News from the Asphalt Pavement Association of Oregon
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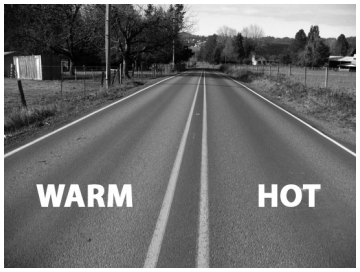
CENTERLINE

PAVEMENT DESIGN

Benefits of Warm Mix Asphalt Catching On



The City of Portland will eventually require WMA from their contractors for all capital projects, and other jurisdictions may follow that lead.

IN 2009, *CENTERLINE* FEATURED an article on warm mix asphalt technology. At the time, warm mix asphalt (WMA) was relatively new to Oregon's paving industry, with only a few producers investing in plant modifications for its manufacture.

Today, several municipalities around the state are accepting WMA from contractors on a permissive specification basis, meaning the contractor has the choice to use either warm mix or hot mix (HMA) technology. The City of Portland will eventually require WMA from their contractors for all capital projects, and other jurisdictions may follow that lead.

There are many benefits of WMA compared to traditional HMA:

- **Cost savings**
  Less heat-producing fuel is required for production and installation. Fuel savings can range from 10 to 30%.
- **Lower emissions**
  Production emissions are significantly reduced (possibly as much as 30%), and make more days available for paving in areas that face challenges maintaining air quality attainment standards.
- **More recycled content**
  Because if its lower viscosity, WMA can contain up to 50% recycled asphalt pavement, reducing the need for virgin aggregate and oil.
- **Longer production window**
  Lower viscosity also increases the production window for WMA. It can be transported longer distances, and can be installed later into the paving season.
- **Longevity**
  WMA is more workable and easier to compact, contributing to the longevity of the pavement. And with less heat generated during production, WMA will oxidize less, resulting in a more flexible, crack-resistant pavement.

The previous *Centerline* article noted there were (at the time) about 13 different ways to produce WMA, but all of them generally fall into two categories – those that use chemical additives and those that use a foaming process.

The foaming process seems to be the preferred warm mix production technique among contractors. It requires modification of plant equipment to introduce a very small amount of water into the binder that foams the asphalt as the water turns to steam. While the modification is not inexpensive, it is a one-time investment that will pay for itself over time. The modification also provides selectable production modes so HMA can still be manufactured using the same equipment.

The chemical additive processes, on the other hand, require continual purchase of proprietary chemical products, and the cost of those additives typically exceeds the savings that are generated by reduced energy consumption during production.

The City of Portland performed its first WMA project three years ago. Beginning in January of this year, the City requires WMA for all contracted capital projects for transportation. In 2012, that requirement will be expanded to include all contracted capital projects.

"All of the benefits of WMA were attractive to us," said **Steve Townsen,** head of transportation engineering for the City of Portland. "Everyone likes it," he said, "Suppliers, because it requires less energy to produce; agencies, because you are not immediately aging the binder by heating it excessively during production; and contractors, because it promotes a healthier environment for their workers with less fumes."

While it's early to evaluate performance of WMA conclusively, **Brian Oberding**, pavement services manager for the City of Portland, notes that trial projects show positive indicators. "We have some comparative trials that will be two years old in June," he said. "We observed the hot and warm mix installations at one year of age and saw no dif-

(continued on page 2)

INSIDE

Benefits of Warm Mix Asphalt – Continued

ference in appearance or wear. We'll look again in June and hope for similar observations," he added.

The City of Eugene has been using WMA since 2009. "City Council set goals for sustainability and environmental impact," said **Paul Klope**, an engineer with the City of Eugene. "In early 2009, we attended the APAO Conference and there was a compelling presentation on WMA. All the local paving contractors were there, and they were interested in retrofitting their plants if the City was interested in pursuing this technology," Klope explained.

The City of Eugene requires city-contracted paving projects (except airport projects) to use WMA. HMA is used only for small jobs performed by City crews, or those jobs that must be done by hand.

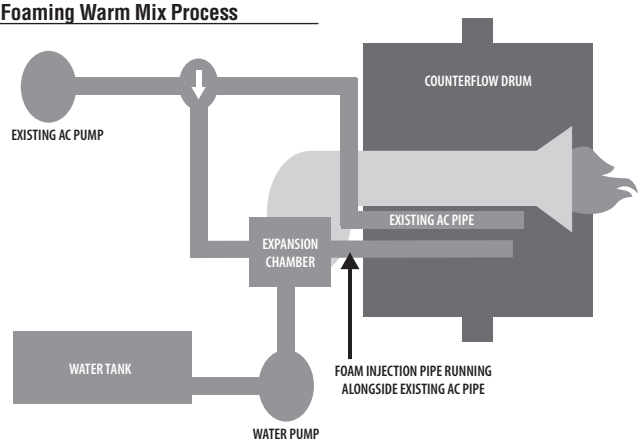
"The field results have been good," Klope said. "We've seen consistency with regard to compaction and density. Compaction actually appears to be as good as or better than with HMA," he said. "And we have verified more effective oil coating with WMA," he added.

Washington County just implemented a permissive specification for WMA this year, but has been conducting trials for a few years. A trial project on Bald Peak Road completed in August 2009 is performing well, said **Greg Clemmons**, Washington County operations engineer. "Half of the road was paved with WMA, and the other half was paved with HMA. We've seen no difference between the two at this point," he said. Another Washington County trial project was performed in 2010 on a low volume road utilizing about 12,000 tons of WMA. "Baker Rock was the primary contractor on both trial projects," Clemmons said. "They modified their plant and would like to see this technology take off," he added.

David Newcomb, vice-president of Research and Technology at the National Asphalt Pavement Association, says about 22 state Departments of Transportation allow WMA on a permissive specification basis. "Texas has been very aggressive in their adoption of WMA," he said. "They had technology providers working side-by-side with the Department of Transportation, getting people comfortable with the process," he added. So what is holding others back? "Fear of the unknown," Newcomb said.

But WMA is the way of the future. Newcomb notes that the Federal Highway Administration started a program called *Every Day Counts*, identifying six technologies that will move highways forward. One is WMA. "The FHA hopes that by the end of this year, there will be 40 states allowing WMA on a permissive basis."

Typical Foaming Warm Mix Process



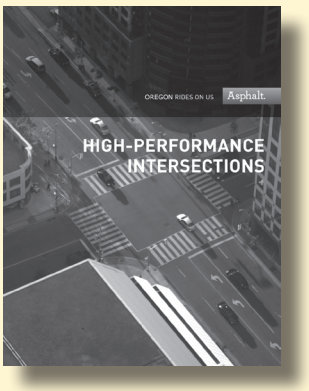
An existing hot mix asphalt plant can be modified to produce warm mix or hot mix asphalt at the flip of a switch. A metered tank feeds water into a foaming chamber, where it is injected into the hot asphalt. Upon contact with the hot liquid asphalt, the water steams and microbubbles form, acting as a catalyst to the foaming process. The foaming mixture expands the volume of the binder 18 times its normal volume, resulting in improved coating, increased film thickness and reduced viscosity.

Very little water is required for the foaming process. It is injected at a rate of 1 to 2% of the liquid asphalt flow rate. For a mix that contains 6% asphalt binder, for example, only 1.8 pounds of water per ton of asphalt would be injected – less than 0.1% of the mix by weight.

6% asphalt binder x 2000 lbs/ton
= 120 lbs of binder
(this is the liquid asphalt flow rate)

1.5% water injection rate
x 120 lbs of binder
= 1.8 lbs of water (per ton of mix)

The water eventually steams off the mix during delivery and lay-down, and you are left with the same rock and asphalt as if you'd manufactured using hot mix methods. ▲



Get the Keys to Stronger, Longer-lasting Intersections

The Asphalt Pavement Alliance published "High Performance Intersections," with tips for pavement design and construction to accommodate the additional stress imposed at intersections. The following 4-point strategy, shown by case studies to reduce maintenance and rehabilitation requirements, is detailed in the brochure that you can download free from the APAO website.

1. Assess the situation.
2. Ensure structural adequacy.
3. Select high-performance materials and confirm mix design.
4. Use proper construction techniques.

Find out more on how your intersections can go the distance. Download "High Performance Intersections" at www.apao.org/documents/HighPerformanceIntersectionsOregon.pdf.

MISSION STATEMENT

The Asphalt Pavement Association of Oregon, Inc., (APAO) is dedicated to promoting the use of asphalt concrete by developing customer driven programs to enhance quality and excellence in all aspects of asphalt technology. We believe that the key to growth and prosperity in the industry is continuous quality improvement obtained through active association membership, positive customer relationships, education, and training.

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For member contact information, visit www.apao.org and click the membership tab.

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Annual Conference Highlights Timely Topics

Mark Schoening, center, presents a first place paving award to Mark Bauer, left, of Baker Rock Resources and Todd Whitaker, right, of Polk County Public Works

THE 17TH ANNUAL OREGON ASPHALT Conference and 41st Annual Paving Awards were presented in Eugene on March 8, 2011.

One entire session of the conference was devoted to warm mix asphalt technology. **Dave Newcomb, P.E.** and vice-president of Research and Technology for the National Asphalt Paving Association, provided an overview of current research and performance indicators on warm mix asphalt at the national level.

Brian Oberding and **Greg Clemmons**, professional engineers with the City of Portland and Washington County – both of which are accepting warm mix asphalt from contractors – discussed where their organizations are headed with this technology. **Larry Ilg, P.E.** with the Oregon Department of Transportation, presented ODOT's position on warm mix asphalt and the outlook for permissive specification of warm mix by ODOT. Read more about advances in the adoption of warm mix technology in this issue of *Centerline*.

Another topic from the conference featured **Ron Sines, P.E.** and vice-president of Old Castle Materials, who presented "Best Practices for Use of Recycled Asphalt Shingles in Asphalt Pavement." Larry Ilg followed with a presentation on ODOT's research and planned specification for permitted use of these materials.

Another session covered "Thin Lift Overlays for Pavement Preservation," by **John Duval, P.E.** and principal of Duval Engineering. **Todd Whitaker, P.E.** and Polk County engineer, detailed his experience with thin lift overlays following several successful projects in his jurisdiction *(see related article on page 4)*. **John Coplantz, P.E.** and ODOT pavement management engineer shared ODOT's position on thin lift overlays as well.

The conference also featured presentations by **Terry Humphrey** on a SuperPave compaction study, and "Predicting and Achieving Optimum Pavement Smoothness Results with IRI (International Roughness Index) Specifications."

The conference concluded by 4pm with the 41st Annual Paving Awards presented that evening. Award-winning projects are listed below. For more information on the Paving Awards, including criteria and nomination information, visit www.apao.org. ▲

State Highway – High Volume

First: I-5: Tualatin River - Willamette River Bridge Section
Contractor: Knife River - Northwest
Agency: ODOT, Region 1

Second: I-84: Rufus - Swanson Canyon
MP 110.46 to 125.6
Contractor: Oregon Mainline Paving
Agency: ODOT, Region 4, District 9

Third: US 97: Lava Butte - S Century Dr
MP 149.24 to 153.03
Contractor: Knife River - Central Oregon
Agency: ODOT, Region 4, District 10

State Highway – Low Volume

First: Dillard Hwy/CR#387
MP 0.71 to 5.85
Contractor: Knife River - Roseburg
Agency: ODOT, Region 3

Second: Spencer Creek Bridge
Contractor: Road & Driveway
Agency: ODOT, Region 2

Third: OR 224: Deep Creek - Eagle Creek
MP 13.92 to 17.92
Contractor: Oregon Mainline Paving
Agency: ODOT Region 1

Special Project

First: 2010 Pathways Reconstruction - Sunriver
Contractor: Hooker Creek Companies
Agency: Sunriver Owners Association

Second: Guenter Driveway - Salem
Contractor: H&H Paving

Third: Springwater Corridor Trail Repaving Project
Contractor: Lakeside Industries
Agency: Portland Parks & Recreation

Commercial/Industrial

First: Eugene Airport Runway 16R/34L Rehab
Contractor: Wildish Construction
Agency: City of Eugene

Second: Portland International Airport - North Runway Extension Phase 2
Contractor: Lakeside Industries
Agency: Port of Portland

Third: Costco Parking Lot - Roseburg
Contractor: Knife River Materials

Smoothness

First: I-5: Halsey - Lane County Line
MP 215.14 to 203.55
Contractor: Wildish Construction
Agency: ODOT, Region 2, District 4

Second: I-5: Tualatin River - Willamette River Bridge Section
Contractor: Knife River - Northwest
Agency: ODOT, Region 1

Third: I-84: Rufus - Swanson Canyon
MP 110.46 to 125.6
Contractor: Oregon Mainline Paving
Agency: ODOT, Region 4, District 9

Urban Arterial

First: Kane Drive - NE Division St to SE Powell Valley Rd
Contractor: Knife River - Northwest
Agency: City of Gresham

Second: Pioneer Pkwy & Harlow/Hayden Br Rd
Contractor: Wildish Construction
Agency: Lane County

Third: Myrtlewood & Pepperwood Reconstruction
Contractor: Knife River Materials
Agency: Klamath County PWD

Urban Street

First: 2010 Street Resurfacing Project - Salem
Contractor: North Santiam Paving
Agency: City of Salem PWD

Second: NW Sellers Rd at NW Banks Rd Intersection
Contractor: Baker Rock Resources
Agency: Washington County

Third: Sherman Ave
Newmark St - City Limits
Contractor: Knife River Materials
Agency: David Evans & Associates

Rural Road

First: Polk County Overlays - Andrea St to end of Maple St
Contractor: Baker Rock Resources West
Agency: Polk County PWD

Second: Shoreview Dr Overlay - Lane County
MP 0.00 to MP 6.526
Contractor: Eugene Sand Construction
Agency: Lane County PWD

Third: Wakonda Beach/Crestline Dr Overlay
Hwy 101 to SW Range Dr
Contractor: Road & Driveway
Agency: Lincoln County PWD

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IN THE FIELD

Thin-Lift Overlays Getting It Done in Polk County

"We were always big on chip seals for maintenance," said **Todd Whitaker**, director of Polk County Public Works. "But ODOT's crews that usually did the work were not available to us any longer, so we had to do something different – either go to public bid for a chip seal crew or revisit the concept of thin-lift overlays, which is something we'd been exploring," he explained.

Polk County asphalt maintenance work has been contracted out as a means to improve efficiency through lower payroll and elimination of equipment-related expenses from the budget. "It's a lean operation, but they have some of the best roads in the state," said **Jim Huddleston**, who credits the late **Polk County Commissioner Mike Propes** as a champion for the shift to contract maintenance.

"We think thin-lift overlay technology has real promise," Whitaker said. The County selected several roads for thin-lift overlay treatments – all with a mix of traffic volume, condition and location variables. "We weren't trying to fix roads that were structurally degraded, but to get a feel for what works and where," he explained.

Baker Rock performed the thin-lift overlays for Polk County, and has done them for Washington County as well. "All of the Polk County roads were in pretty good shape," said **Mark Bauer** of Baker Rock Resources. "These were preventive measures more than repair projects," he said.

Thin-lift overlays provide many benefits over chip or slurry seal treatments. They add structure to the pavement, provide a new wearing surface and better fuel mileage, generate less road noise, and are more attractive visually. The initial cost is often higher than other maintenance treatments, but given that thin-lift overlays may last two to three times longer than slurry or micro seals, the lifecycle cost can be much more economical.

"Our cost was about twice what a chip seal would cost," Whitaker said, "but we're going to get longer life and better acceptance (of road quality) from the public," he explained.

Centerline featured a Washington County thin-lift overlay last year that was installed on Murray Boulevard in front of the Nike campus. At initial construction, the overlay was expected to last seven years. Last year, it had already performed well for almost ten years, and the County projected another five years or more of mileage from the project.

One of the Polk County thin-lift overlays earned a paving award from APAO at the 41st Annual Paving Awards presented March 8. The project was selected for first place in the rural road category. ▲