Warm Mix Asphalt (WMA)

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What is WMA?
What is WMA?

True Warm Mix Asphalt:
• It’s HMA produced at a lower temperature and it compacts at a lower temperature.

WMA produced at any temp:
• It’s HMA with a wider compaction window
Warm Mix Production Temperatures

- **175°C**: Conventional Hot Mix
- **150°C**: Foamed Asphalt
- **120°C**: Chemical Additives and Wax
- **90°C**: Often used as a coating aid. Not a true warm mix.
Advantages of WMA

1. Improved compaction
2. Reduced thermal segregation
3. Extended hauls and paving season
4. Longer binder life
5. Reduced emissions and fuel consumption – Improved worker conditions – lower impact on the environment
Compaction and Workability
NCAT Test Track
Pavement Densities

![Graph showing pavement density comparison for different materials and compaction temperatures.](image-url)
Case Study
Initial Paving of HMA – SMA Mix 76–28 PMA

• HMA at 170 to 175°C

• Had Tried Foam at 150°C on an Earlier SMA Project (Stone Mastic, for studded tires)
  – Tried To Go Lower
  – Could Not Achieve Density
Hot Mix – Stone Mastic
Very Stiff Mix
Some Extra Hand Work
HMA

- 170° to 175°C
- 1350 – 1550 Tonnes/Day (190 Tonnes/Hr)
- Struggling With Density
  - 92.0 to 93.0
  - Plenty of 91.5s to 92.0s
WMA
133°C
No More Chunks
WMA

• 130° to 143°C
• 2250 Tonnes/Day (250 – 370 Tonnes/Hr)
  45% Increase in Production
• No Density Struggles
  94.0+ Density
  Full 5% Density Bonus
  $2 per Ton Bonus
WMA Mix

• Cut 1 Roller from the Project
• Less Waste (Plant & Road)
• Less Wear on the Plant
• Less Time Cleaning Up the Paving Equipment
• Tonnes per Man Hour Went Up
• Dramatically improved compaction on a stiff SMA/PMA mix
Longer Life Binder
Binder hardening

Reduced Oxidation with Evotherm

Pen

Virgin AC  After Paving  2 Years Later

Hot Mix  Evotherm
4 Years Later – The Hot Mix
HMA
Side by Side – HMA vs. WMA
HMA vs. WMA
Reduced Thermal Segregation
24 Deg Difference
7 Deg Difference
Longer hauls

Doubles market area

40% increase

80km

120km
Cool weather paving

Idle paving crew cost: $1000/hr

One hour incremental paving

- 250 tons
- $12,500 incremental revenue

Increase in hours for seasonal workers

- Improved employee retention
- Improved paving quality
Reduced Emissions
HMA vs. WMA

HMA (150°C)  WMA (120°C)
Lower emissions
How to get WMA
How do you get Warm Mix Additives into your Asphalt?

• #1 easiest way: Terminal blended

• #2: Plant add
Evotherm pump systems
Evotherm pump

Self contained
Fits anywhere
Simple operation
Low maintenance
Manual or plant integration
Any power supply
  —4 to 20mA or 0 to 10 VDC input
  —4 to 20mA or 0 to 10 VDC output
Any plant type or terminal
Evotherm tank telemetry system

[Images of Evotherm tanks]
Technical Support Team

QA/QC based approach to supporting the Warm Mix

Industry experienced technicians

- Mix design
- Production lab
- Plant setup of WMA equipment
- Roadway density
- Overall best paving practices
- Other WMA technologies

Capable of support on any mix or plant types

Regional approach to support

Services provided at no added cost
Why not WMA?
Why not WMA?
Why not WMA?

• Changes the binder grade?
• Concerns about performance?
• No Spec
• Cost
"All SUPERPAVE Hot Mix Asphalt Mixtures shall be modified using a WMA additive capable of lowering plant production temperatures to below 260°F [125°C]. Warm Mix Asphalt additives reduce compaction effort and permit lower production temperatures than conventional hot mix asphalt. The WMA additive shall be a product listed on the Northeast Asphalt User Producer Group (NEAUPG) website (http://www.superpave.psu.edu/NEAUPG.html)...."
Questions?
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