Test Method for Measuring for Quality in Milling Operations

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January 28, 2005

NCAUPG HMA Conference
Lafayette, Indiana

Milling

Questions, Contact

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Indiana's Quality Journey

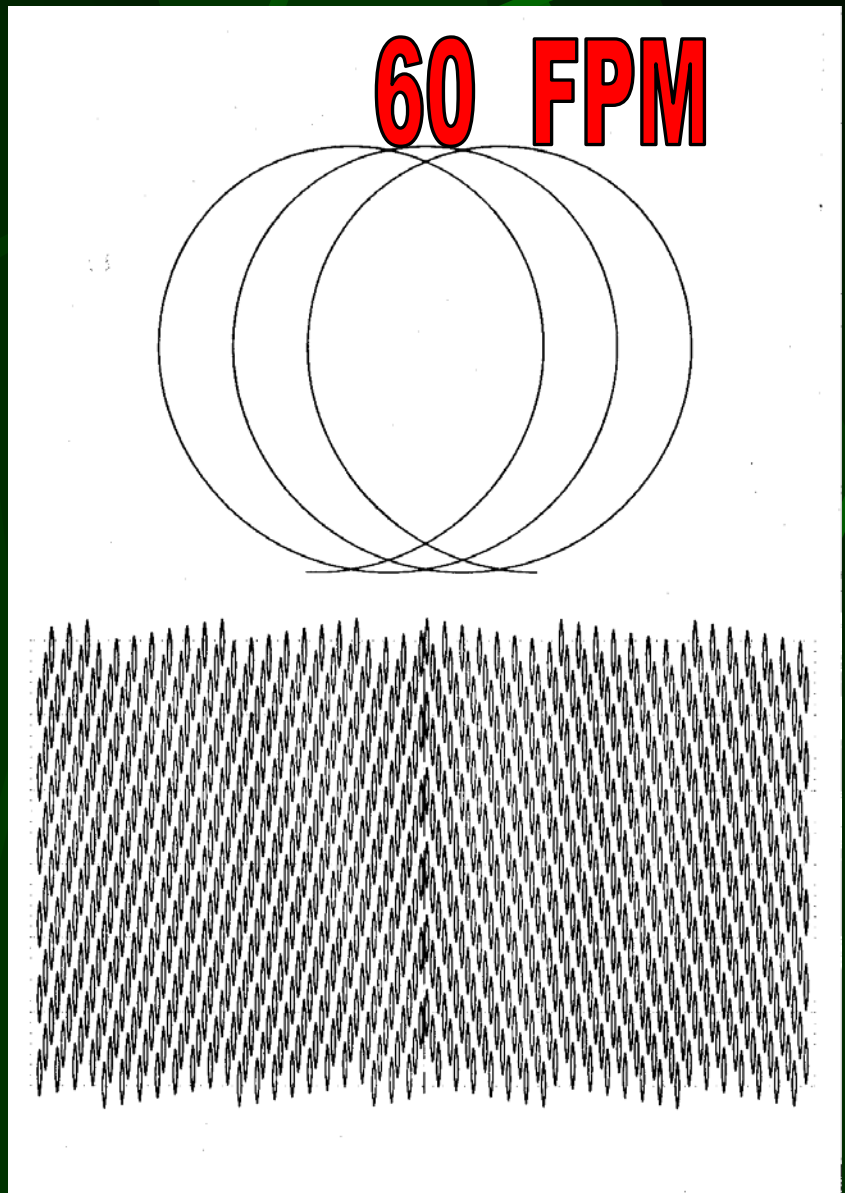
- 1986 QC/QA for Marshall Mixtures
- 1992 Sampling from Roadway
- 1994 QC/QA for Superpave Mixtures
- 1994 QC/QA for Aggregates
- 1995 QCP for HMA Plant Operations
- 1996 QC/QA for Binders
- 1996 Warranties
- 2000 Volumetric Acceptance
- 2003 Quality Testing for Milling

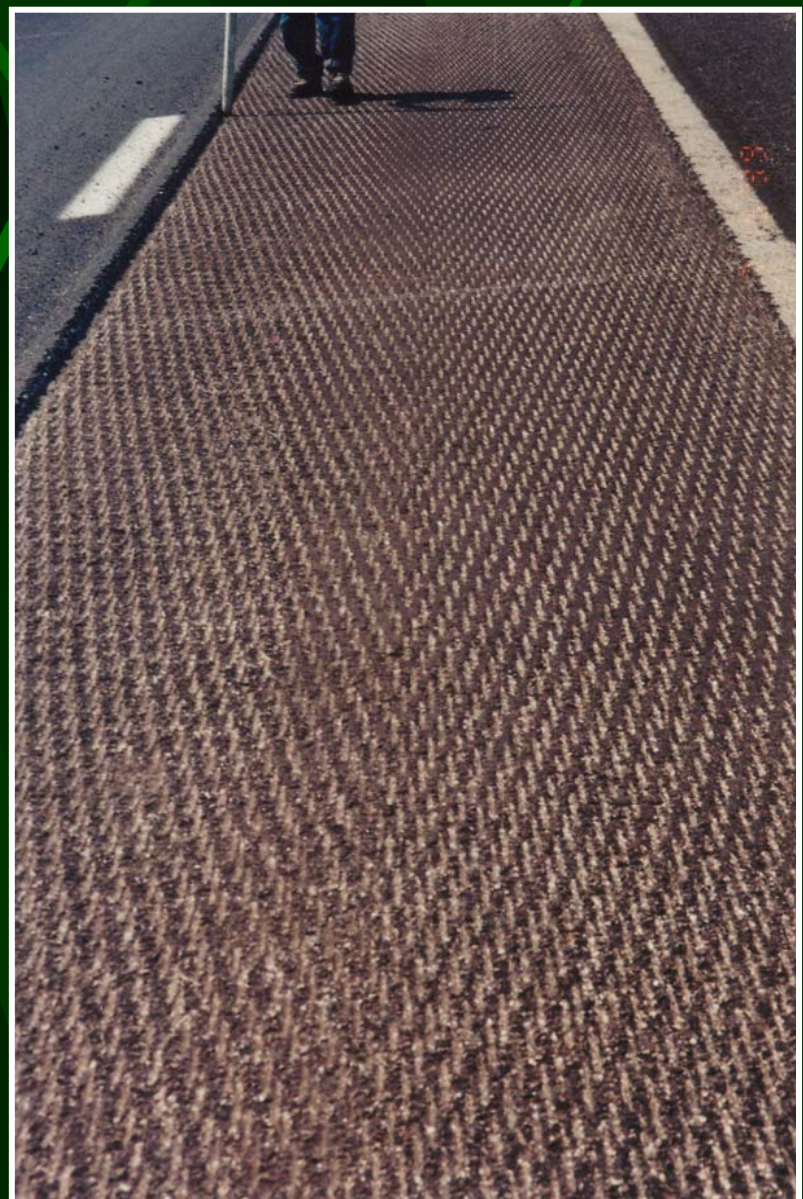
Indiana's Milling Experience

- 1979 Started Milling Operations
- 1985 Standard Specifications
- 2000 Specs modified to require equipment "automatic control devices to establish profile grades"
- 2003 Surface Macrotexture requirements added

CUTTING PATTERN

TEXTURE TESTING





POOR CONDITIONS

Problems

BAD TEETH AND HOLDERS

1 SENSOR

Specifications for Milling w/Macrotexture

1. **Asphalt Scarification/Profile Milling.** Asphalt scarification milling is used to provide roughened texture to an existing surface. (1/4-1/2 in.)
2. **Asphalt Milling.** Asphalt milling is used to remove material from an existing pavement to a specified average depth by milling the surface and creating a uniform profile. (1.0, 1.5, 2.0, 3.0 or 4.0 in.)

Specifications Con't
No Macrotexture

3. **Asphalt Removal Milling.** Asphalt removal milling is used to remove an entire asphalt overlay.

4. **Transition Milling.** Transition milling is used to provide a connection between an HMA overlay and an adjoining pavement. (>1.5 in.)

Basis for Macrotexture Testing

- **ASTM E 965-01**, ***Standard Test Method for Measuring Pavement Macrotexture Depth using a Volumetric Technique*****.** **Referred to as the "Sand Patch Test".**

- **Note 1 – "…. This test method is not considered suitable for use on grooved surfaces or pavements with large (≥ 1.0 in. (25 mm)) surface voids."**

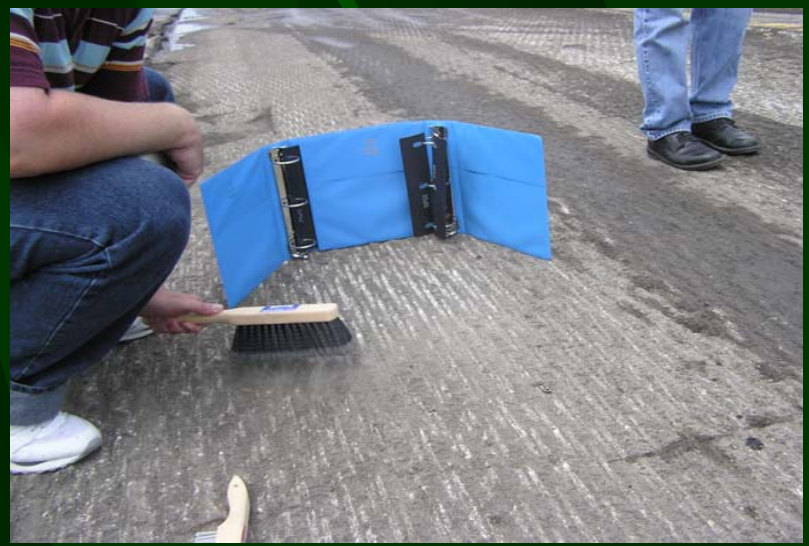
Testing Equipment

Select Area

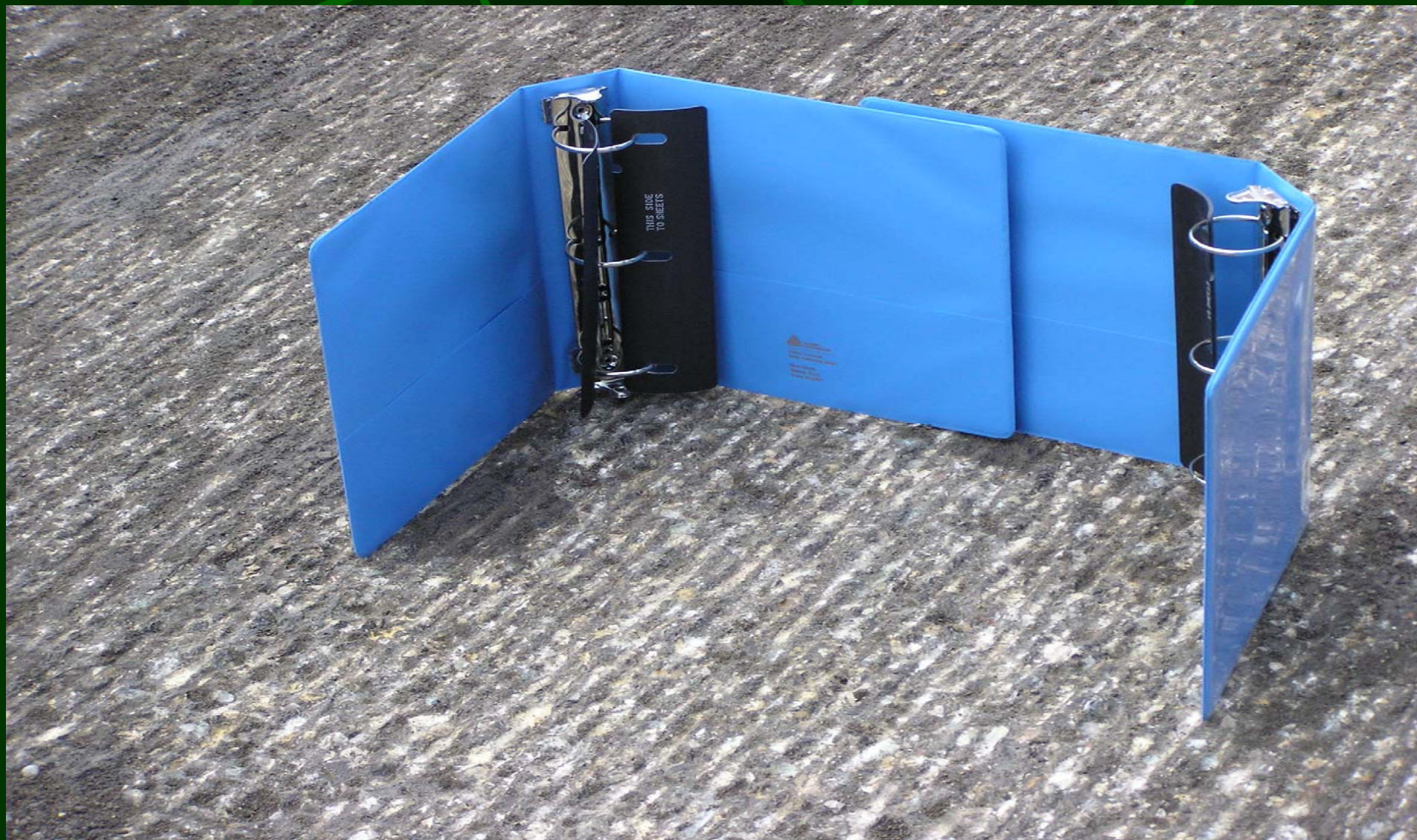
- Random Number Generation
- Representative Milled Area
- Free of localized Features
  - Cracking
  - Spalling
  - Repairs, etc.
  - Special Milling

Clean Area

- Power Broom
- Wire Brush
- Soft Bristle Brush



Set up Wind Screen

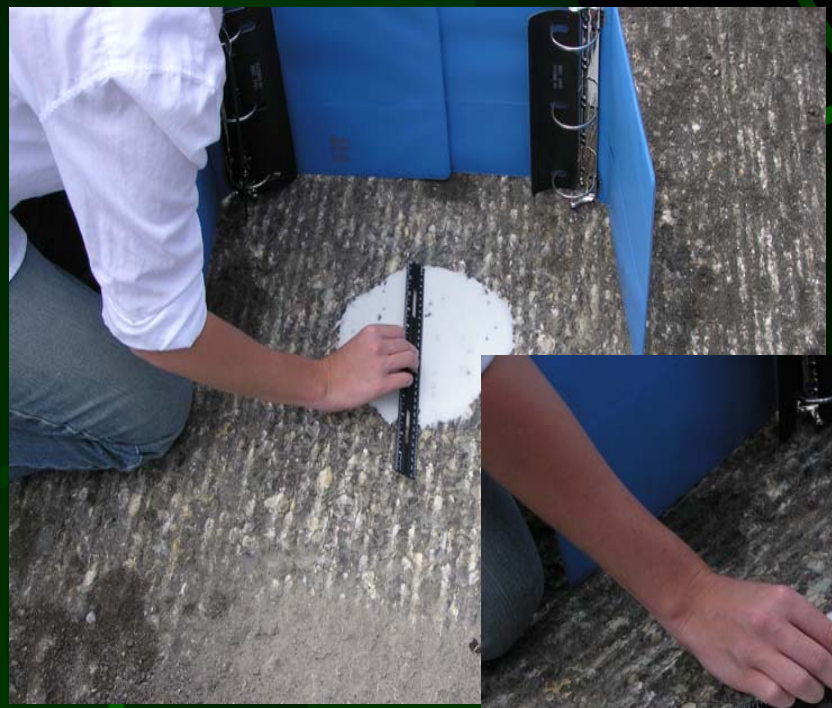


Pour Glass Beads

- Type of Beads
  - Coarse Glass
  - AASHTO M 247, Type I Glass Beads Used in Traffic Paints
- Quantity (200 ml)
  - Pre-measured
- Pour Height
  - 2-4 inches

Spread Glass Beads

- Circular Motion
- Slow Motion
- Defined Edges



Measure the Area

- Standard Ruler - 12 inch
- Measure four times at 90 Degrees
- Calculate Average Diameter
- Compare Macrotexture Ratio to Specifications
  - 1.8 for Single HMA Lays
  - 2.2 for Multiple HMA Lays

Benefits of Milling Specifications to Indiana

- Testing operations are not complicated, are quick and repeatable
- Visual observations can be correlated with Macrotexture Testing
- Minimal Testing Costs
  - Time (Few minutes)
  - Materials (Standard)

Benefits of Milling Con;t

- Measurement Procedures and results are not “too” sensitive to field techniques -> (± ¼ in.)
- Plate Sampling for mixture acceptance is more consistent
- Improved working platform has improved the densities of the mixtures

INDOT Milling for 2004

- QUALITY NOT QUANTITY
- GET IT RIGHT THE FIRST TIME
- GROUND SPEED w/ GRADE AND SLOPE CONTROLS
- FULL WIDTH MILLING
- AVERAGING SYSTEMS
- KNOWLEDGEABLE FIELD CREWS

Thank You!