Warm Mix Asphalt

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What is WMA?

- Process or additive that allows for the production and compaction of asphalt pavements at temperatures lower than traditional HMA
  - Reduction can range between **275 - 185°F**
  - Different mixes and technologies dictate temperature change

WMA Technologies Used in North America

- Foaming
  - Double Barrel Green
  - Terex Warm Mix Asphalt System
  - Gencor
  - Stansteel
  - LEA
  - Aspha-min
  - Advera WMA
  - WAM Foam
- Organic Additive
  - Sasobit
- Chemical Additive
  - Evotherm
  - Evotherm DAT
  - REVIX
  - Rediset WMX
  - Cecabasa RT

Summary of WMA Introduction to Drum Plants

- Foaming Devices
  - Foaming unit injects pressurized water into binder
- Additives
  - Typically injected near binder line

General Differences Between Technologies

- Foaming using just water is less expensive but the drop in temperature is also less
- Some of the additives alter binder properties
  - i.e. Sasobit
- Some additives act like additional fines
  - i.e. Aspha-min and Advera WMA

Benefits of WMA

- Energy savings
- Reduced emissions
- Extended paving season
- Increased haul distance
- Reduced issues with crack sealant
- Less oxidized binder
  - Less brittle, may endure cold better
  - Softer binder good for high RAP content mixes

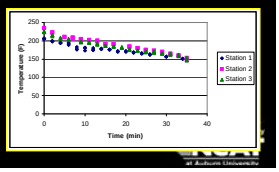
Similarities With HMA

- Same plants, just modified in many cases
- Same paving equipment
- Same rolling equipment



Concerns About WMA

- Moisture susceptibility
- Rutting
- Affect on baghouse
- Coating
- Cooling
- Activate RAP and RAS binder
- Compatibility with polymer modified binder
- Expense

How Are The Concerns Being Addressed?

- Moisture susceptibility
  - Anti-stripping agents
  - Monitoring of pavement performance
  - Checking moisture content of mix
- Rutting
  - Binder is less oxidized but lab and early field result indicate it is not an issue

How Are The Concerns Being Addressed?

- Affect on baghouse
  - Monitoring high tonnage projects
- Coating
  - Some mixes look poorly coated prior to the silo but at the site are fine
  - Adjusting temperature
- Cooling
  - Properly tarped trucks
  - WMA does not cool at the same rate as HMA
  - Compaction window broader for WMA

How Are The Concerns Being Addressed?

- Activate RAP and RAS binders
  - Field and laboratory studies underway
  - Evaluating blending of virgin and RAP binder for HMA and WMA
- Compatibility with polymer modified binder
  - Test sites constructed
  - Higher temperature than neat mixes
- Expense
  - Offset by energy savings
  - Add RAP

How Do You Design For WMA?

- In the past as a drop in
- New WMA mix design guide
  - NCHRP 09-43
  - March 2010
  - Addresses different technologies

WMA Resources

- WMA Technical Working Group
  - NAPA, FHWA, DOTs, Industry, and NCAT
  - Guide specification
  - www.warmmixasphalt.com
- NAPA Documents
- Researchers, DOTs, and contractors with experience
  - At least 35 states have had WMA demos

Questions?