Tack Coat Construction Issues

A Florida DOT Perspective

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(The King of Asphalt and a Prince of a Man)

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Overview

- Purpose of Tack Coats.
- Types of Materials.
- Do Tack Coats really work?
- Research work by FL DOT and others.
- Some Specification pointers.
- New materials and applications.

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Why Tack Coats?

- Bond layers together
- Renewed emphasis
  - Construction Slippage Failures
  - TRB Session 2005 on Tack Coats
  - Bond Failures at Accelerated Pavement Test Facilities
  - New materials: "trackless" and polymer modified tacks
  - NCHRP project 9-40 on Optimization of Tack Coats

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Tack Coat Materials

- Asphalt Cement
  - Safety and Application Concerns 250-300F+
- Cut Back Asphalt
  - Asphalt cement in solvent
  - Environmental Concerns.
- Emulsified Asphalt
  - Asphalt, emulsifier and water.
  - Anionic is typical product used in Florida

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Evolution of FL Tack Materials

- Allow just about any emulsified tack (1970's)
  - SS, MS, RS, different base AC's, anionic/cationic
  - Engineer set rate .02 to .08 gal/sy
- Problems and Failures.
  - Use wrong material at wrong rate for situation.
  - Dilution and Mixing of multiple materials
  - DOT and Industry lack experienced personnel.
- Change RS-1h or RS-2 (1990) pretested/no dilution
  - RS-1h with AC-20 base, RS-2 with AC-10 base.
  - AC-5 for night paving.

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Do Tack Coats Work? FL Research

- Developed simple Bond Strength tester.
  - Adapted from PCC Iowa Bond Strength test.
  - Test and loading parameters in research report
- Rain (water) decreases bond strength (big time).
  - Effect decreases with time.
- Rate of application increases bond strength.
  - 0.02, 0.04, 0.08 gal/sy.

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Do Tack Coats Work? FL Research

- Time/Traffic increases bond strength.
  - Tested 1 day, 2 weeks, 5 weeks, and 14 weeks
- Interface texture affects bond strength.
  - Milled surface, coarse texture, fine texture.
- Validated common sense.
  - Published AAPT 2004
- NCHRP project 9-40 to LTRC (2005)

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Device for Pine Equipment

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Specifications for Shear Strength?

- Difficult to do….what we have found:
  - Strength is dependent on age.
  - Mixture types (surface texture) affect strength.
  - Different requirements for different traffic.
- FL deficiencies covered under 3-year "materials & workmanship" **performance** warranty (Jan 2004).
- Bond failures usually show up early.
- Test best suited for failure investigation.

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Specification Pointers

- Recommend Emulsified Asphalts.
  - Limit the number of materials
  - Pretest material / no dilution allowed
- **Heat** the Emulsified AC to 140-180F.
- **CLEAN** the Surface and Tack **ALL** layers.
- Use right application .02-.08gal/sy & **Check** rate
  - Old milled surface .06gal/sy
  - New asphalt .02gal/sy
  - OGFC .045gal/sy
- Get right the first time

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Clean the Surface!!



- **Do what it takes!**

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Don't Blame Emulsion for Bond Failure

- Many Mysterious Material Requirements
  - Saybolt Vis, Sieve test, Demulsibility, etc.
  - Pumping / Spraying / Breaking
- But it's the Asphalt (residue)
  - **Bond / Stick**
  - Characteristics of residue.
  - Amount of residue.
  - Quick field test.

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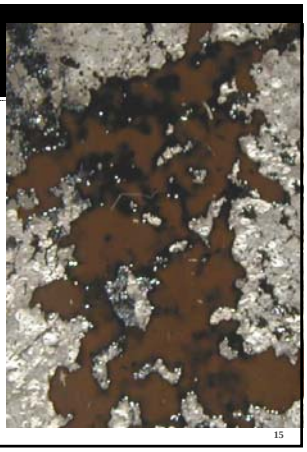
Emulsion

- "Unbroke" Emulsion is Brown
- "Broke" Emulsion is Black
- HMA will boil water



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Some Current Concerns

- Night Paving.
  - Breaking of emulsified tack.
- Bond Failures.
  - Usually construction related.
  - Not usually failure of residual asphalt material.
- Tracking of Tack.
  - Pick up on tires of HMA delivery vehicles.
  - Make sure surface is clean (run traffic).
  - Can look like stripping failure

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No One likes Tracked Tack

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New Materials & Applications

- CRS-1h (cationic tack)
  - Better breaking characteristics for night paving
- NTSS-1hm ("trackless tack")
  - Modified (Softening Pt 149F min, Penetration 20 max)
- Bonded Surface Course (say Novachip®)
  - Polymer modified tack at 0.20gal/sy.
  - Tack placed internal in the paver just before mix
  - New construction: with OGFC.
  - Maintenance: with gap graded over cracked pavement

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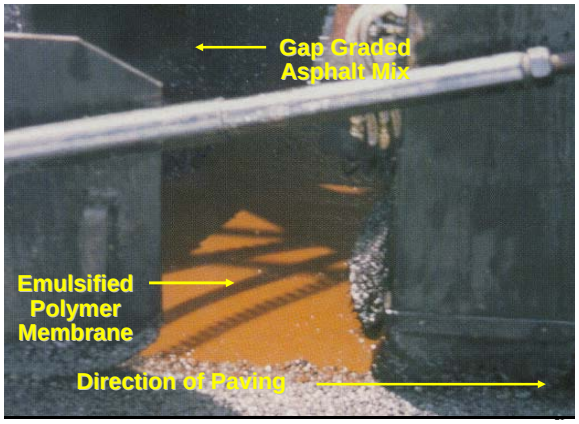

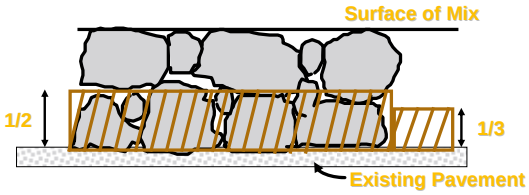

- Wicks 1/2 way up when hot.
- Final wick is 1/3 of depth.
- Polymer tack is sticky.
- Process/paver is patented®.

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Tack Summary

- **Clean the surface**.
- Use pretested material
- Don't mix or dilute.
- Use calibrated tank / meter
- Use the right material for the situation.
- Use the right tack rate & **check it**.
- Get a uniform application on the surface.
- One opportunity to "**Get it Right**".

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