



Asphalt Issues Update Mixture & Binder Expert Task Groups

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Asphalt Mix ETG & Binder ETG

- Objective: To provide a forum for the discussion of ongoing asphalt binder/mixture technology and to provide technical input for current and future research, development and technology implementation related to asphalt mixtures design and construction.
- Initiated in 1994
- Government, Industry, Academia



Asphalt Mix Expert Task Group

- AASHTO SOM Input (Harvey)
- SGC Operational Issues (Dukatz/D'Angelo)
- AMPT Flow Number, NCHRP 9-29 (Bonaquist)
- Specific Gravity Task Force (West)
- Mix Design Manual, NCHRP 9-33 (Christensen)
- IDT E* Ruggedness (Kim)
- Longitudinal Joint Construction (LaFleur)
National Survey Results (Harman)

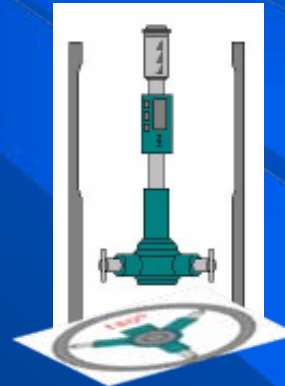
Subcommittee on Materials Standards Update – ETG Input

- T 312 – 08 Preparing and Determining the Density of HMA Specimens by SGC
 - Internal Angle Only ($1.16 \pm 0.02^\circ$)
 - Only TP 71 Simulated Loading
 - (Conformance Issue 2010 AMRL)
 - Precision and Bias Based on External Angle
- Asphalt Mixture Performance Tester Asphalt
 - End Note Reference to NCHRP 9-29 and the Simple Performance Tester
 - Published as TP 79, PP 60, PP 61, and PP 62



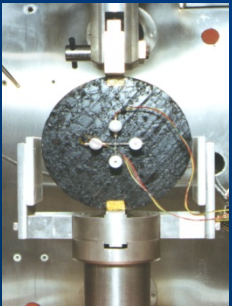
Superpave Gyratory Compactor Operational Issues

- Guidance document, publication as a TRB Circular through subcommittee AFK50 provide background information on the development of internal angle measurements.
- T312 Proposed Annex for Evaluating Molds



Superpave Gyratory Compactor Operational Issues

- N_{design} adjustments
- Latest study 9-9(1) recommendations
- 9-33 maintain existing N_{design} criteria
- Performance Testing Evaluation



Asphalt Mix Performance Tester




- NCHRP 9-29
- Evaluate mixture rutting (F_n) and fatigue response (E^*)
- Relatively inexpensive and easy to use
- Provides MEPDG input



Asphalt Mix Performance Tester (2009/2010)

- Develop pooled fund for training and equipment purchase of the equipment
- Technician training for operation of the equipment (AAT contractor/NCAT Lab)
- Remaining issue with determination Flow Number



Asphalt Mix Performance Tester Flow Number (Fn)

- Developed as indicator of rutting potential
- 9-33 relationship flow number/maximum traffic with lab mixes (field mix issue-age)
- Issues
 - High temperature 50% reliability PG LTPPBind 3.1
 - Confined/unconfined
 - Load - various levels have been used



Flow Number -- What's Next

- Too early to prepare standard criteria
- Continue to monitor work in progress
- Encourage investigation of
 - Relationship to rutting performance
 - Sensitivity to mix design factors
 - Use of both confined and unconfined tests on the same materials



Specific Gravity Task Group

Task Group Objectives:

- Identify issues with current AASHTO standards - Recommendations regarding changes and/or new methods
- Evaluate alternate methods
- Guidance document, publication as a TRB Circular





Specific Gravity Task Group SOM Recommendations.....

- T166 (Bulk Specific Gravity)
 - Changes sent to replace reference to paraffin method with vacuum sealing method
 - Change water absorption limit to 1.0%
 - Precision estimates from NCHRP 9-26
- Effects on Volumetrics - possible:
 - Design VMA measurement increases by 0.5%
 - In-place density measurement (%Gmm) increases by 1.0% for mixes



9-33: Mix Design Manual for HMA

Final report January 2010 (AAT)

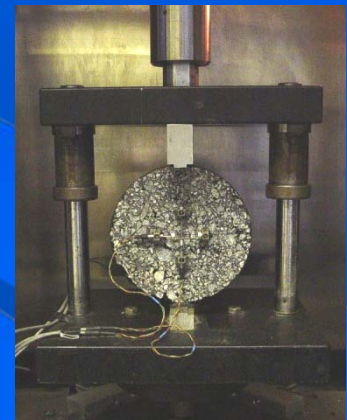
- Test procedures for dense, gap and open graded mixes
- HMA performance tests
- Criteria developed with M-E Design Guide
- Final critical issues being evaluated:
 - FAA values and CAA values
 - Flat & elongated requirements
 - Performance Tests
 - Design VMA values
 - Design gyration levels
 - RAP



NCHRP

IDT Testing for E^*

- Current E^* test protocol not adequate for testing field cores for forensic studies and rehabilitation design
- Need for E^* test protocol using IDT
- NC State developed IDT testing mode
- Draft specifications developed
 - Specimen fabrication
 - Master curve generation
 - IDT E^* testing/procedural ruggedness



Agencies Specifying Joint Density





Improvement Efforts

- Benchmarking Survey – *Complete*
- Specification Evaluation & Summary of HMA Compaction Methodologies
- Implement Innovative Technologies
- Stakeholder Involvement
- Marketing/Educational Materials

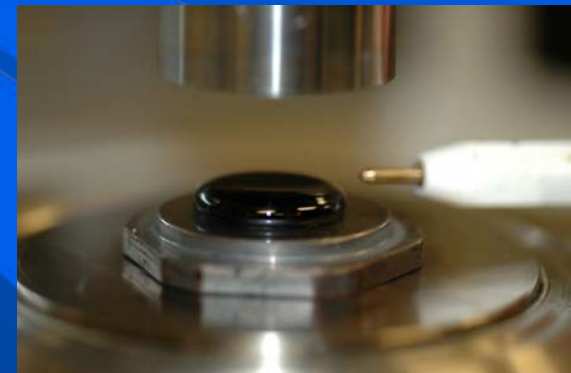


Binder ETG - Key Activities

- MSCR Test Method(D'Angelo/Anderson)
- Fatigue Response of Polymer Modified Binders
- Polyphosphoric Acid (D'Angelo)
- Recovered Motor Oil (Youtcheff)
- DSR Sample Preparation (VanFrank)
- ABCD Low Temperature alt. to DT (Kim)

Multi-Stress Creep and Recovery Test Method

- Inadequacy of Superpave high temp $G^*/\sin\delta$ to predict modifier behavior
- Testing is done at actual pavement temperatures
- New MSCR High Temperature Spec (M320 Table 3) correlates to rutting for both neat and polymer modified binders
- Various implementation efforts and specification refinement





Polymer Modification and Fatigue

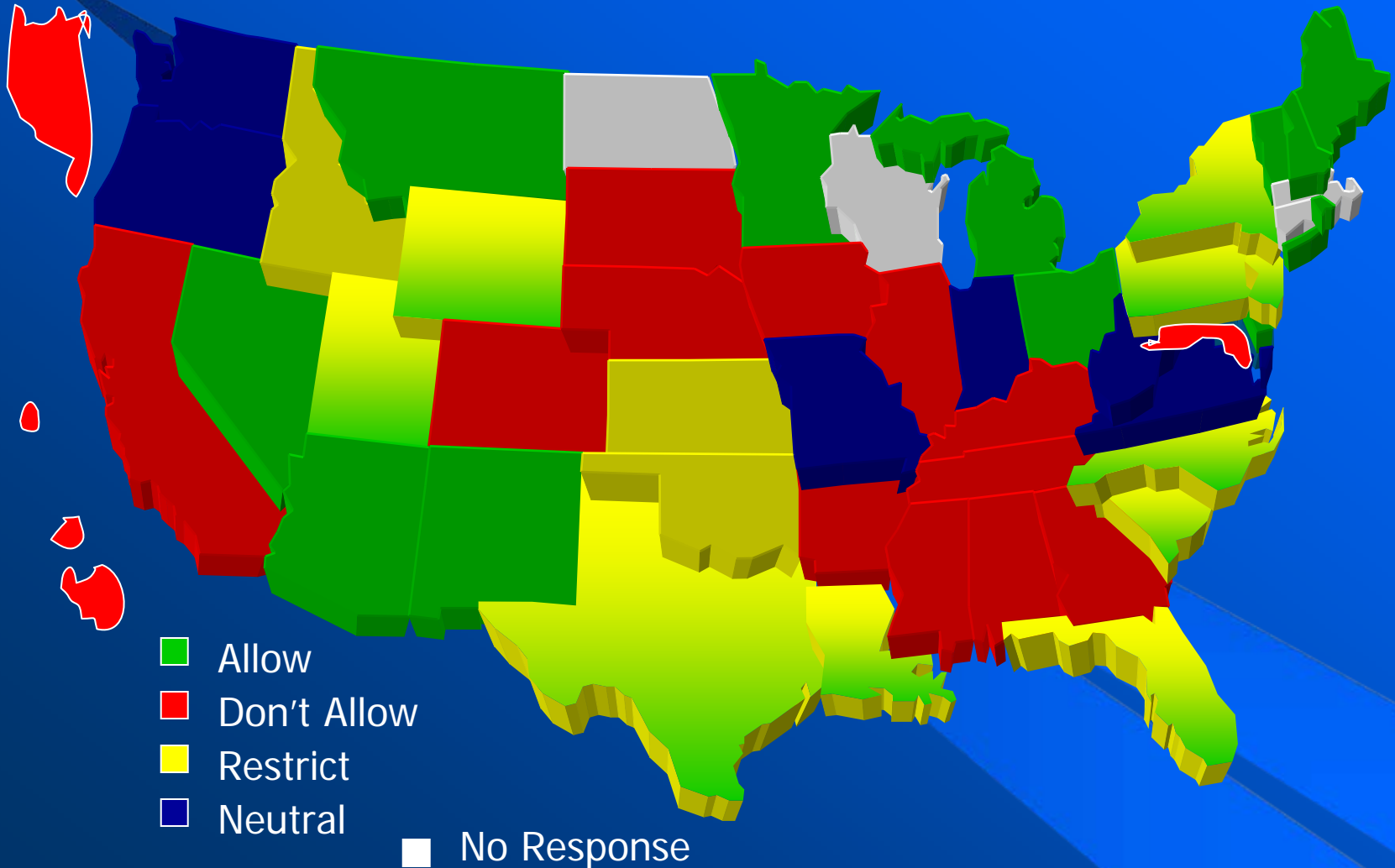
- Highway agencies use polymer modified binders for two primary reasons.
 - First to improve rut resistance and still be able to maintain low temperature properties.
 - Second to improve durability and fatigue response.

Fatigue Testing – one approach



- Fatigue testing on HMA samples in the DSR
- How does polymer modification effect fatigue properties of binders.
- Does the percentage of PM significantly change the fatigue response of binders.

Phosphoric Acid Modification Specification Survey





PPA Summary

- PPA is a valuable tool to binder suppliers necessary to provide binders that meet current specifications and provide performance desired.
- It is the suppliers responsibility to investigate performance characteristics
- Effect of PPA on moisture damage is asphalt and aggregate dependant and is treatable with both lime and liquid anti-strips.

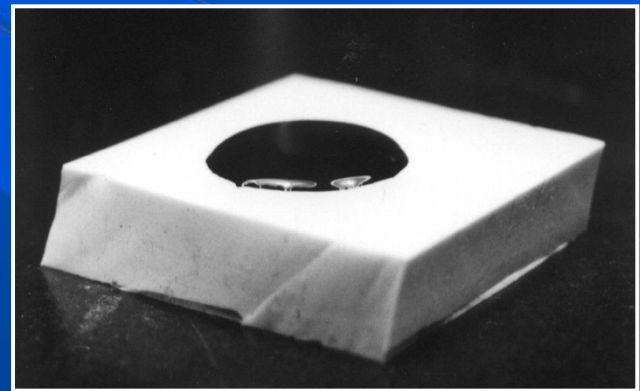


Detection of PPA and Trace Metals in Asphalt Binders

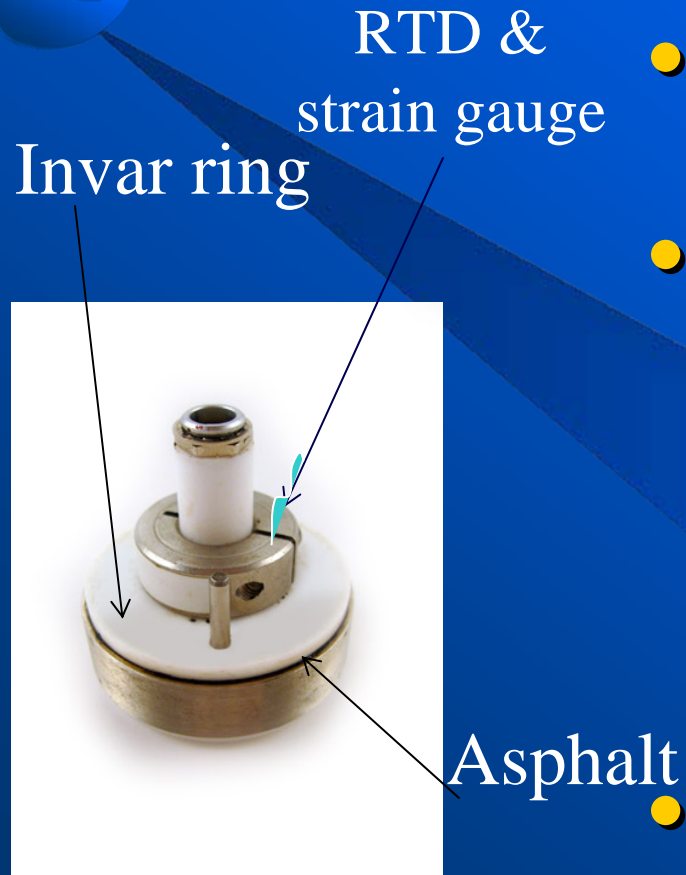
- Phosphoric Acid content of asphalt binders can be readily measured using XRF Spectroscopy.
- Presence of recycled Engine Oil Bottoms can be detected by measuring trace metals Cu, Mo, Ba, Ca, Pb and Zn levels.
- More Research is needed on effects

DSR Specimens

- T 315-08 maximum 2 hours time for specimen to held in molds
- AASHTO SOM tech section 2b requested ETG evaluation
- Asphalt Institute/FHWA to evaluate storage time



Asphalt Binder Cracking Device (ABCD)



- Evaluation of low temperature binder properties
- When temperature drops, asphalt shrinks 100 X more than the ABCD invar ring. Asphalt compresses the ring, strain gauge measures this compression.
- Evaluate Polymer Modified Binder
- Draft Specification under review



Asphalt Mixture & Binder Expert Task Groups

Thank You!

Download ETG Presentations at:


<ftp://fhwaftp.fhwa.dot.gov>

User ID: hiptguest

Password: hiptguest

Pavement Website

<http://www.fhwa.dot.gov/pavement>

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Focus Areas

Optimize Pavement Performance

- Asphalt
- Concrete
- Mechanistic Empirical Design Guide
- Long Life Pavements
- Pavement Management Systems
- Pavement Structural Analysis
- Long Term Pavement Performance (LTPP) Program

Advanced Quality System


- Stewardship Reviews/Quality Assurance
- Risk Assessment
- Warrenties

Pavement Surface Characteristics

- Smoothness
- Pavement Condition/Ride Quality

Environmental Stewardship

- Recycling
- Reducing Pavement Noise



Knowledge System

Publications

- Ground-Penetrating Radar
- [All Pavements Publications](#)

Software

- Quality Assurance Software
- [All Pavements Software](#)

Community of Practice

- NCHRP 1-37A (Mechanistic-Empirical) Pavement Design Guide

Pavement Notebook

- Feature 1


Events

- [Materials Inputs for Design Workshop](#), Atlanta, GA, May 5-6, 2005

Workshops and Training

- [M-E Design Guide Workshop Registration](#)

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FHWA's Strategic Goal for the Pavement Technology Program

Provide leadership and technology for the delivery of long life pavements that meet our customers needs and are safe, cost effective, and can be effectively maintained.