What is WMA?

WMA appears to allow a reduction in the temperatures at which asphalt mixes are produced and placed:

- Reduced viscosity at lower temps
- Complete aggregate coating
Why WMA?

Potential Advantages

– Energy Savings
– Decreased Emissions
  - Visible
  - Non-Visible
– Decreased Fumes
– Decreased Oxidation Hardening
– Decreased Plant Wear
Issues of Interest

The purpose of the scan was to gather information on technologies used to produce WMA, with emphasis on long-term performance. Topics of interest included:

- WMA processes
- Mix design and construction practices
- WMA performance
- Limitations
- Benefits
Who Did We Visit?
Our Team

- Eric Harm, chairman
- John D’Angelo, co-chairman
- Gaylon Baumgardner
- John Bartoszek
- Matthew Corrigan
- Jack Cowsert
- Tom Harman
- Mostafa Jamshidi
- Dave Newcomb
- Brian Prowell, reporter
- Ron Sines
- Wayne Jones
- Bruce Yeaton

- Illinois DOT
- FHWA
- Paragon Technical Services
- Payne & Dolan
- FHWA
- North Carolina DOT
- FHWA
- Nebraska DOT
- NAPA
- Adv. Materials Services LLC
- P.J. Keating
- Asphalt Institute
- Maine DOT
2007 WMA Scan Team
Factors Driving Development of WMA in Europe

- The environment and sustainable development concerns, “Green Construction”
  - Reduction in energy consumption
  - Reduction in CO\textsubscript{2} emissions
- Extension of paving season and potential for longer haul distances
- Improvement in field compaction
- Welfare of workers, particularly with Gussasphalt, which is not used in the U.S.
European Mix Design Practices

- Mix design practices varied from country to country
- Some gyratory, some Marshall
- Some empirical, some fundamental
- All used performance tests!
Warm Mix Asphalt Processes

- **Organic, Wax-like additives**
  - Sasobit® – Sasol International
  - Asphaltan B – Romanta
  - Fatty Acid Amides – Licomont S 100

- **Foaming Processes**
  - Aspha-min zeolite – MHI/Eurovia
  - Low Energy Asphalt – Fairco/Eiffage Travaux Publics
  - WAM Foam – Kolo Veidekke/Shell/BP
  - LEAB® – BAM

- **Emulsion Based**
  - Evotherm™ – MeadWestvaco

- **Vegetable based synthetic binders**

- **Emerging U.S. Technologies**
Classification of WMA by Temperature Range

- Cold
- Half-Warm
- Warm
- HMA

Temperature, °F

Fuel/Ton

Heating
Vaporization
Drying

Latent Heat of Vaporization
Placement and Compaction

“Business as usual”
Primarily use:
• Heavy, tamping bar, vibratory screed pavers
• Steel-wheel vibratory and static rollers
• Workability generally good
Performance of WMA

Consensus of European Countries that WMA should provide equal or better performance than HMA

- Norway – performance mixed, problems not attributed to WMA
- Germany – performance same or better, developed guidelines to allow use of waxes and zeolite
- France – toll road operator, district, and city of Paris pleased with performance to date
SCAN Challenges
Adapt technologies from low production European batch/drum plants to higher production plants used in the U.S.
Coarse aggregate must be dry

- Aggregates used in Europe have relatively low water absorptions, < 2%
- Aggregates routinely used in the U.S. have higher water absorptions
- Best Practices should be used to minimize the moisture content in aggregate
Initial product approval; how do we sort out the good products from the bad?
Products should be approved on a national or at least a regional basis

- German agencies, industry, and academia have jointly developed a “Merkblatt” or guidelines for the use of WMA.

- In France, SETRA performs certifications of new products. Cooperatively supported between agency and industry.

Aspha-min Certificate
Individual contractors are going to have to determine which WMA process will work over the widest range of applications. In the past changes have been mandated by agencies. In Europe, contractors have staffs who routinely do research to develop new products.
The overall performance of WMA must be as good as HMA. On a life-cycle basis, if WMA does not perform as well, there will not be energy savings or reduced emissions in the long run.

- Build sections with HMA controls
- Data collection guidelines
- Monitor for 3 to 5 years

**Rv152, Hp3, Km 0.046-2.339 Akershus**
Implementation Goals

The WMA Scan Team should provide technology transfer of the information gained through presentations, articles, and reports.

Best practices need to be developed for handling and storing aggregates to minimize moisture content, burner adjustment, and WMA in general or specific technologies.
Implementation Goals

An approval system needs to be developed for new WMA technologies. The approval system should be based on performance testing and supplemented by field trials. WMA TWG should lead the development of a performance based evaluation plan for new WMA products. Realistically, such a system is needed for a broader range of modifiers/technologies used in HMA.
Conclusions

• There is a consensus among the WMA Scan Team that WMA is a viable technology and that U.S. Agencies and the HMA industry need to cooperatively pursue this path.

• The U.S. has already made great strides in evaluating WMA, thanks in part to agency / industry partnerships like the WMA TWG and the WMA Scan Tour.
Thank You!

Questions/Discussion?