SEAUPG 2004 Conference - Baton Rouge
Presented By John Bukowski - FHWA

Superpave Mixture / Aggregate Expert Task Group

Activities & Action Items
September 27-28, 2004
Washington, DC

Role of ETG

- Provide technical advice on Superpave mixture & aggregate issues;
- Provide technical input to the FHWA on Superpave mixture & aggregate projects;
- Identify potential improvements to mixture & aggregate specification/standard test methods;
- Identify needed standards; and
- Provide a forum for government / industry discussion of emerging issues.

Superpave (HMA) Mixture Issues

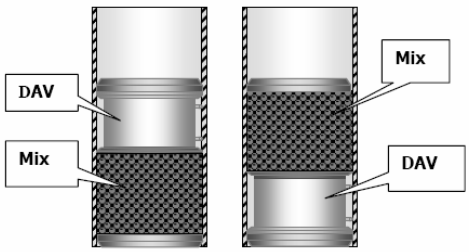
- **Gyratory Compactor Internal Angle Issues**
- **Mix Volumetrics - NCHRP Projects**
- **Simple Performance Testing**
- **Other Performance Testers**

www.fhwa.dot.gov/pavement

Internal Angle of Gyration

- Currently T312 allows for gyratory calibration using either internal or external angle measurements.
- Internal angle of gyration calibration
  - Potentially time-intensive
    Up to 1 day for a calibration
  - Affected by mixture stiffness?
    Requiring recalibration for different mix types

Dynamic Angle Validator



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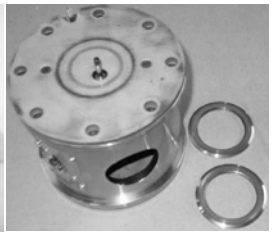
Superpave Gyratory Compactor

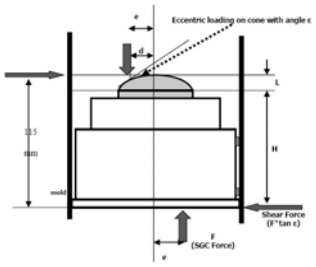
- **Study conducted for ETG and FHWA under Asphalt Institute Contract**
  Research Team:
  Dr. Kevin Hall, University of Arkansas
  Mike Anderson & Mike Huner, Asphalt Institute
- **Determination and Calibration of the Dynamic Internal Angle of Gyration Without Using HMA**

Mechanical Simulation of an Asphalt Mixture – RAM



RAM – Rapid Angle Measurement Device (Pine)

Mechanical Simulation of an Asphalt Mixture – HMS



HMS – Hot-Mix Simulator (TestQuip)

Superpave Gyratory Compactor Calibration

- **Determine the relationship between mix stiffness and eccentricity.**
- **Establish and average mix eccentricity – standard mix stiffness for calibration**
- **Compare the RAM and the HMS**
- **Standard mix-less procedures**
- **Future?? - Only internal angle measurement recommended in T312**
- **Produce document on gyratory maintenance**

Discussion

- The devices are repeatable
- The devices appear to react different than mix
- The RAM's defined eccentricities do not consistently match that of the PDA

2003 SOM Ballot Items
Printed in 2004 Standards

- **M323-04 Specification for Superpave Mix Design**
  – Previously MP2
- **R35-04 Practice for Superpave Volumetric Design**
  – Previously PP28

9-25: *Requirements for Voids in Mineral Aggregate for Superpave Mixtures*

Which volumetric design criterion best ensures adequate durability and performance: VMA, VFA, or calculated binder film thickness?

Advanced Asphalt Technologies (March 2004)

9-31: *Air Void Requirements for Superpave Mix Design*

Should design air void content vary with traffic loading and climatic conditions?

Advanced Asphalt Technologies (March 2004)

9-25/9-31 Preliminary Approach to Specification Modification

- **Set target VMA as a function of calculated aggregate surface area.**
  and allowable range, target ± 1.0 %.
- **Design air voids 3 to 5 %.**
- **Minimum V_{be} / VFA requirements:**
  - **10% / 70% within 100 mm of surface**
  - **8% / 65% otherwise**

9-9(1): *Verification of Gyration Levels in the N_{design} Table*

Preliminary Findings:

- **Current N_{design} levels slightly too high based on results from 40 field projects and 32 NCAT Track sections.**
- **Modified binders significantly reduce rate of densification.**

NCAT (August 2005)

9-33: *A Mix Design Manual for Hot Mix Asphalt*

Update method in AI Manual SP-02:

- **Simple performance test(s).**
- **<u>As-delivered</u> M-E design guide performance models and software.**
- **New volumetric criteria.**
- **Framework for integrated mix and structural design.**

Advanced Asphalt Technologies, LLC (August 2006)

Status of TP 62-03

Method for "Determining Dynamic Modulus of Hot Mix Asphalt Concrete Mixtures"

- **Coordinate ETG w/ NCHRP 9-29 Simple Performance Tester**
- **Task Group – Propose Revisions**
- **Revised Draft Test Method**
- **Develop Test Criterion**

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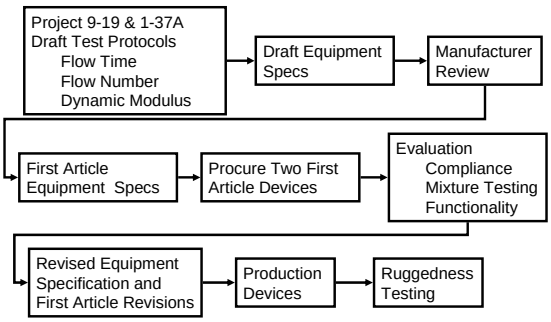
Project 9-29 Overview



Simple Performance Test System

- Tests
  - Flow Time
  - Flow Number
  - Dynamic Modulus
- Modulus
  - 10,000 psi to 2,500,000 psi
- Temperature
  - 4 to 60 °C
- Confinement
  - to 30 psi

Simple Performance Test System

- Three Vendors
  - Interlaken (also First Article)
  - Shedworks/Industrial Process Controls (also First Article)
  - EnduraTec
- Production Unit Cost
  - $45,000 to $50,000

Summary of reviewer comments & recommendations

Summary of comments from many reviews

- Number of Test Replicates
- Specimen Instrumentation
- Temperature Equilibrium Time
- Computation of E*
- Master Curve Development

Revision of Superpave Tests

Task group review …

AASHTO T 320 Superpave Shear Tester
AASHTO T 321 Beam Fatigue Test
AASHTO T 322 Indirect Tensile Test

Next ETG Meeting:

Spring 2005

FHWA Pavements Program

- Optimize Pavement Performance
- Advanced Quality Systems
- Enhanced Surface Characteristics
- Stakeholder Involvement
- Environmental Stewardship

Mixture Issues Update