Tack Coat Best Practices

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Far too frequent practices.
Importance of Tack Coats

- To promote the bond between pavement layers.
- To prevent slippage between pavement layers.
- Vital for structural performance of the pavement.
- All layers working together.
- Apply along all transverse and longitudinal vertical surfaces.

Why do we use Tack Coats?
Bonded Demonstration

½” Deflection, 60# Load

¼” Deflection, 160# Load

Unbonded

Fully Bonded
Bonded Demonstration

- Two bonded layers had less deflection than five unbonded.
- Five bonded layer deflected half as much as five unbonded with 267% greater loading.
Pavement Behavior

Load Distributed by Tire

Stress Distribution

Compression

Tension

Aggregate Base

Soil Subgrade

Courtesy of Rich May
Consequences of Poor Bonding

- Layer independence
  - Reduced fatigue life
  - Increased rutting
  - Slippage
  - Shoving
- Compaction difficulty

Direction of traffic?
Loss of Fatigue Life Examples

- May and King:
  - 10% bond loss = 50% less fatigue life

- Roffe and Chaignon
  - No bond = 60% loss of life

- Brown and Brunton
  - No Bond = 75% loss of life
  - 30% bond loss = 70% loss of life
8 – 10 years (est.) Interstate Pavement
Cores Showing Debonding

Bonding Failures

Courtesy of MODOT
Tack Coat Challenges

- Contractor
  - Application Rate
  - Consistency of Application
  - Tack Coat Pickup or Tracking By Vehicles
  - Traction for Construction Equipment
  - Breaking/Setting Time

- Agency
  - Acceptance
  - Dilution?
  - Application Measurement
  - Bond Quality
Common Tack Coat Materials

- Emulsified Asphalt
  - Most common option
  - SS-1, SS-1H
  - CSS-1, CSS-1H
  - RS-1, RS-1H, RS-2
  - CRS-1, CRS-2
  - PMAE
  - Non-tracking

- PG Graded Binders
  - Neat Binders
    - PG 58-28
    - PG 64-22
    - PG 67-22
  - Polymer Modified
Best Practices

- Surfaces need to be clean and dry.
- Uniform application.
- All exposed surfaces need tack.
- Tack should not be tracked off the surface.
Best Practices

- Match application to conditions.
  - Materials
  - Residual rate
- Verify application rate.
- Resist tacking too far ahead of paver.
Distributor Truck Setup

- Liquid temperature
  - Monitor and match to material

- Calibrate distributor truck
  - Spray bar height
  - Spray bar pressure
  - Nozzle angle
  - Nozzle selection
  - Thermometers
  - Volumeter
Spray Bar/Nozzles

- SINGLE COVERAGE
- DOUBLE COVERAGE
- TRIPLE COVERAGE

NOZZLE ANGLE SETTING: 15 TO 30 DEGREES

SPRAY BAR AXIS
Calculating Field Application Rates

- Dilution rates are critical in determining final application rates.
- Temperature is important in determining accurate volumetric calculated rates.
There are three primary methods of determining field application rates.

- Determination by volume.
- Determination by weight or mass.
- Determination by direct measurement, ASTM D2995
Areas of Known Agreement

- Layer Bonding is Vital
- Surface Preparation
  - Clean
  - Dry
- Millings Improves Field Performance
  - Shear
  - Cleaning
Areas of Known Agreement

- Application Quality Vital
  - Proper Rate
  - Consistency

- Distributor Truck
  - Setup
  - Calibration/Verification
  - Maintenance

- Tacking of Longitudinal Joints
  - Bonding
  - Confinement
Areas of Known Agreement

- Tack Coat Rate Depends on Surface Condition
  - Fresh
  - Weathered
  - Raveled
  - Milled

- Need for Research
  - Field Performance
  - Field Testing
    - Bond strength
    - Application amount

- Treat Tack as **Separate Pay Item** vs. Incidental Item
Free 4-hour workshop requested through FHWA divisional offices

Questions?

Free webinar: