

# Warm Mix Asphalt

(WMA 101)

A stylized silhouette of a mountain range in a darker teal color, located in the bottom right corner of the slide.

# What Is Warm Mix Asphalt ?

- ◆ A technology that allows the mixing, lay down, and compaction of asphalt mixes at significantly lower temperatures than current HMA.

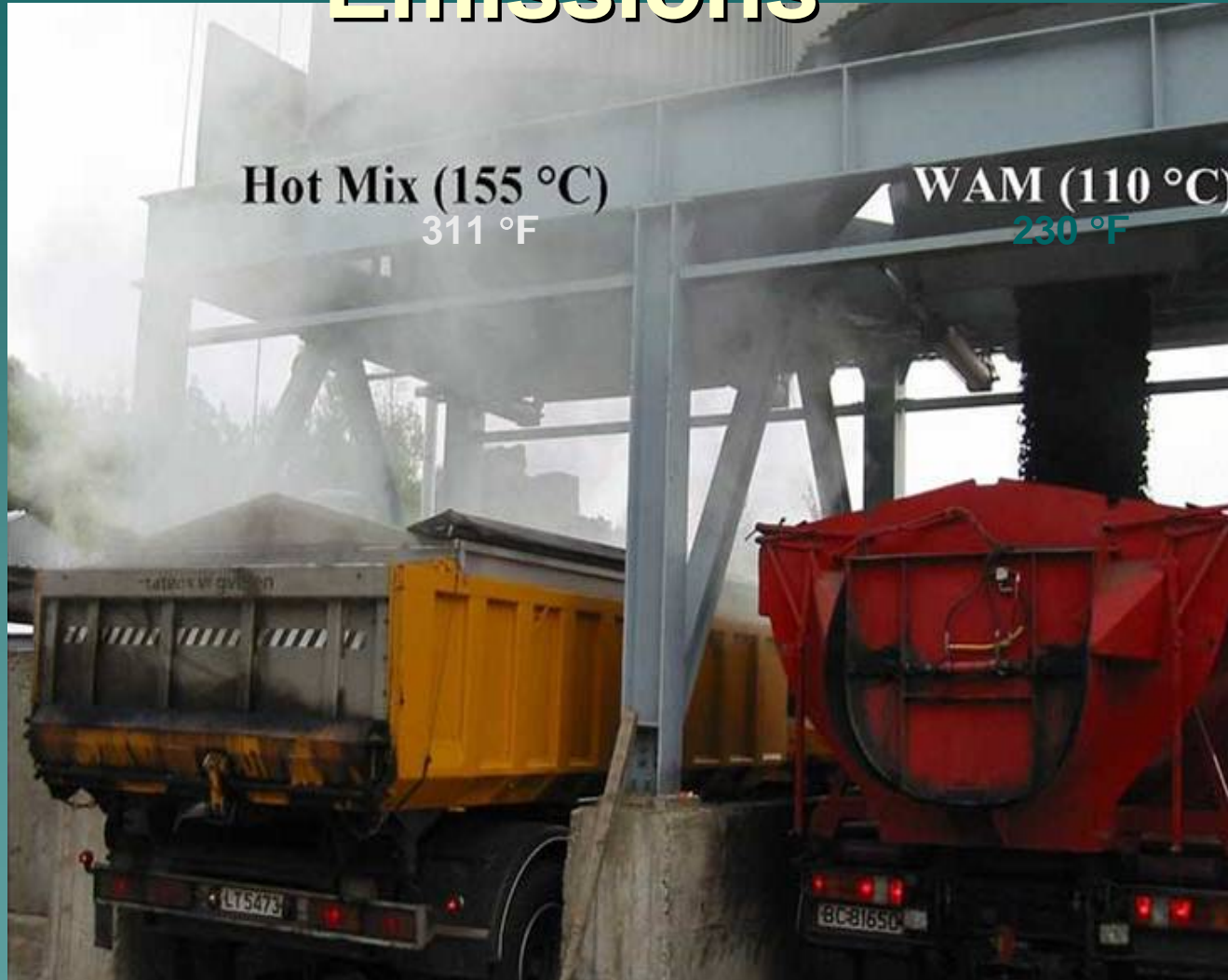
# Why Warm Asphalt ?

- ◆ Reduce production and laydown temperatures
- ◆ Reduce emissions
- ◆ Reduce energy costs
- ◆ Reduce aging of binder
- ◆ Other Possible Benefits:
  - Cool weather paving (extend season)
  - Compaction aid for stiff mixes

# We Can Reduce Temperatures Today with No Additives

- ◆ Pre-Superpave – typical compaction temperature 275 °F
- ◆ Place Thicker Lifts – NCHRP 9-27
  - 3 x NMAS for fine graded
  - 4 x NMAS for coarse graded
- ◆ Tarp Trucks
- ◆ Drier Aggregate – pave under stockpiles

# Comparison of Visible Emissions



Courtesy of Shell/Kolo Veidekke

# Warm Asphalt Mix Technology

Several processes have been developed to improve mixture workability allowing lower production and laydown temperatures

- WAM Foam
- Zeolite
- Sasobit
- Evotherm

# Where Did It Come From ?

- ◆ European Technology
  - ◆ Research started 1995
  - ◆ Promoted in Europe and Australia since 2000
  - ◆ European Scan tour 2002
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# How Do They Work ?

- ◆ Lubricate the mix
  - Use of moisture to foam binder
  - Asphalt flow improver (paraffin wax)
  - Emulsion (chemistry package)



# What Does It Take ? (For Now)

- ◆ Mix Design
- ◆ Mixing Plant
- ◆ Lay Down

# Mix Design

- ◆ Use existing mix design and design optimum binder content
- ◆ WMA will compact to lower air voids in the SGC
- ◆ Compaction temperature will be lower

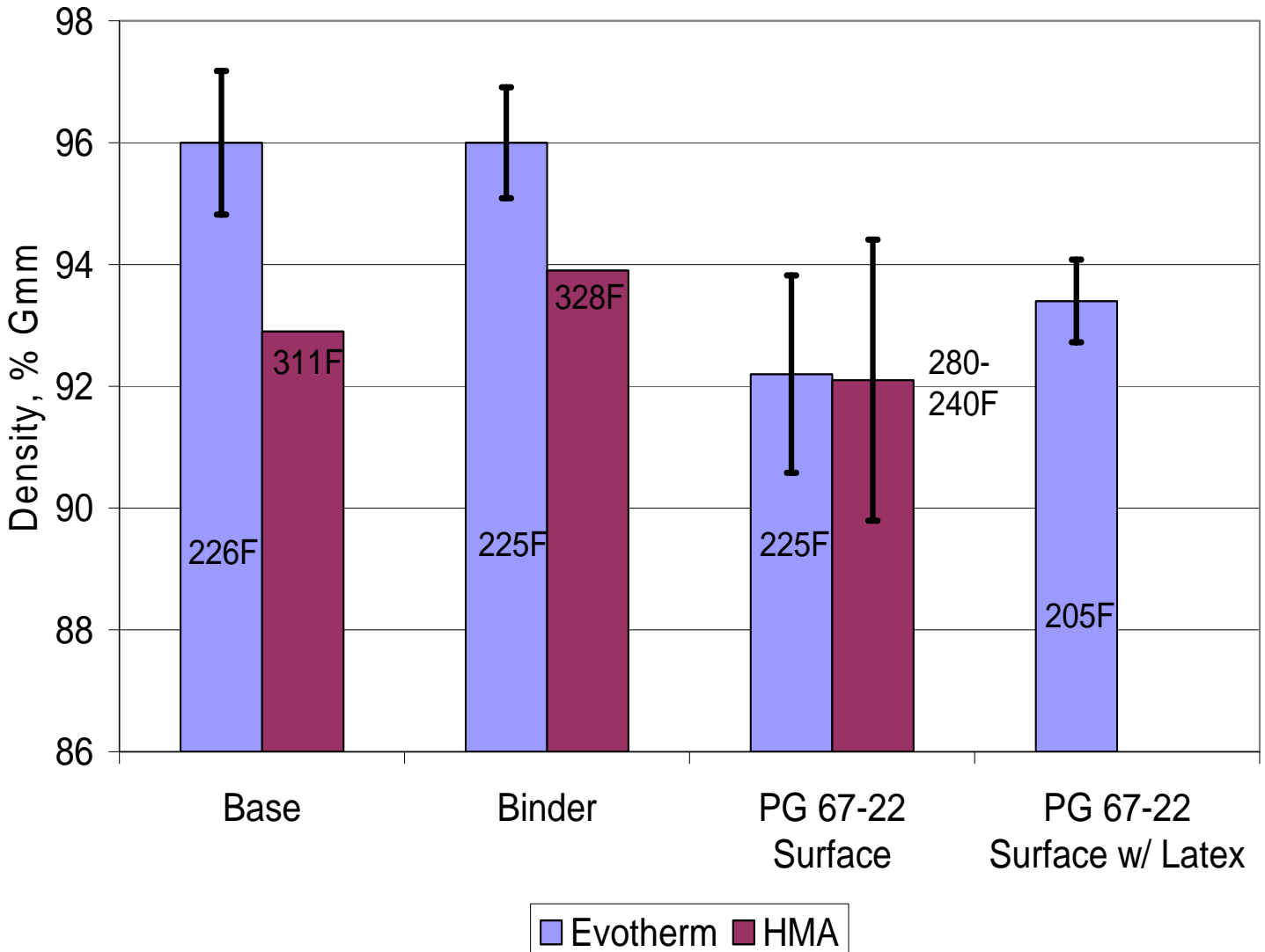
# Mixing Plant

- ◆ Modification may be required
- ◆ Process type determines modification
  - Granulated material
  - Flakes or prills
  - Binder – foaming or blending
  - Emulsion

# Lay Down

- ◆ Proper transportation of mix
- ◆ Proper lay down of mix
- ◆ Proper compaction of mix

# Pavement Densities



# What has worked ?

- ◆ 10 field trials done
- ◆ All additives work
- ◆ All mixes compactable at lower temperatures
- ◆ Emissions are lower
- ◆ Early opening to traffic

# Concerns ?

- ◆ Rutting
- ◆ Moisture in mix
- ◆ Moisture susceptibility
- ◆ Mix design method
- ◆ QC/QA procedures

# Field Trails





# German Autobahn Paving



# Laydown of Polymer Modified Warm Asphalt with Zeolite at 250 F



94% Gmm  
55 F Air Temp.



followed by 4 vibratory  
passes, followed by stat

4 passes of Rubber Tire, finish roller

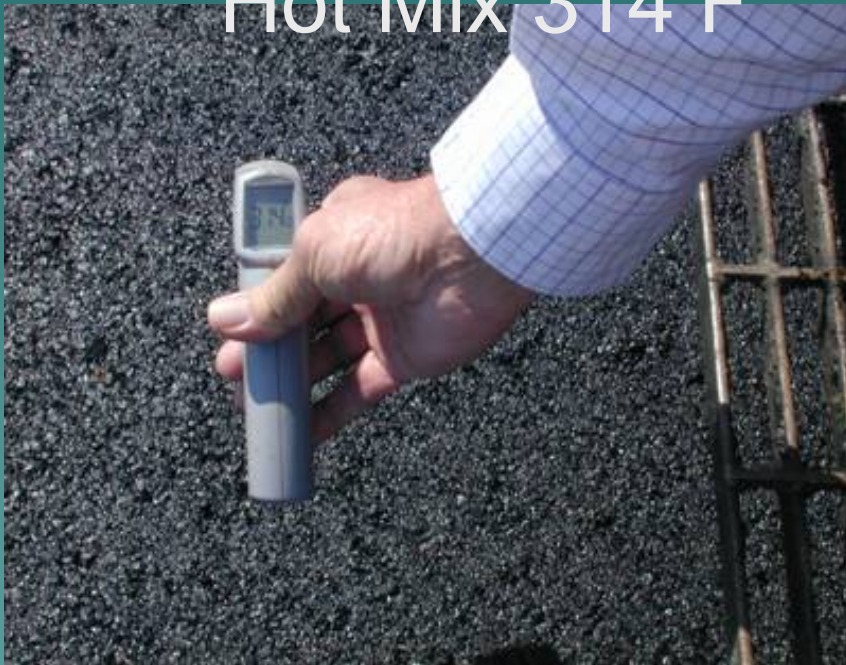
# U.S. Drum Plant Addition of Aspha- min





# Seeing is Believing!

Hot Mix 314 F



138.1 pcf

Aspha-min Mix 254 F



138.5 pcf

**Evothem Field Trial  
Near Indianapolis, IN  
July 2005**

A stylized silhouette of a mountain range in a darker shade of teal, located in the bottom right corner of the slide.











# MD SMA Sasobit Trial Capital Beltway



# Questions to be answered

- ◆ Can technologies be adapted for use throughout the US ?
- ◆ What are the performance characteristics of these pavements ?
- ◆ Will the binder age as much at the lower temperatures ?
- ◆ Will the potential for thermal cracking be reduced ?

# Questions to be answered

- ◆ How will modified binders react in these mixes ?
- ◆ What will need to be done to check the behavior of performance-graded binders in these mixes ?
- ◆ Is this a true cost effective technology ?

Questions ?

The image features a solid teal background. In the bottom right corner, there is a dark teal silhouette of a mountain range with jagged peaks. The word "Questions ?" is centered in the upper half of the image in a white, sans-serif font with a subtle drop shadow.