

SEAUPG 2004 Conference - Baton Rouge Presented By John D'Angelo - FHWA

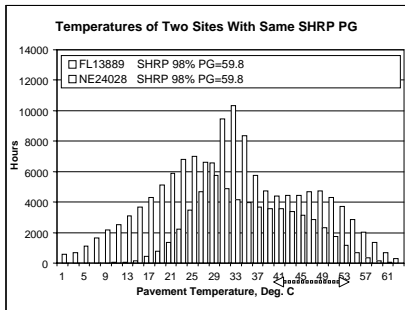
Superpave Binder Specifications What does the future hold

John D'Angelo
Office of Pavement Technology

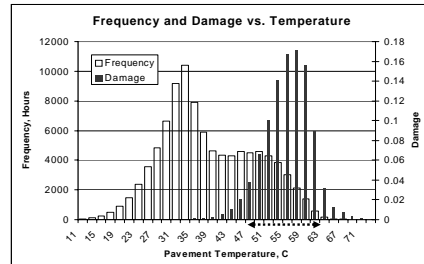
Is the current binder selection based on pavement temp. correct?

- Is a PG 58 in Florida the same as a PG 58 in Nebraska?
- Is the average 7 day high temp the best measure of pavement rutting?

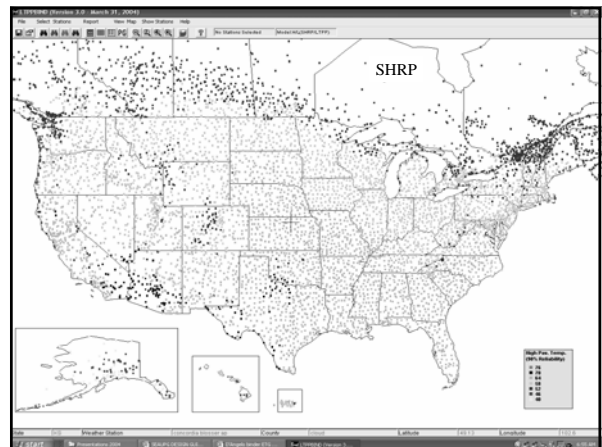
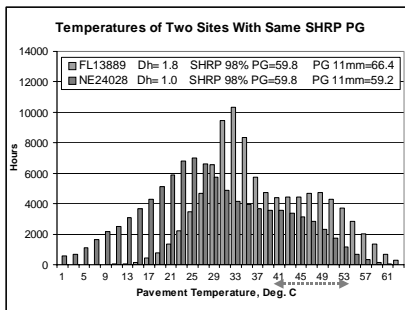
Same SHRP PG, Different Performance



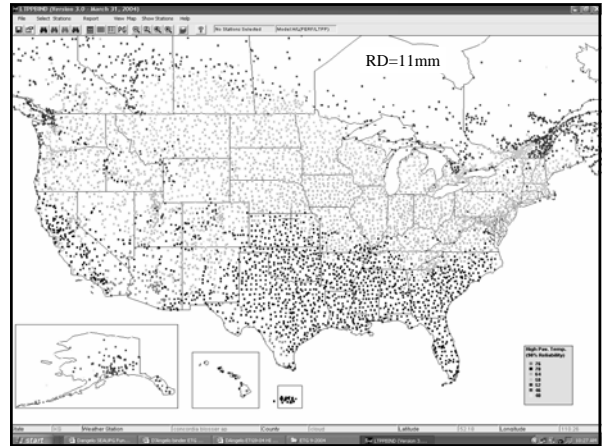
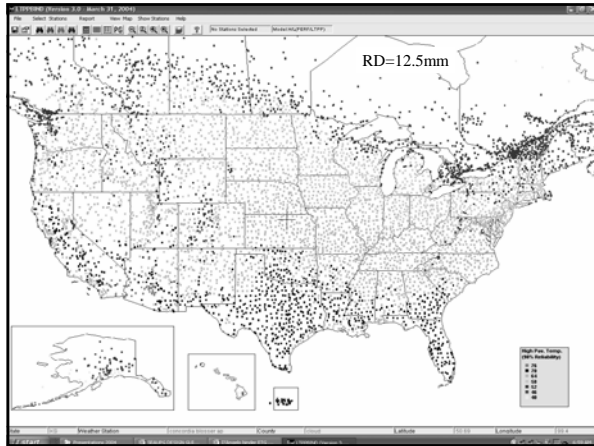
Most Damage is at Many Hours of High Temperatures, not Highest Temperatures



Same SHRP PG, Different Performance



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Grade Bumping by Base PG and Speed for All Rut Depths

Speed	Base Grade	ESAL, Millions			
		<3	3-10	10-30	30+
Fast	52	0	10.3	16.8	19.3
	58	0	8.7	14.5	16.8
	64	0	7.4	12.7	14.9
	70	0	6.1	10.8	12.9
Slow	52	3.1	13	19.2	21.6
	58	2.9	11.2	16.8	19
	64	2.7	9.8	14.9	17
	70	2.5	8.4	12.9	14.9

LTPPBind 3 new software

- Web site
- <http://ltpbind.com/>

Intermediate Temperature Criteria

- The ETG recommended that the intermediate binder grade not be changed when the high temperature grade is bumped.
- The new LTPP Bind shows a PG 67 in not a bumped grade for the southeast.

Modified Binders Affect Performance

- Study same mix different binders.

PG 63-22 mod. no rutting

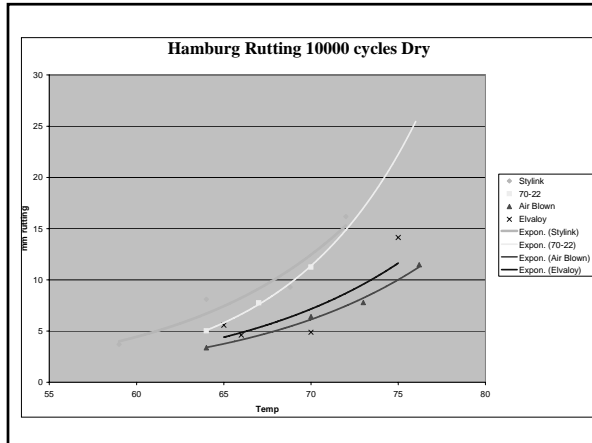
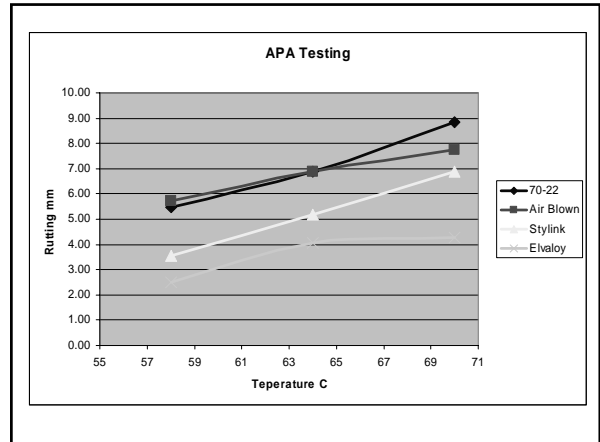
PG 67-22 unmod. 15mm rutting



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High Temperature Binder Criteria

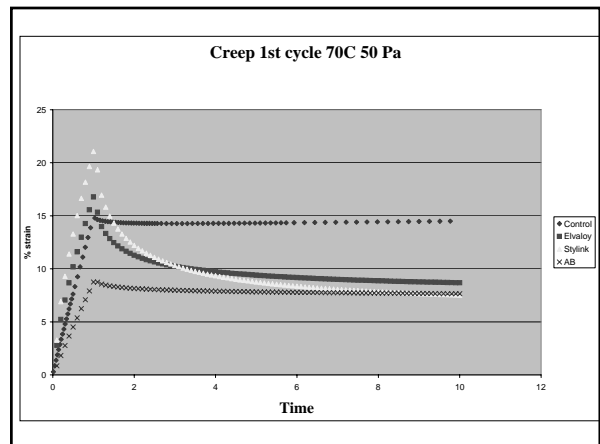
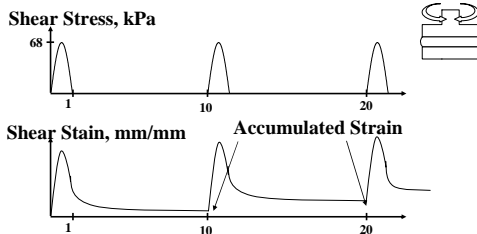
Table 1. Asphalt Binders Selected for This Study.			
Asphalt Binder	Continuous Grade	Trade Name	Source
PG70-22	PG71.8-23.0	N/A	Citgo Asphalt refining Co. supplied for ALF, Lab. No. B6267
PG70-28	PG74.1-28.2	Air Blown	Trumbull and Owens Corning supplied for ALF, Lab. No. B6227
PG58-40	PG64.4-42.3	Elvaloy	Mathy Testing Services
PG58-40	PG61.9-41.3	Stylink	Koch Materials



High Temperature Binder Criteria

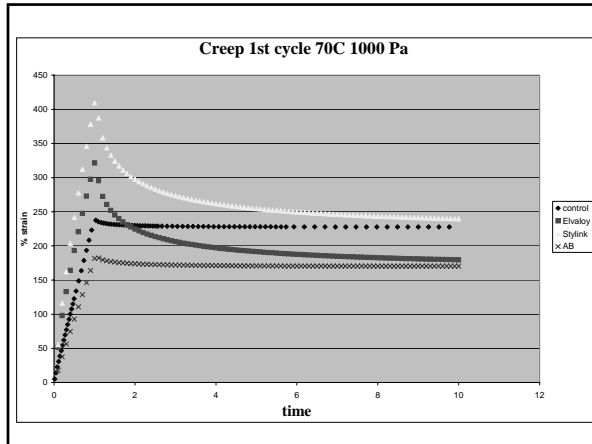
- Asphalt Pavement Analyzer and the Hamburg tester rank binder for rutting differently
- The stress states in the test are different

NCHRP 9-10 Rutting Test Repeated Creep Recovery Test



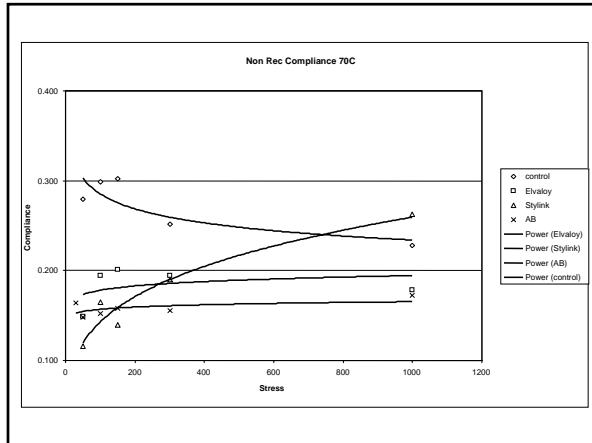
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High Temperature Binder Criteria

- New criteria non recoverable compliance “creep strain divided by the applied stress” is based on binder creep testing at several stress levels.
- Determine the average unrecovered stain after 50 creep and recovery cycles and then divide the stress level of the test by the average unrecovered strain.

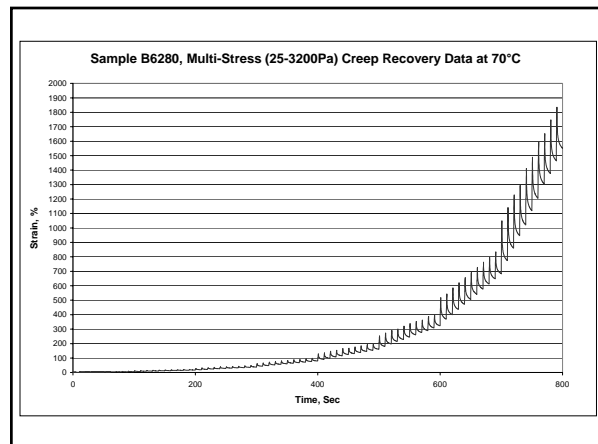


High Temperature Binder Criteria

- Testing 50 creep and recovery cycles at multiple stress levels can be time consuming.
- Next step is to reduce testing time.
- Perform multiple stress levels on the same sample.

High Temperature Binder Criteria

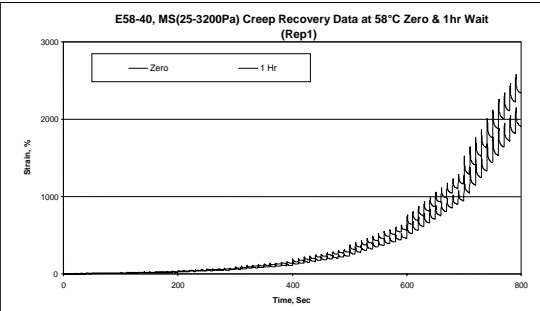
- New test criteria:
 - Perform multiple stress levels on the same sample at reduced number of cycles.
 - Stress levels: 25, 50, 100, 200, 400, 800, 1600, and 3200 Pa.
 - Run 10 cycles at each stress level
 - Total cycles per test 80.



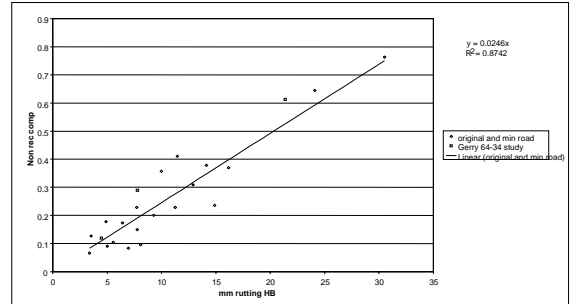
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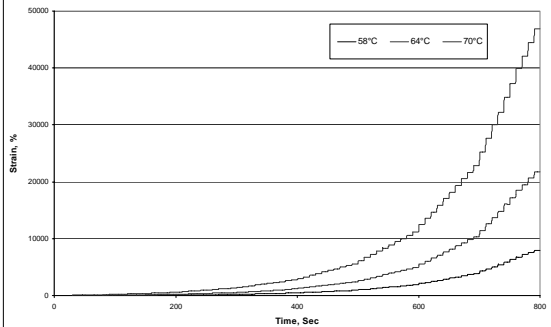
Retest of binder after 1 hr rest



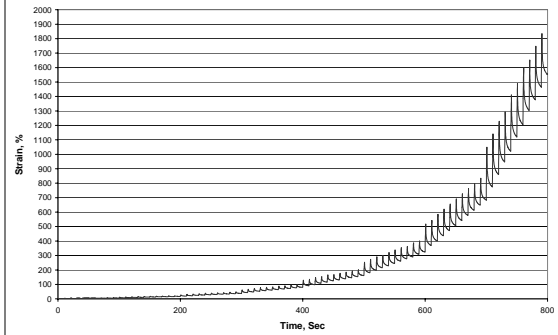
Mix testing multiple studies



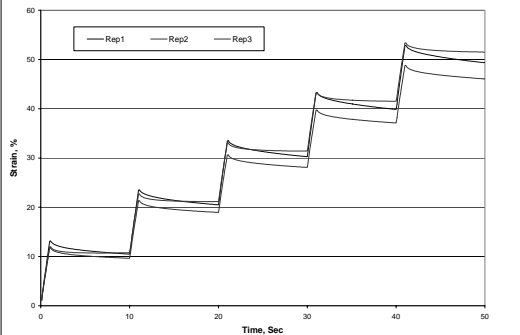
MTE-64-22, Multi-Stress (25-3200Pa) Creep Recovery Data Comparison



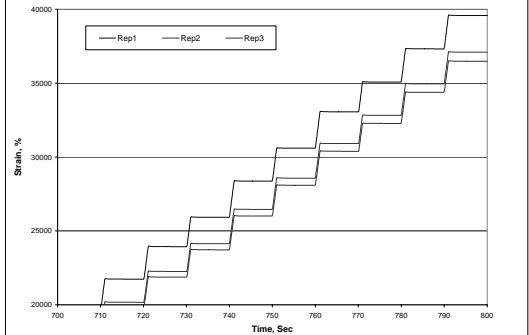
Sample B6280, Multi-Stress (25-3200Pa) Creep Recovery Data at 70°C



SBS Linear (B6230), MS (25-3200Pa) Creep Recovery Data at 76°C



SBS Linear (B6230), MS (25-3200Pa) Creep Recovery Data at 76°C



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**9-39: *Determining the Mixing and
Compaction Temperatures of Superpave
Asphalt Binders in HMA***

- **Reliable, user-friendly method.**
- **Equally applicable to modified and unmodified binders.**
- **Simple and quick to use.**
- **Suitable for routine specification use.**

(RFP anticipated December 2004)

Thanks!