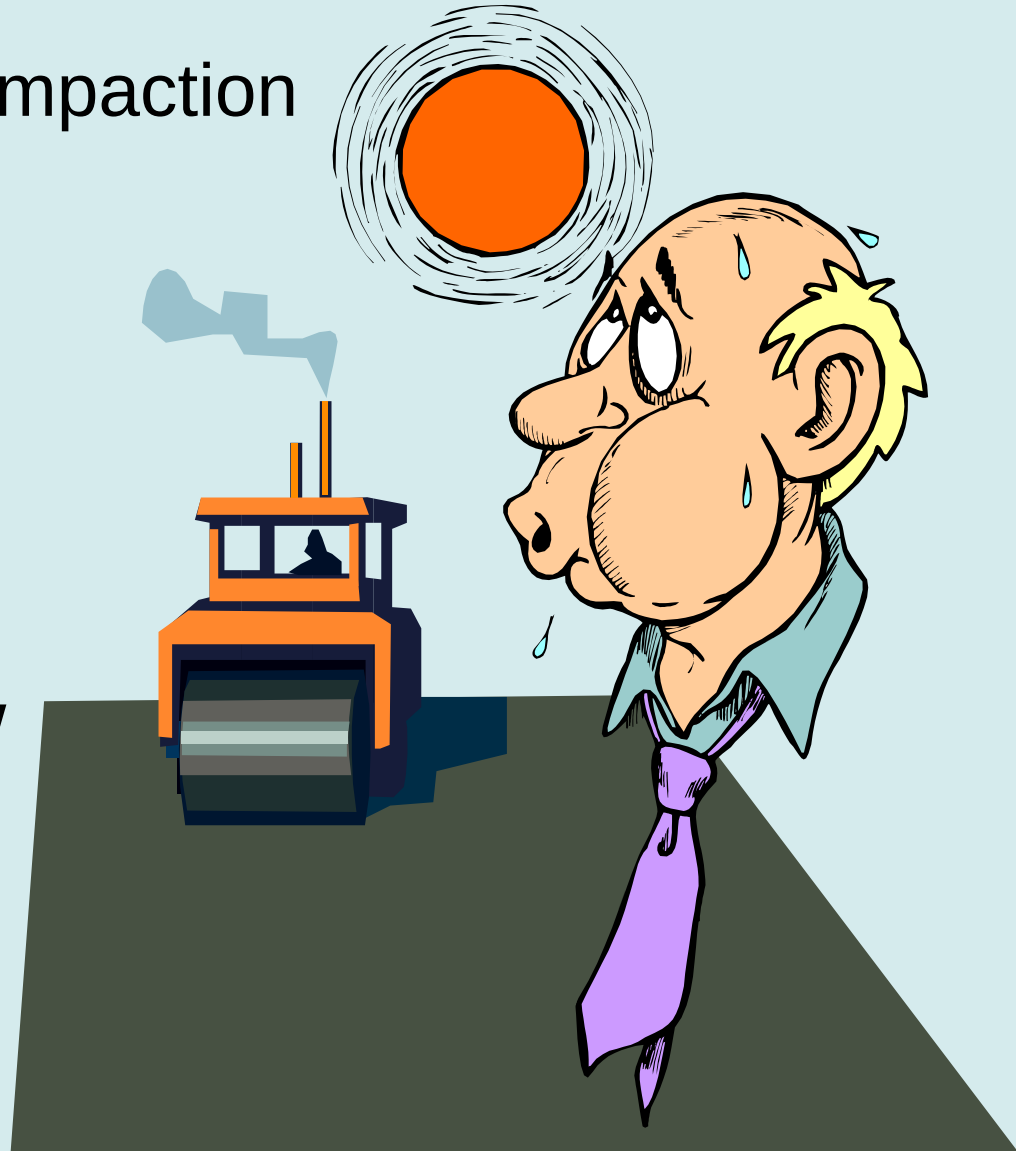
Warm Mix Technology to Improve Compaction

2005 NEAUPG Annual Meeting
Burlington Vt.

Larry Michael

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®

- Product of
  - Sasol Wax GmbH (Germany)
- Fischer-Tropsch parrafin wax
  - Fine crystalline long chain aliphatic hydrocarbon
  - Produced from coal gasification
- Available in
  - Flakes or powdered form
  - 2, 5, 20, and 600 kg bags

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

Frankfurt Airport

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

PRACTICAL SOLUTIONS

Frankfurt Airport

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

PRACTICAL SOLUTIONS

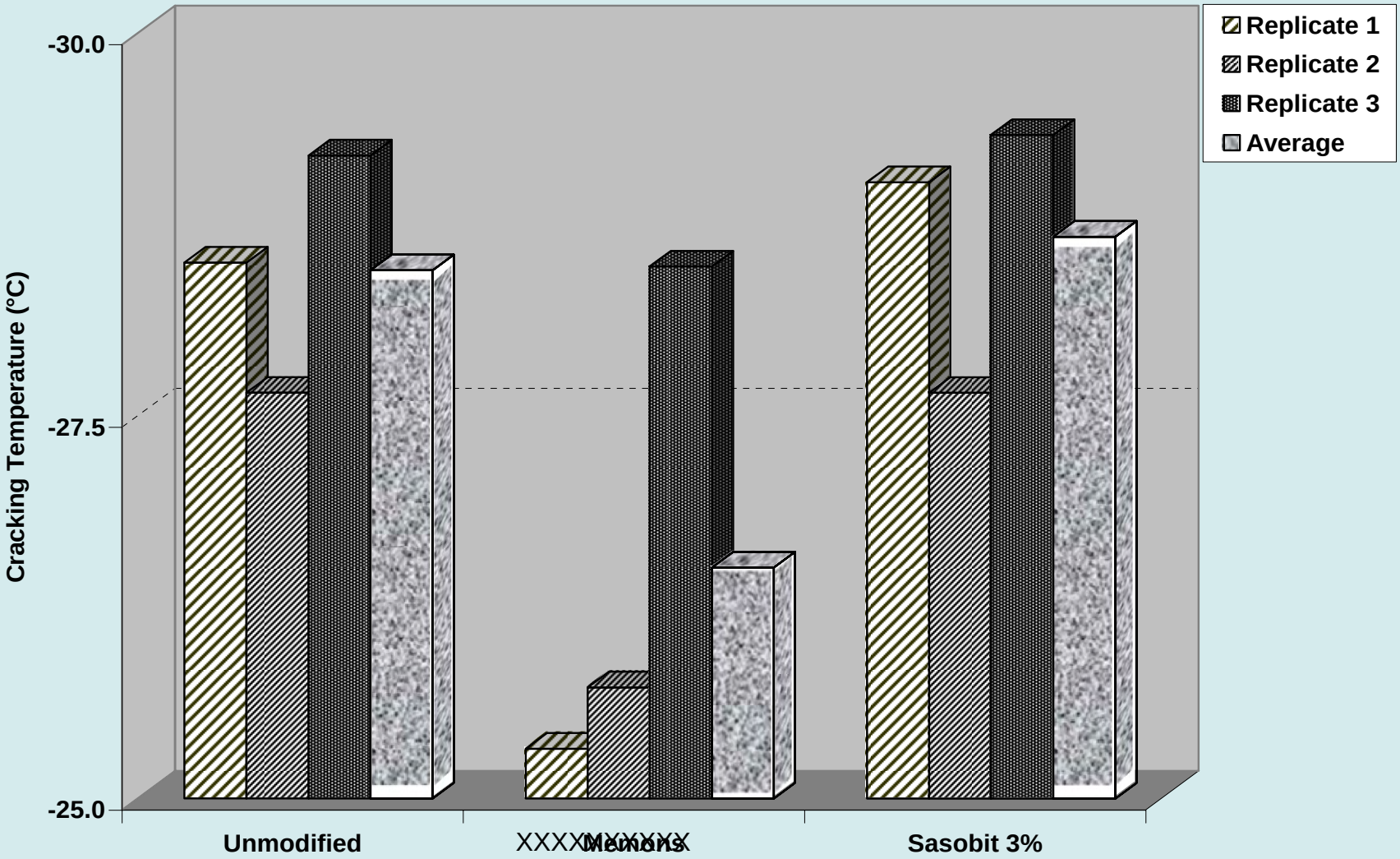
QUESTION…

Will Sasobit have a negative effect on mix quality?

NCAT Evaluation

- Improved compact ability to 190^{0}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

TSRST


Replicate 1
Replicate 2
Replicate 3
Average
-30.0
-27.5
-25.0
Cracking Temperature (°C)
Unmodified
XXXXMXXXXX
Sasobit 3%

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


45 % Rap


DANGER
KEEP AWAY FROM MOVING PARTS
Krendl
Fiber Moving Equipment


09/13/2005

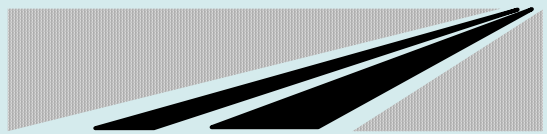

SHA


340 F

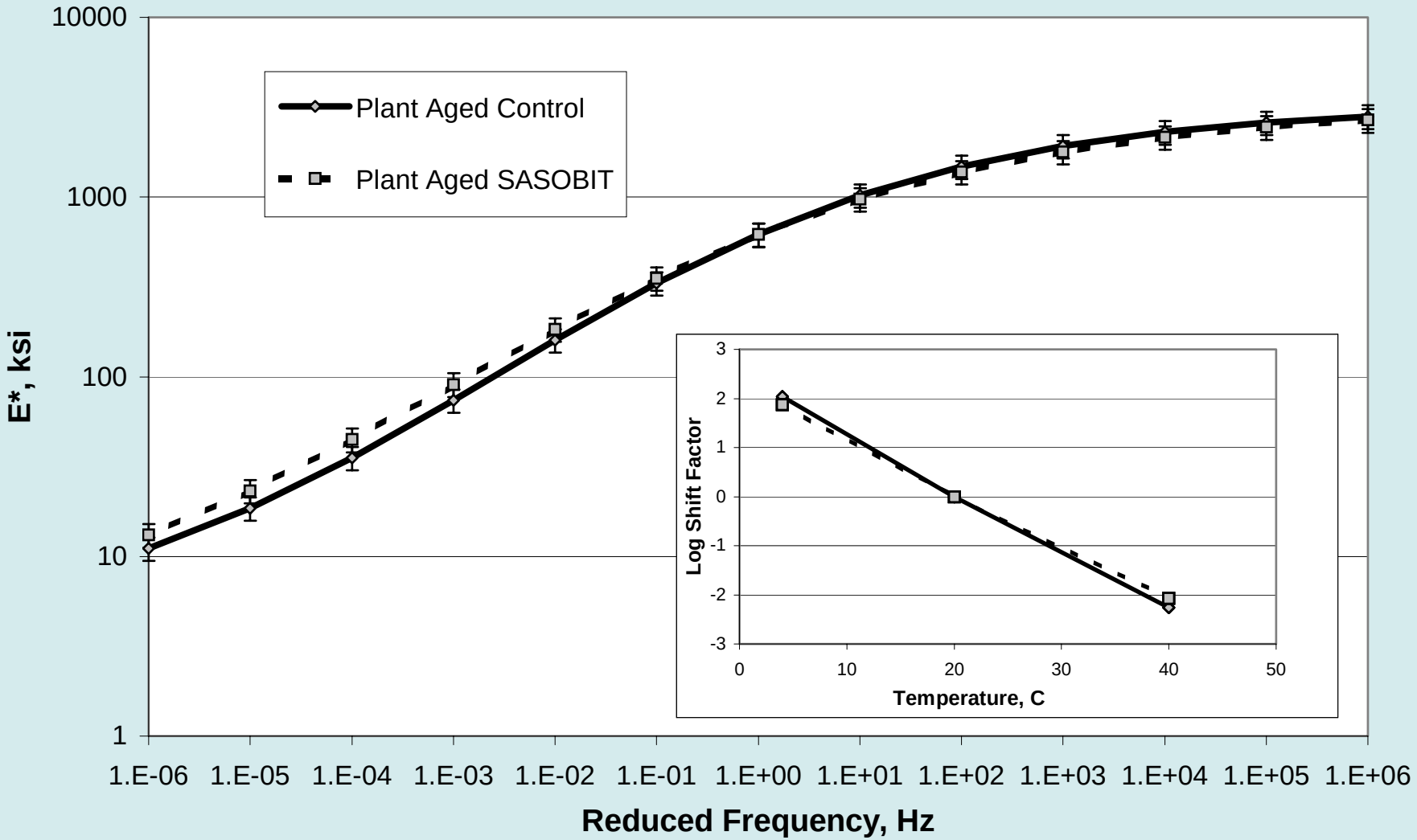
Performance Evaluation of High RAP Base Mixture Containing Sasobit

Maryland State Highway Administration

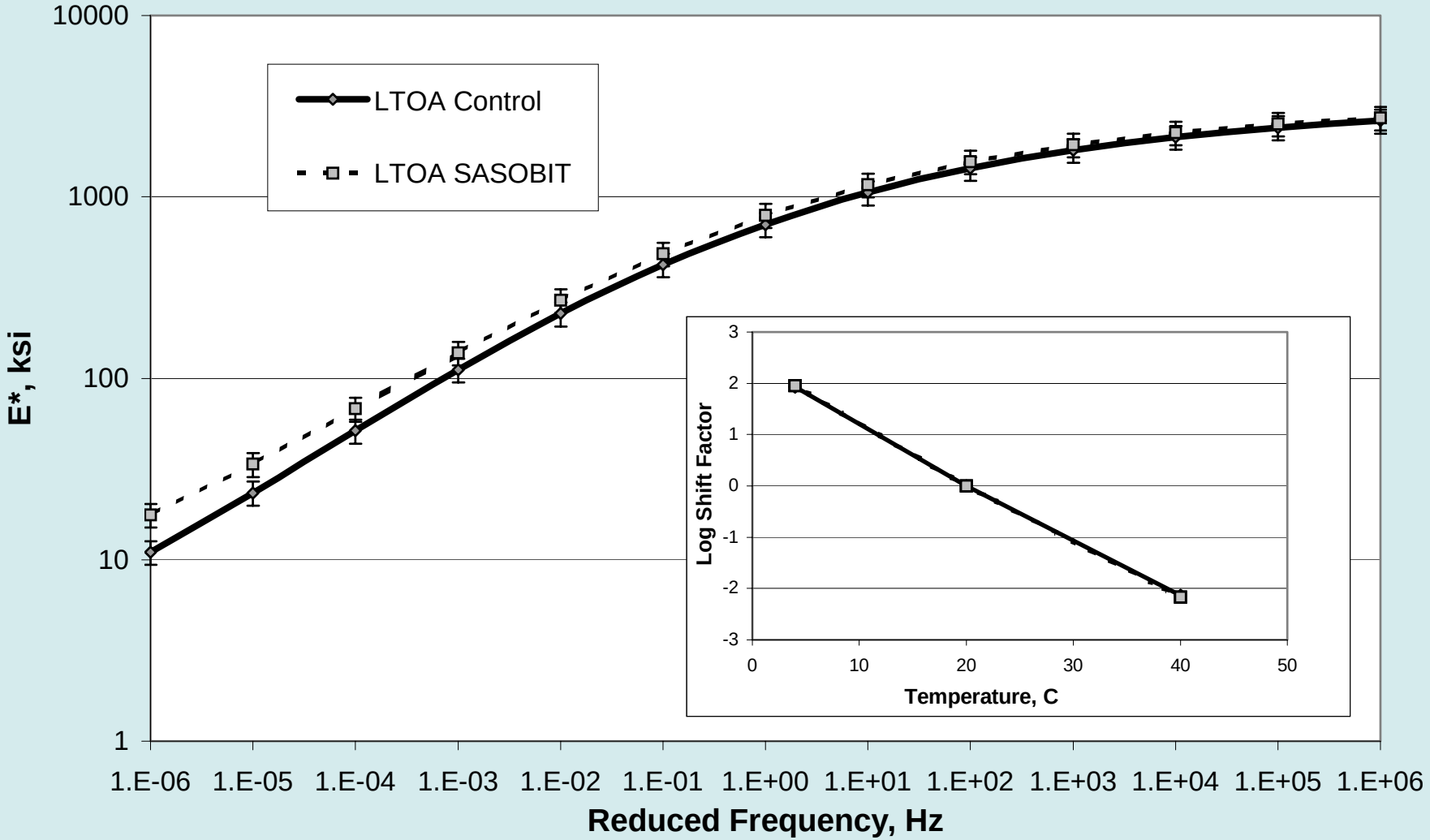
Advanced Asphalt Technologies, LLC
108 Powers Court, Suite 100
Sterling, VA 20166-9321
(703) 444-4200
August 19, 2005



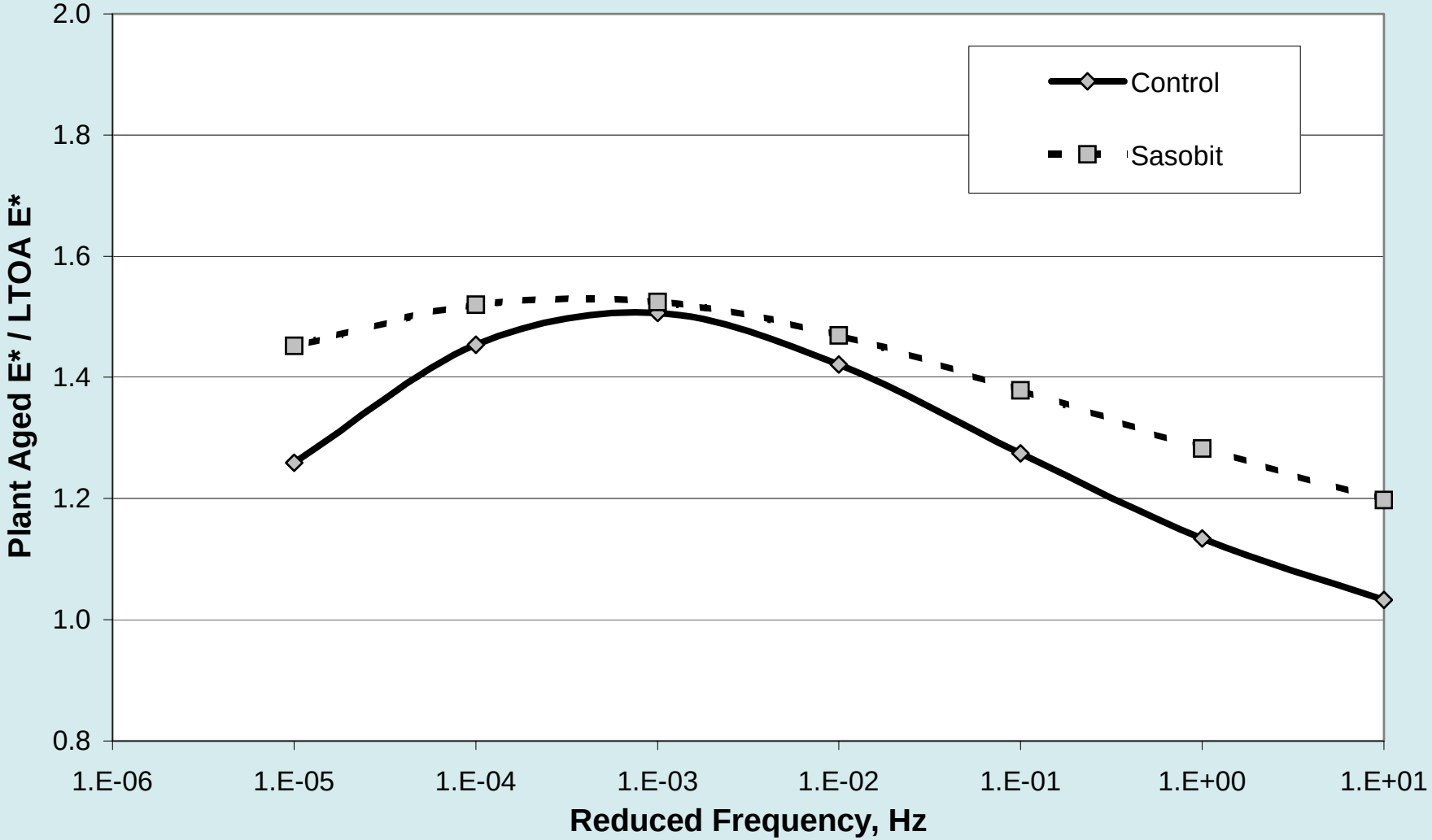
Mixture Dynamic Modulus Master Curves for Plant Aged Conditions



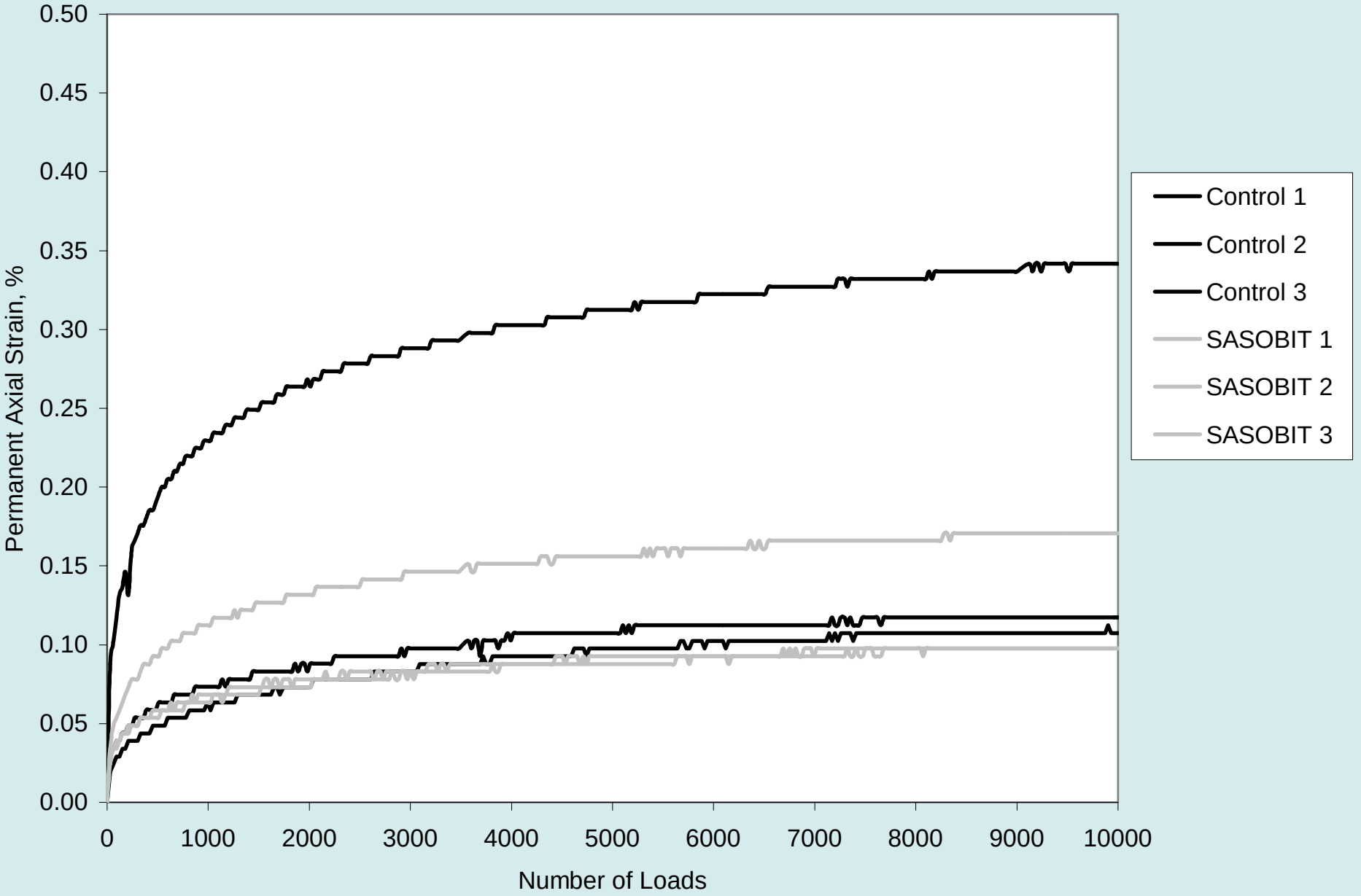
Mixture Dynamic modulus Master Curves for Long-Term Oven Aged Conditions



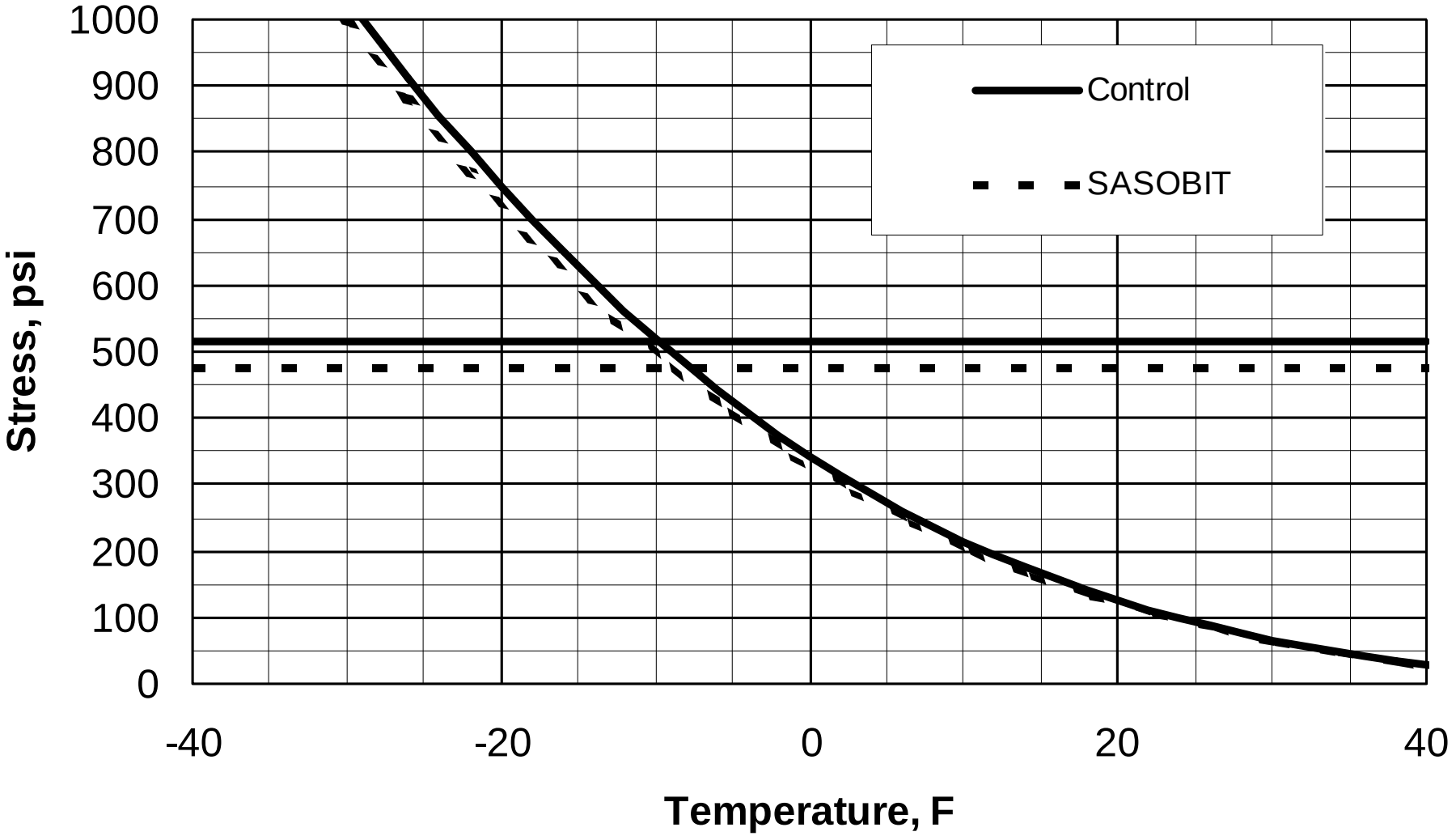
Effect of Simulated Long-Term Aging



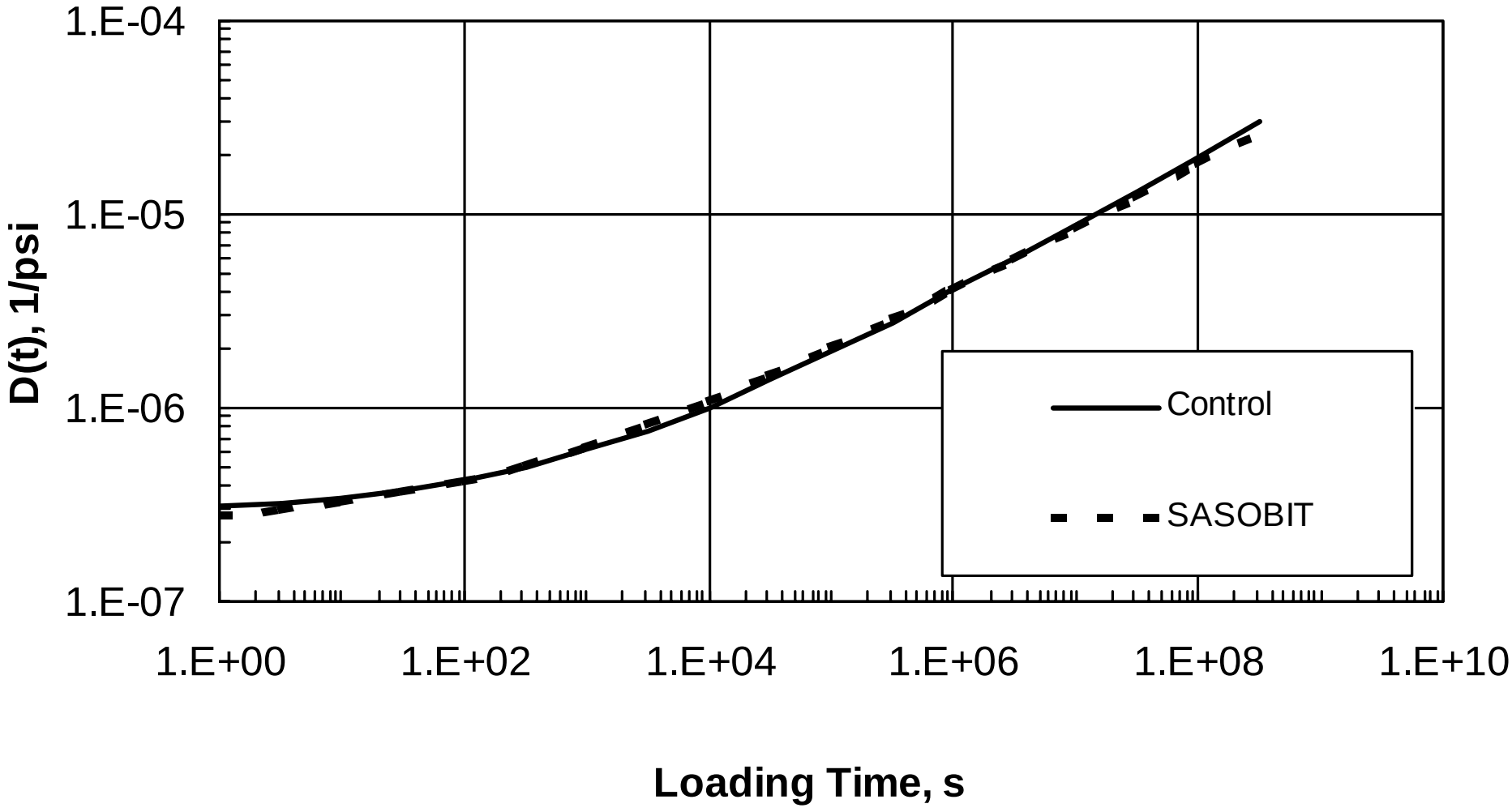
Repeated Load Permanent Deformation Response for Control and Sasobit® Mixtures



Estimated Thermal Stresses and Critical Cracking Temperatures



Comparison of Master Creep Compliance Curves




19.0mm SMA


PROPERTY OF:
HI-TECH ASPHALT SOLUTIONS INC.
8301 Plum Grove Drive
Mechanicsville, VA 23111
LEASING AND SERVICE:
PHONE (804)730-4871
FAX (804)730-0072
NOTICE
Sasobit
Hi-Tech Asphalt Solutions, Inc.


250
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TEL-TRU
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Sasobit
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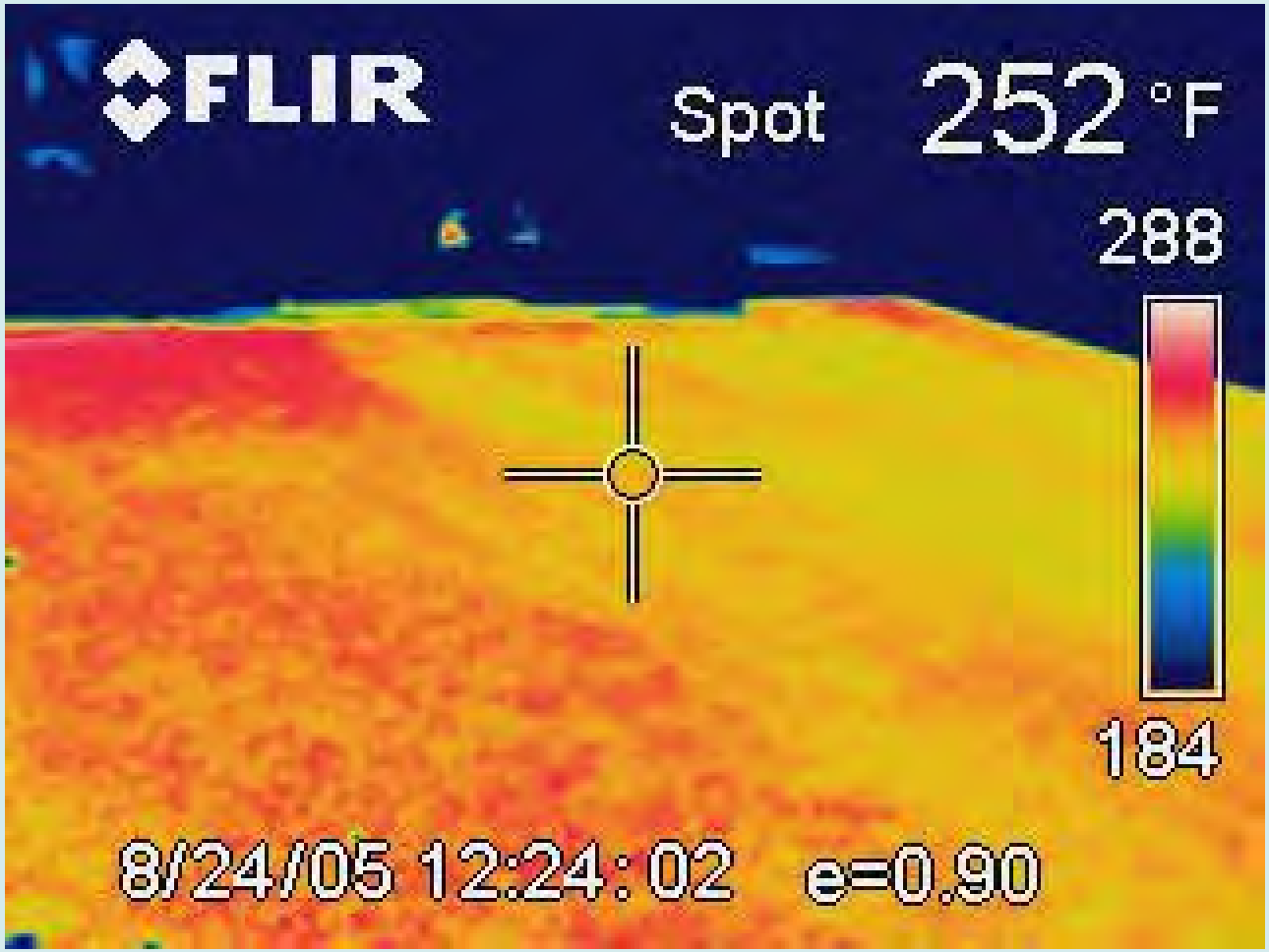


Sasobit: Mix temp 252ºF. Using tighter temp scale. Mat looks good.

Intelligent Compaction

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


ASPHALT-MANAGER
BOMAG
BOMAG
BOMAG
Metservice


ASPHALT-
MANAGER

ICC Draft Report

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


9.5mm with 35% RAP
09/13/2005

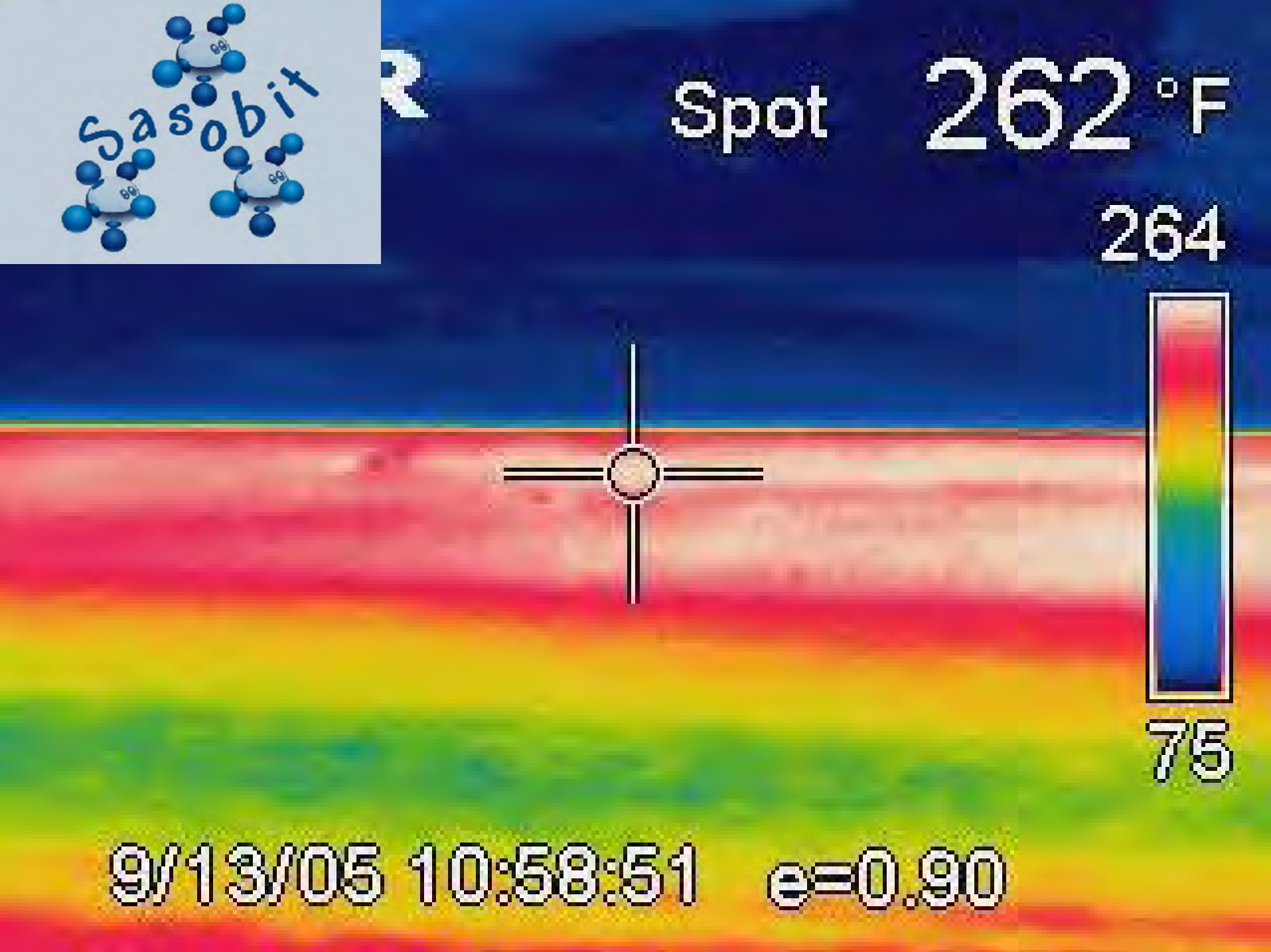

09/13/2005


09/13/2005


09/13/2005


350 F without Sasobit
09/13/2005


Sasobit
09/13/2005


Spot 262 °F
264
75
9/13/05 10:58:51 e=0.90

SUMMARY

With Sasobit you can:

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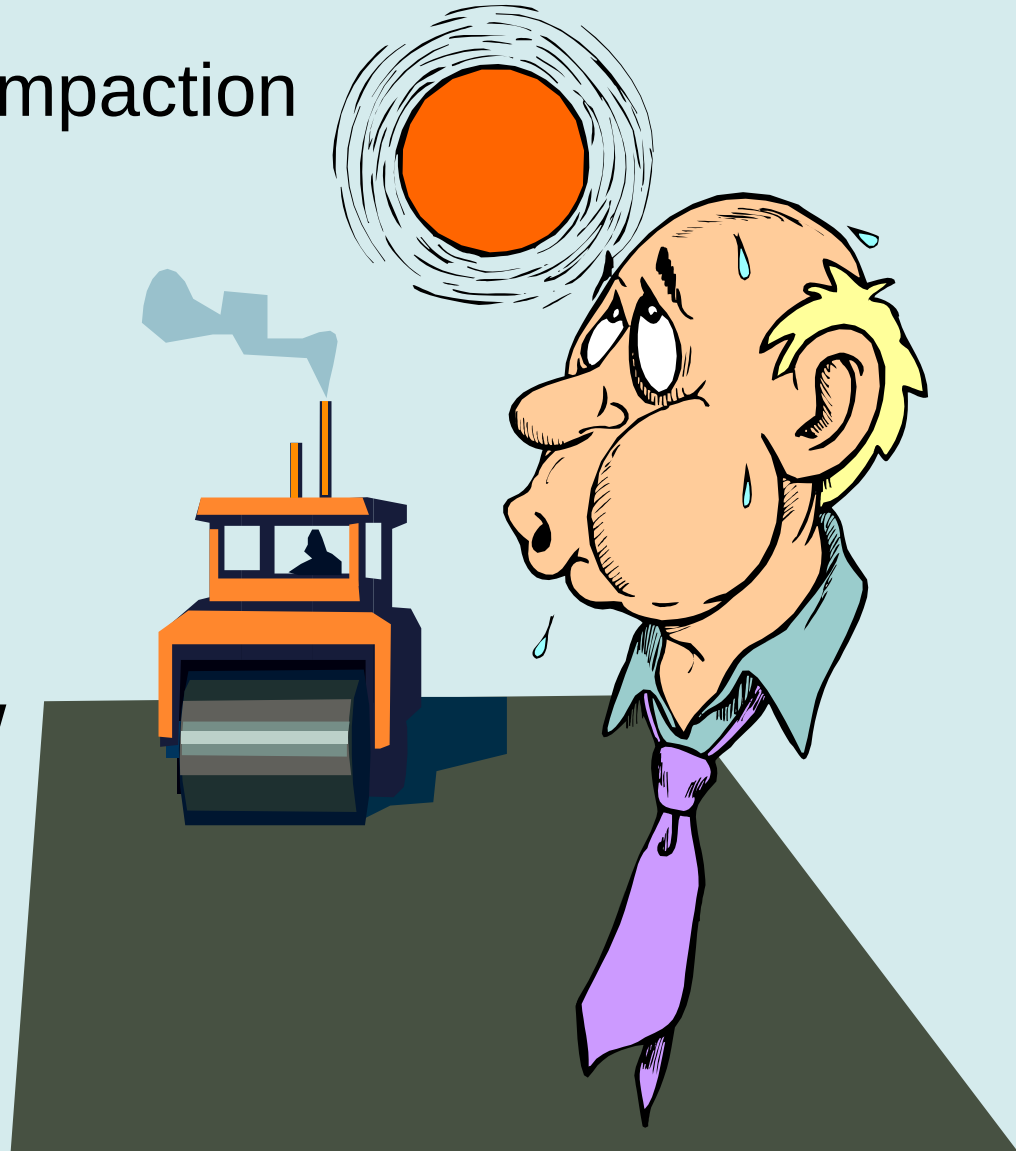

Questions?