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Wirtgen TECHNOLOGY

SPRING 2003

SPECIAL REPORT: Base Stabilization

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On the Cover: *Farm road is foamed asphalt-stabilized with WR 3000 in Solano County, Calif.; see article page 9.*

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As I see it...

A World Of Foamed Asphalt

A year ago this space reported on how foamed asphalt — as placed using the Wirtgen WR 2500 Recycler — was garnering attention and winning fans from coast-to-coast in North America.

In that issue (Winter 2002, available from http://www.wirtgen-group.com) we noted how foamed asphalt was being used successfully from California to Maine, and from Canada to Louisiana.

What we didn't say is that foamed asphalt — or expanded or foamed bitumen, as they like to say overseas — has proven itself time and again around the world, in every type of climate and under nearly every circumstance.

This was brought home to us at an international conference on road recycling and stabilization, sponsored by Wirtgen Group, which drew over 800 contractors and engineers from around the world in September to Wirtgen Group headquarters in Germany.

There, delegates heard technical presentations and saw field demonstrations on foamed asphalt, cold in-place road stabilization, and other recycling themes. Several new Wirtgen products for stabilization were debuted (see related article in this issue).

Principle Not New

The principle of foamed asphalt isn't new. What's new is the utilization of this innovative process for the production of cold-stabilized based material in road construction.

Foamed asphalt is created by carefully injecting a predetermined amount of cold water into hot penetration-grade asphalt in the mixing chamber of a pavement remixing unit, and offers a cost-effective alternate for road base stabilization.

Since the end of the 1980s, Wirtgen has been a major player in development of foamed asphalt (bitumen) technology, in which foamed hot asphalt is used to stabilize and improve existing road materials, producing highest quality base courses and cold mixes at lowest cost.

These materials can be processed in-place by milling and crushing the existing pavement structure — while incorporating foamed asphalt — using the WR 2500 or WR 3000 Recyclers from Wirtgen, or plant-mixed off-site using the Wirtgen KMA 150. Precise addition of water allows control of the rate of asphalt expansion and the amount of expansion.

The expanded asphalt has a resulting high surface area available for bonding with the aggregate, leading to a stable road base using the existing in-place materials. The benefit is substantial cost savings over use of asphalt emulsions for base stabilization, and complete elimination of the cure or "break" period. The foamed base then is graded and compacted, and can permit traffic — including heavy trucks — almost immediately.

Experience Overseas

South Africa, Norway and the Baltic Republics have the most experience with foamed asphalt. It's popular in The Netherlands. In Norway, it's been used since 1983. It's been used throughout Africa and in western and eastern provinces in Canada. And it's found a place in Australia, where researchers used a WR 2500 to place foamed asphalt, and a Wirtgen WLB 10 foamed asphalt lab to test mixes.

"The use of foamed bitumen is growing in popularity and general acceptance both in Queensland and throughout the world as a result of recent research and extensive trials," wrote authors Kendall, Baker, Evans and Ramanujan in *Foamed Bitumen Stabilisation: the Queensland Experience* (20th Australian Road Research Board Conference, March 2001).

"Rehabilitation using foamed bitumen has proved to be successful because of its ease and speed of construction, its compatibility with a wide range of aggregate types, and its relative immunity to the effects of weather," they wrote. "Foamed bitumen has the potential to be used throughout Queensland and provides another useful tool for the rehabilitation of heavily trafficked thin high plasticity pavements."

In Canada

At January's Transportation Research Board (TRB) meeting in Washington, Ontario Ministry of Transportation researchers Becca Lane, P. Eng., and Tom Kazmierowski, P. Eng., reported on the success of foamed asphalt being used on the Trans-Canada Highway in a peer-reviewed paper. This project was covered in *Wirtgen Technology's* Winter 2002 issue.

Yet another technical paper described Louisiana's experience with making foamed asphalt with yet another option, Wirtgen's KMA 150 mixing plant, described in this issue.

Foamed asphalt can work for you, too. Please allow us to show you how.

S W Murray

Stu Murray
President
Wirtgen America Inc.

TEA-3: Your Livelihood At Stake

AAA Foundation for Traffic Safety

There's a major challenge to road builders and owners in the United States this year: Reauthorization of the federal surface transportation program. And if you're a road builder, a road owner, or a citizen motorist, you have a lot at stake.

The existing federal law — the Transportation Equity Act for the 21st Century, or TEA-21 — expires Sept. 30 after six years of phenomenal growth in federal highway spending. Over the duration of the act, federal investment in highways and transit rose nearly 40 percent: highways were guaranteed at $171 billion and transit at $36 billion.

The successor bill, now dubbed TEA-3, must be enacted by Oct. 1 or else federal surface transportation funding will be seriously disrupted.

In the meantime, the pressure is on to limit surface transportation expenditures even as traffic volume rises.

In the face of enormous federal budget deficits as a result of the economic slowdown, and the new, burgeoning demands of national defense and homeland security, some budget cutters are looking at surface transportation to tighten its belt after years of growth.

At press time, members of the House and Senate agreed on a $31.6 billion highway investment level for fiscal year 2003, and President Bush later signed the compromise appropriations bill. The industry succeeded in an uphill battle to preserve TEA-21 spending levels in the face of budget restraints.

Administration Relents On Cuts

Now for some more good news: In early February, the Bush administration proposed $30.2 billion for highways for FY 2004, out of an overall $54.3 billion for the entire U.S. Department of Transportation.

The proposal includes a highway obligation ceiling of $29.3 billion, including a short-term stimulus program of $1 billion for ready-to-go projects. If put together with other federal funding outside the obligation ceiling, some $939 million, the total highway program is proposed at $30.2 billion.

This is very close to FY 2002's $31.8 billion obligation ceiling, and a real victory, considering the administration had attempted to set a FY 2003 ceiling of $27.7 billion, down $4 billion from the previous year.

As an economic tonic, the proposed additional $1 billion from the Highway Trust Fund balance would fund ready-to-go projects that can create 42,000 jobs nationwide. That funding would have to be obligated by states within six months, or would be reallocated to other states.

Just as good, the Bush administration wants revenue from the 2.5 cent per gallon tax on gasohol sales that now goes to the General Fund to be deposited in the Highway Trust Fund, long a top industry priority. The administration estimates that could generate an average $600 million annually.

But the gasohol exemption, as it's called, has proved politically bulletproof, because alcohol used in gasohol is produced from corn, and Iowa is a big corn state. And since Iowa holds the first primary election of the presidential election season, politicians wanting that first win in Iowa climb over themselves to pledge support for the gasohol exemption.

Bush Administration's Plans

The Bush administration's FY 2004 budget proposal (described above) includes the first year of TEA-3, so it's an indicator of TEA-3 content.

But a list of talking points for the FY 2004 budget release obtained by the American Association of State Highway & Transportation Officials (AASHTO) indicates the administration will recommend:

- The "highest possible funding for investment in our country's transportation infrastructure, constrained only by the resources available."
- No new user fees (federal gas tax increases).
- Retaining and refining guaranteed funding.

Interstate highway work will suffer if federal program is not reauthorized by Oct. 1

- Linking highway spending to highway account receipts, while retaining TEA-21's revenue-aligned budget authority (RABA) feature. During the late 1990s, when gas tax revenues were well ahead of early estimates, RABA made sure surplus gas tax funds went to the highway program, and not to general expenditures.
- Increasing spending flexibility for state and local authorities, and
- Implementing environmental streamlining, which will let important construction projects move forward through efficient but effective environmental review. For too long, environmental laws have been abused by those who would obstruct essential public works projects year after year.

Needs Eclipse Bush Proposal

As agreeable as the Bush administration plan appears to be, it appears it still won't address the tremendous backlog of work that must be done to address road deterioration, and relieve congestion.

"While this budget is a good place to start," said AASHTO executive director John Horsley, "[only] months ago the [Federal Highway Administration] testified that $76 billion is needed annually just to maintain our current highway system. If you apply the traditional [federal/state] share then some $35 billion in federal funding would be required."

As a result, AASHTO has called for Congress to ramp up federal highway spending over six years from $34 billion to at least $45 billion per annum. This would supplement state spending, now under pressure.

Industry Eyes Even Higher Ceilings

While AASHTO — which represents state DOTs in Washington — is supporting a minimum $45 billion program, industry lobbying groups such as the American Road & Transportation Builders Association (ARTBA) and the Associated General Contractors (AGC) say much more is possible, albeit not without a gas tax increase.

And some powerful legislators agree, raising the stakes and giving roadbuilders hope that TEA-3 will be the windfall that TEA-21 was.

They feel annual federal surface transportation expenditures in the range of $40 billion to $50 billion are not out of the question. In summer 2002, elected officials, state governors and DOTs, and private sector leaders agreed that lots more money — perhaps as much as $50 billion a year — needs and can be part of the next surface transportation bill.

And even more money — perhaps $60 billion by FY 2009 — is possible, as ARTBA demonstrated at a July 16 House subcommittee hearing on the long-term viability of fuel taxes for needed Highway Trust Fund revenues.

There, industry leaders said that as the nation begins to move away from petroleum-based vehicles — toward ethanol and renewable-fueled conveyances — the gas excise tax-based foundation of our Highway Trust Fund is going to have to evolve as well, or else surface transportation funding will be profoundly shortchanged. A new plan is needed.

This issue has become more acute after President Bush, in his January state of the union address, proposed a national initiative to develop a hydrogen-fueled passenger car.

In July, at a House subcommittee hearing, ARTBA president Pete Ruane testified that more efficient cash management of the Highway Trust Fund — along with small annual increases in the federal motor fuels excise taxes of two cents or less per year — could result in incremental increases to a $60 billion/year program by 2009. That virtually would double the record $32 billion federal investment this year under the existing TEA-21 legislation.

AGC noted this is equivalent to a 12-cent federal gas tax increase over six years, phased in with 2 cent increases each year.

"Two cents makes sense," Ruane said. "The reality is without a new or expanded revenue stream, the purchasing power of the federal highway program will be less in 2009 than it is this year. It boils down to a question of political will and doing things more efficiently."

Support There For Increase

In Sept. 19 testimony before the House Highways & Transit Subcommittee, ARTBA Chairman Tom Hill said the association's vision for the scheduled 2003 TEA-21 reauthorization is centered on three goals, each of which addresses a public hot button:

- **Safety,** via cutting the number of deaths and injuries on America's highways between 2004 and 2009 through targeted capital investments.
- **Congestion,** via ensuring that traffic congestion for the American public and business community does not get materially worse between now and 2009; and
- **Economy,** in that higher funding levels will make sure the physical condition of federally-aided highways, bridges and transit systems at least remain the same through the duration of TEA-3, so that American businesses can continue to improve their productivity.

"These goals can only be achieved if the capital investments necessary to maintain existing system conditions and performance are provided," Hill, chief executive officer of Washington, D.C.-based Oldcastle Materials, Inc., the nation's largest highway materials and asphalt pavement firm, told the subcommittee.

Petri Wants Up To $50 Billion

Since last summer, at numerous venues, House Highways and Transit Subcommittee chair Rep. Thomas Petri (R-Wis.) has called for an annual highway and bridge program of $40 billion to $50 billion.

To finance this high level of funding he said he'd consider a gas tax increase or indexing the tax to inflation, or other means, to boost income to the Highway Trust Fund. That's needed because, Petri said, the current federal 18.4-cent per gallon gas tax drop to 13.5 cents in real purchasing power by the end of the next reauthorization cycle, due to inflation.

At a G.O.P. conference at press time in February, House Transportation and Infrastructure Committee Chairman Don Young (R-Alaska) outlined his proposal that would grow the highway program in no little way — to $60 billion by 2009 — through gas tax indexing. There, Petri reiterated his support for gas tax indexing.

And in January, Senate Environment and Public Works chairman James Imhofe (R-Okla.) spoke in favor of enhancing highway revenue by indexing the gas tax to inflation, in lieu of an outright tax increase.

Legislators like Petri, Young and Imhofe — and our lobbyists in Washington — will need the support of the industry as they fight on behalf of highway users everywhere. We hope that you will use this Special Report to familiarize yourself on the funding issues that will impact our industry — favorably or unfavorably — through the end of the decade ... and put your knowledge to work.

How To Personally Influence The Debate

There are time-proven ways to get your message across to your senator, representative and White House as TEA-3 unfolds in 2003.

- **Letter-writing.** Letter-writing is the classic way to stand up and be counted! Write your legislators and urge them to support higher funding levels in TEA-3. While faxes, e-mails and phone calls count as well, nothing is quite like a single-sheet personal letter, signed in ink, for creating an Inside-the-Beltway "feelie" that can't be easily disregarded.
- **Participate in fly-ins.** Many industry associations sponsor seasonal fly-ins, or fly-ins for important votes. Typically these begin with a breakfast orientation, followed by Capitol Hill visits to legislators, then debriefing and reception, often featuring political luminaries.
- **Visit local offices.** Visit your legislators, or their aides, in their home district offices. Try it during congressional recesses; you may meet them personally. August 2003 will be a critical time, as TEA-21 expires Sept. 30, and historically program reauthorization comes down to the wire.
- **Host a hometown visit.** Similarly, you can make a big impression with your legislator and employees. When he or she is in town, host a legislator at your office, plant or job site for early doughnuts and coffee, or catered lunch. Let him or her meet your employees, and understand how their extended family and friends — indeed, the local economy — depend on continued road construction and maintenance.
- **Participate and contribute.** Legislators listen to voters, and they listen even more to contributors. Your contribution signifies your seriousness and the importance of the topic you favor. You're not "buying influence", but participating in the political process, a time-honored American tradition.

Rural California Road Benefits From Foamed Asphalt

Wirtgen WR 3000 foams Calif. 220 in Solano County

"Cold foam seems to have the ability to build a road from bottom-up, in a timely manner, and has very little impact on traffic."

In the famous Delta region of California's San Joaquin Valley, where the California Delta sprawls across 738,000 acres of prime agricultural land south of the state capital, farm roads are built on an excavated alluvium that just won't stay in place.

The roads are subject to baking hot weather and drenching cold Pacific rain storms in winter, and agricultural trucks that often are well overloaded. Road driving surfaces heave, shift and collapse.

Sounds like a job for foamed asphalt, a dedicated contractor, and the Wirtgen WR 3000.

With its 10-foot-wide drum, the WR 3000 is big brother to the more common WR 2500 with 8-foot-wide drum. However, the equipment platform is the same, and the only difference between the two models is the width of the drum and the mechanics and hydraulics that serve it.

Agricultural Lowlands

The California Delta is a network of 1,000 miles of rivers, tributaries and channels located south of Sacramento. Much of the land is large islands that sit below sea level, protected by levees, isolated by streams and canals fed by five major rivers, including the Sacramento and the San Joaquin rivers.

Water is such a part of delta like that folks refer to the roads and highways as "asphalt sloughs".

One such "asphalt slough" is California 220, a blacktop road which last year was nearing complete failure. In fall 2002, a 3.1-mile length of the road in Solano County was completely rebuilt by Western Stabilization Inc., Dixon, Calif., using foamed asphalt applied by a Wirtgen WR 3000.

The road suffered from longitudinal cracks, with cross-slope anywhere from 3 to 5 percent. Existing asphalt had been placed in depths from 6 to 18 inches. And while traffic is very light, heavy agricultural loads do their damage. Corings indicated not much base below the pavement.

The road was being stabilized 6 inches deep, except where roadway "whoop-dee-doos" — base failure-related "roller-coaster" waves in the pavement — were present. Those were being stabilized to a depth of 10 inches, which would allow more material for a motor grader operator to smooth out voids and take out humps.

'Cold Foaming' Prolongs Life

"If we had done conventional reconstruction on this road, and dig-outs, we'd end up with a very, very limited life," said Caltrans North Region materials engineer Joseph F. Peterson, P.E. "By cold foaming to a depth of 6 inches, and placing a chip seal as the wear course, we're going to add 5 to 10

Pavement is reclaimed and foamed in one pass

Big WR 3000 has 10-foot drum width

years of life to the roadway."

Caltrans' foamed asphalt mix design called for 2.25 percent liquid asphalt, and 1 percent cement. The cement was required because of the lack of base material and minus 200 material, as investigations indicated. Also, water for compaction was being added to the mix at a rate of 1.5 to 2.5 percent, depending on weather conditions. The water also was serving to activate the cement.

The road was being treated in two passes, with the initial foamed surface compacted with a sheepsfoot roller, then rough-graded, compacted with smooth roller, and fine grading, all without stakes required. A rubberized chip seal was to be placed as a driving surface.

As always with foamed asphalt stabilization, a mix design using actual materials from the job site must be developed prior to construction. The best tool for this is the Wirtgen portable WLB 10 foamed asphalt lab. Western's consultant owns a WLB 10, and so does Caltrans.

"Right now we have a lot of roads that are highly distressed, and given our high traffic loads, we need a methodology to rebuild our roads quickly and with minimum impact," said Caltrans' Peterson. "Cold foam seems to have the ability to build a road from the bottom-up, in a timely manner, and has very little impact on traffic."

And that was borne out on California 220. "This cold-foamed asphalt process will take us four working days to rebuild from bottom-up at a depth of 6 inches," Peterson said. "We'll put a chip seal on top and that will take another two days, so in effect we've rebuilt the roadway in six days. If we were to do this conventionally, we'd be out here for 30 to 60 days."

Still, the route 220 job is a pilot project as Caltrans studies the efficacy of foamed asphalt in different climates. "We're evaluating the cold foam under different conditions," Peterson said in late fall 2002. "We've used it in a valley environment in which there are wild temperature swings, and we just completed 20 lane miles in snow country near Truckee, so we can see how it behaves under freeze-thaw conditions. And now we're trying it here in the delta as a maintenance strategy, so we can see if we can rebuild the roadways very economically and quickly."

Contractor Spreading Word

The California 220 project also served to introduce local government agency personnel — and Caltrans engineers from other parts of the state — to the foamed asphalt process.

"We've had visitors from different cities and counties, and from the University of California-Berkeley," said Paul Jones, foamed asphalt business development manager, Western Stabilization. "I'm spreading the word on foamed asphalt and bringing individuals to view the job on-site, rather than hear about it in the office. It can open a lot of doors for us.

"We're able to work without road closures, and provide a road that will meet all criteria for less money, less time and with less environmental impact than conventional construction," Jones said. "That's because we're not trucking aggregate in and out, but using the existing material in-place."

And the Wirtgen WR 3000 is doing the job for Western Stabilization and its clients. "The Wirtgen surely is the machine of choice," Jones said. "Some of our competitors have what I would call inferior machines. Whether it's the computer controls, computerized addition of foam by the rate of travel, or other features, the Wirtgen series meets California specs."

Western Stabilization has foamed more than just roads. For an environmental firm, Western Stabilization built multi-acre organic composting pads out of asphalt-foamed crushed demolition concrete. The concrete was trucked in, distributed, and Western foamed the concrete in-place into two, 2-acre slabs, which then were sealed. "The only alternative was to build pads out of concrete, so we were able to give them the same outcome for a quarter of the cost and time," Jones said.

Settling On Wirtgen Platform

"We recycle, we do lime stabilization, and in addition to the recyclers we've got four cold planers, including two Wirtgens," said Dick Stuart, general manager. "For the foamed asphalt side, our business development work is critical, because the learning curve is so steep for customers. We have to create a demand."

Western Stabilization owns three WR models, one WR 2500, and two WR 3000s. One of the 3000s is not fitted for foamed asphalt and works as a straight recycler. The firm also owns a Wirtgen 1900 DC cold mill it purchased in 1992, and which is reputed to be among the first in North America. It has some 14,000 hours on it. Western also owns a W 1200 F mill.

"We've settled 100 percent on a Wirtgen platform for foamed asphalt stabilization and recyclers," Stuart said. "Their production capability is boosted by their ability to put horsepower into the grade. We've owned recyclers that produced more raw horsepower, but they were not as efficient as Wirtgen for putting that power into the grade. Horsepower isn't the only issue; there's the matter of efficiency."

Western bought the WR 3000 for its added width. "We had a water resources job in which we were developing an 18-foot-wide road," Stuart said. "Like California 220, which is an 18-foot road, in two passes we were done. With the 8-foot machine, there's no avoiding three passes."

Wirtgen Moves With Market

"Wirtgen has taken control and moved with the market," said Jeff Warren, Western's asphalt recycling division manager. "The Wirtgen products are outstanding. We're getting production rates that far surpass our other brand in any and all cases. The gradations and pulverizing are better."

Post-purchase support also means a lot to Western. "Wirtgen's Mike Marshall held our hand every step of the way, for the first year, and for demonstrations we've had since then," Stuart said. "They've been excellent in terms of equipment support, and on necessary process technical support."

Western also works closely with its dealer, Nixon-Egli Equipment Co., Tracy, Calif., to keep the Wirtgen products at work on the job. "Their shop foreman, Shawn Keefe, is johnny-on-the-spot, and not only comes through for us in maintenance, but is an effective advocate for us as a customer with Wirtgen," Stuart said. "If we have an issue, he's on our side."

While Western pursues the big fish, it hasn't forgotten the smaller local governments, which form a major part of its foamed asphalt stabilization work, Western's Stuart said. "Smaller jurisdictions may be able to put a project together within its maintenance budget, as opposed to new construction," he said. "They also tend to be squeezed the hardest financially, so they're looking for the most economic way to improve their roads, and foamed asphalt stabilization has proven to be a very economical solution."

More information about contractor Western Stabilization is available at http://www.wstabilization.com.

Western Stabilization still uses one of first 1900 DC machines in North America

The WR 2500 And WR 3000 And Foamed Asphalt

"Foamed" or "expanded" asphalt is a road base recycling process relatively new to the United States. With foamed asphalt, a stabilized road base is created by carefully injecting a predetermined amount of cold water into hot penetration-grade asphalt in the mixing chamber of a pavement remixing unit, such as the Wirtgen WR 2500 with 8-foot-drum, or its larger version with 10-foot-drum, the WR 3000.

When a Wirtgen WR 2500 or WR 3000 recycler equipped for foam asphalt is used to make a foamed asphalt-stabilized base, a high-surface-area asphalt froth is created by precisely injecting cold water into hot liquid asphalt as it enters the machine's mixing chamber.

There, air bubbles in the expanded liquid asphalt froth act as the carrier of liquid asphalt to fines in a reclaimed asphalt pavement (RAP) aggregate mix. While expanded asphalt doesn't completely coat all aggregate surfaces, it does form a mortar or glue which bonds the particles together.

In less than 15 seconds the froth subsides and the dispersion of asphalt is achieved, eliminating time waiting for the "break" required when expensive asphalt emulsions are used. The technology also sidesteps use of costly cutback solvents. The liquid asphalt cement is pure, with nothing added to it to change its properties. That makes it more economical to use than emulsions, which are processed oils.

Following mixing of base materials with the liquid asphalt froth, a large rubber-tired compactor performs breakdown rolling right behind the remixer, prior to initial grading of the road using a motor grader. The final compaction in the high 90s is achieved by a steel-wheeled roller following the grader.

The WR 2500 and WR 3000 also can perform base recycling with emulsions where appropriate, base pulverizing only, or even volumetrically controlled soil or base stabilization using lime or cement in dry or slurry form.

Cold Recycling Plant Offers Option For Foamed Asphalt

KMA 150 produces foam-stabilized base for Louisiana U.S. 190 project

The Wirtgen WR 2500 is synonymous with creation of foamed asphalt-stabilized road bases from existing, degraded asphalt roads.

But other options exist, especially when preparing stabilized base for more substantial, less time-critical construction, such as for a portland cement concrete (PCC) pavement.

In those circumstances, the Wirtgen KMA 150 offers a portable plant option to making foamed asphalt at a central, fixed location, without EPA permits, as Louisiana researchers learned last year. In this field test, researchers from the Louisiana Transportation Research Center determined that foamed asphalt base could be used in lieu of lime-stabilized base with 8-inches of crushed limestone.

The use of foamed asphalt treated reclaimed asphalt pavement (RAP) mixtures is very promising, and can be used as an alternative to the traditional limestone base under portland cement concrete, wrote Louay N. Mohammad, Ph.D., Murad Y. Abu-Farsakh, Ph.D., P.E., Zhong Wu, Ph.D., and Chris Abadie, P.E., in their paper, *Louisiana Experience with Foamed Recycled Asphalt Pavement Base Materials*.

At the January 2003 Transportation Research Board meeting in Washington, the authors described Louisiana's use of existing recyclable materials as a key to more efficient and economical highway construction. "The use of foamed asphalt technique to stabilize [RAP] is one strategy for an efficient use of salvage construction materials," they wrote.

The Louisiana Transportation Research Center experimented with alternative uses of RAP during the recent reconstruction of U.S. 190 near Baton Rouge. The continuously reinforced concrete pavement design called for a lime-treated subbase and 8 inches of stone base.

"RAP by itself is not a qualified base material as its strength is not comparable to other base materials traditionally specified, especially stone," the authors wrote. Test sections were placed to determine how would the actual strength of the foamed RAP compare to stone.

The Louisiana researchers generally followed the *Wirtgen Cold Recycling Manual*. In this study, the optimum water injection rate was found to be 2.75 percent with the PG 58-28 binder at 160 deg C (320 deg F). A Wirtgen WLB 10 laboratory unit was used to foam the bitumen and mix the RAP materials with foamed asphalt.

A performance-graded, Superpave-style asphalt cement, PG 58-28, was used. The asphalt temperature for laboratory mix was 160 deg C, as was the minimum temperature required of transport on delivery at the field site.

Both materials had 100 percent passing the 37.5 mm (1.5-inch) sieve, and had less than 3 percent fines. Two foamed asphalt-treated RAP mixtures were studied, one of 100 percent RAP, the other 75

Louisiana tests show foamed asphalt base has higher stiffness than limestone base layer

At Lousiana U.S. 190 foamed asphalt project, RAP is fed to screen and crusher prior to entering KMA 150 plant; cement is fed from trailer (center); liquid asphalt is fed from tanker at right of cement trailer; and foamed asphalt base is conveyed to haul truck. Background, center is crushed, reclaimed concrete stockpile; at right is RAP stockpile.

Wirtgen KMA 150 is emissions-free cold recycling plant

percent RAP and 25 percent crushed concrete mixture from the existing roadway.

After testing, two field test sections of foamed asphalt RAP base were constructed on U.S. 190 beginning Jan. 23, 2002. The Wirtgen KMA 150 pug mill mixer was used to mix the RAP with foamed bitumen and cement. A scalping/screening unit was placed ahead of the pug mill to insure the proper gradation of the RAP (100 percent passing 1 inch required).

The researchers concluded:

- Foamed asphalt-treated RAP materials showed higher in-situ stiffness values and structure numbers than those of a limestone base layer, according to the field test results, although this evaluation was made at the construction stage
- There is no significant difference existing in the measured field strength/stiffness between the foamed asphalt base with 100 percent RAP materials and with the 75 percent RAP/25 percent crushed concrete.
- The addition of 1.5 percent of portland cement in the foamed asphalt mixture design resulted in a contribution to strengths among soaked samples. Also, as the curing period increased, the layer stiffness values and structure numbers of the foamed asphalt bases are also significantly increased.
- The economic analysis showed that the foamed asphalt treated RAP base had a similar construction unit price as the limestone base in this study.

"Together with the better structure properties described above and the significant contribution to the public environment of using salvage materials, the foamed asphalt treated RAP base is one of best alternatives in lieu of limestone base when RAP materials are readily available," they said.

Abadie later concluded that foamed RAP is an acceptable base material and should be considered for use as a standard base, but that it's not suitable for a wearing surface, and must be well drained as foamed RAP will lose cohesion and strength when loading occurs in moist conditions.

More information on this project is available at http://www.fhwa.dot.gov/pavement/foamrap.htm.

About the KMA 150

The KMA 150 portable cold mixing plant from Wirtgen will mix 150 tph of cold mix asphalt, without emissions and without requiring any EPA permits.

The KMA 150 is a highly mobile, 150-tph plant which is capable of making several types of high-quality, high-strength asphalt blend products. All virgin materials can be processed using emulsions or foamed asphalt. These mixes can incorporate lime, cement, polymer additives, fly ash and other materials to enhance strength and performance.

Up to 80 percent RAP and 20 percent crusher dust can be processed through the large, heavy-duty, twin-shaft pug mill, then treated with 2 to 3 percent foamed asphalt and 2 percent portland cement for strength enhancement.

The plant's mobility permits cold processing of source materials, as well as RAP. All the cost-effectiveness of the mobile in-place mixer is now available in an easy-to-move, easy-to-operate central plant.

Liquid emulsions or paving grade asphalt cement are trucked to the job via tank trailers. Because no heating is required, the mixing plant is emission-free. Wirtgen's unique system provides a cold mix asphalt product that can be manufactured with the structural value equal to, or greater than, hot mix asphalt base, produced at 30 to 50 percent less cost, and without complex, costly problems related to site location and permitting currently experienced in the hot mix industry.

World Travels To Wirtgen Group 'Recycling Days'

Contingent of North American contractors attended Recycling Days in September

More than 800 road construction experts from all around the world — including the United States, Asia, Africa and Europe — came to Wirtgen Group territory in September for the first Wirtgen Recycling Days.

At this combination product roll-out, field demonstration and technical symposium, the road contractors, engineers and technicians heard seven expert speakers from four countries, visited Wirtgen Group manufacturing plants, and saw impressive machine demonstrations of Wirtgen, Hamm and Vögele products.

But most important, they got a hands-on technical and practical overview of economical cold and hot road recycling technologies, as pioneered by Wirtgen, the world's leader in recycling equipment.

Several cold recyclers, a hot recycling train, Vögele pavers, and Hamm rollers demonstrated the pioneering role of the Wirtgen Group in modern road recycling and paving.

Recycling Days on Sept. 13 and 14 followed a successful Mining Event in May 2002, at which Wirtgen's four surface miners and mine dinting machine were spotlighted to potential customers.

It followed that an expert symposium should offer customers and interested visitors — whether from research, administration, or operating companies of the industry — a similar platform for the exchange of information and experiences in road recycling.

Three New Machines

International visitors examined three new machines from the cold recycling product line making their debut during Recycling Days.

- The new **WR 4200** cold recycler has a total weight of 82 short tons (75 metric tonnes), providing cold recycling with a continually adjustable working width from 9.2 feet (2.80 m) to an impressive 13.7 feet (4.20 m), along with classic Wirtgen know-how in machine and control engineering.
- The new **WR 2500 S** — in which the "S" stands for Super — is a beefed-up version of the pioneering WR 2500, and garnered much attention. The WR 2500 S features 10 percent more engine power, and optimized features in almost all functions, to make it the new "flagship" among the Wirtgen recyclers.
- And the new **KMA 200** mobile cold recycling mixing plant boosts the capacity available with the existing KMA 150, featured in this issue (see *Cold Recycling Plant Offers Option For Foamed Asphalt*, page 12).

The delegates witnessed the KMA 200 produce high-quality cold mix from reclaimed asphalt pavement (RAP) and foamed asphalt quickly and cleanly. The material then was transported to a nearby

"With Recycling Days, Wirtgen Group provided a much-needed platform for road recycling technology transfer from experts from all parts of the world. It's part of the way that Wirtgen does business."

Visitors to Recycling Days view new WR 4200 cold recycler, 2200CR cold recycling/cold milling machine based on W 2200 platform; and new WR 2500 S, based on WR 2500 platform

Vögele paver for placement. Accompanied by expert commentary, the cold mix was placed by the Vögele Super 1900 paver, and compacted by a Hamm HD 75 K.

Pre-construction testing of job site materials is essential for a successful foamed asphalt mix design, which is done efficiently with the easily transported Wirtgen WLB 10 foamed asphalt testing lab, which also was demonstrated.

Other products profiled were the new Wirtgen-built Model 350 mixer/stabilizer, based on the old Raco 350 platform; the all-new W 2200 with cold in-place/mixing package; an improved WM 1000 portable slurry mixer; and another look at the Wirtgen hot in-place Model 4500 Remixer.

The big American contingent toured the Wirtgen main plant at Windhagen, the new $25 million state-of-the-art Hamm Compaction Division design, manufacturing and assembly facility at Tirschenreuth (see related sidebar), and the Vögele paver manufacturing plant at Mannheim. All commented on what an amazing growth had taken place and that a new image for the Wirtgen Group name had been created.

Technical Symposium Featured

But the event had more than product unveilings, expert demonstrations, plant tours, and fine cuisine, because it was a technical symposium as well.

At the technical lectures, seven expert speakers from four different countries gave their perspectives in pavement recycling.

Presentations included

- *Recycling Technologies of the Future*, by Thorsten Fröbel, Wirtgen GmbH
- *Experience from the Application of the Cold Recycling Technology with Different Binding Agents*, by the ever-popular Dave Collings, AA Loudon & partners, South Africa
- *Deep In-Place Pavement Recycling in Thailand*, by Dr. Teeracharti Ruenkraiergsa, Road Research and Development Center, Thailand
- *Experience from the Application of Cold Recycling from a Local Authority's Point of View*, by Hugh Donovan, City of Edmonton, Alberta, Canada
- *Foamed Bitumen: Innovative Binding Agent for Modern Cold Recycling*, by Prof. Kim Jenkins, University of Stellenbosch, South Africa
- *Cold Recycling for the Rehabilitation of a Heavily Trafficked Road*, by Prof. Ernst Beussner, Germany, and
- *Rehabilitation of Pavements with Hot Recycling Technology*, by Georg Schmitt, Germany, which focused on the Wirtgen Remixer process.

What Is Foamed Asphalt?

Foamed asphalt is created by carefully injecting a predetermined amount of cold water into hot penetration-grade asphalt in the mixing chamber of a pavement remixing unit, and offers a cost-effective alternate for road base stabilization.

These materials can be processed in-place by milling and crushing the existing pavement structure — while incorporating foamed asphalt — using the mobile equipment like the WR 2500 Recycler from Wirtgen, or plant-mixed off-site using the Wirtgen KMA 150 cold mix plant. Precise addition of water allows control of the rate of asphalt expansion and the amount of expansion.

The expanded asphalt has a resulting high surface area available for bond-

ing with the aggregate, leading to a stable road base using the existing in-place materials. The benefit is substantial cost savings over use of asphalt emulsions for base stabilization, and complete elimination of the cure or "break" period. The foamed base then is graded and compacted, and can permit traffic — including heavy trucks — almost immediately.

A Much-Needed Platform

"We heard calls for a follow-up event even before the first had ended," said Stu Murray, president, Wirtgen America Inc. "With Recycling Days, Wirtgen Group provided a much-needed platform for road recycling technology transfer from experts from all parts of the world. It's part of the way that Wirtgen does business."

South Africa, Norway and the Baltic Republics have the most experience with foamed asphalt, Murray said, but its use is growing quickly in North America. "It's popular in The Netherlands," Murray said. "In Norway, it's been used since 1983. It's been used throughout Africa and in western and eastern provinces in Canada. And it's found a place in Australia, where researchers used a WR 2500 to placed foamed asphalt, and a Wirtgen WLB 10 foamed asphalt lab to test mixes.

"There are 26 foamed asphalt machines working from Alaska to Mexico, with many more to come," Murray said. "This is the fastest growing segment of the cold recycling business in North America, and we look forward to boosting our promotion of this technology."

Compactor is tested at expanded Hamm plant in Tirschenreuth, Germany

Hamm Factory Expansion Will Benefit U.S. Customers

The expansion and modernization of Hamm Compaction Division's world headquarters plant in Germany in 2002 is paying big dividends for customers of Hamm equipment in the United States.

Already one of the world's leading manufacturers of compaction equipment, Hamm is meeting increasing customer demand with the expansion of its Tirschenreuth, Germany facility. The $25 million expansion is providing increased capacity, faster order fulfillment, and improved product quality.

The plant has been expanded from 570,000 square feet to approximately 1.7 million square feet, on a 99-acre site with plenty of room for future expansion.

This now permits four simultaneous production lines, each 328 feet in length. For the first time, all areas of preassembly, assembly, finishing and testing are under one roof.

The massive expansion will provide a number of benefits to Hamm customers in North America.

"Because the expansion has doubled the plant's output capability, we'll be able to provide more timely deliveries of equipment to customers in North America," said Rich Enners, senior vice president, Hamm Compaction Division.

This is significant, as Hamm shipments to North American customers have increased at an annual rate of 22 percent since Hamm's acquisition by Wirtgen Group in 2000. North America alone represents half the world market for compaction equipment.

Also, quality of the final product will be enhanced, due to improved testing facilities prior to shipment. "It's now perhaps the most state-of-the-art assembly facility for compaction equipment in the world," Enners said. "An automated four-station test process built as part of the expansion will further ensure high quality product."

And the capacity improvement will bring long-term economies of scale to production of Hamm compactors, allowing Hamm to be even more price-competitive in the marketplace.

"The opening of this new facility underlines our commitment to ongoing product improvement, and is designed to match the growing demand for Hamm compaction equipment across the world," said Jurgen Wirtgen, Wirtgen GmbH. "This marks a major landmark in Wirtgen's history."

In North America, Hamm Compaction Division markets single-drum vibratory soil compactors; articulated double-drum vibratory and tandem combination vibratory asphalt compactors; pneumatic-tired asphalt compactors; and static three-wheel asphalt compactors.

Now headquartered in Nashville, Hamm Compaction Division complements Wirtgen Group's existing North American lines of Wirtgen asphalt recycling, milling and road construction equipment, and Vögele America Inc. asphalt pavers.

In Pennsylvania, Shaull's Service Inspires Loyalty

Formerly a roadbuilder, founder Walter H. Shaull established tradition of urgency of service that lives on through Ginannis and staff

A long-time, family-owned distributor in Pennsylvania is attempting to retain customers and win new ones through total commitment to customer service, no matter when, where or how it's needed.

Shaull Equipment & Supply Co. sells paving equipment, including the full line of Wirtgen milling machines, Hamm asphalt and soil compactors, and Vögele America asphalt pavers, all from Wirtgen Group. The firm also sells Gehl skid steer loaders and Stone small compactors.

And from its facilities in Lemoyne, Pa., across from downtown Harrisburg, and in Bakerstown, Pa., north of Pittsburgh, Shaull offers customers service 24 hours a day, seven days a week throughout the year.

Customers Addicted To Service

While this intensive focus on service is costly, customers remember it and find before long they can't do without it.

"Our business is based on service," said Les Ginanni, Sr., president, Shaull Equipment & Supply. "We have the best service in the country, and we wear it on our sleeve. I don't care where the machine is," Ginanni Sr. said. "We service what we sell, and that's the source of our power."

"Our philosophy is that we'd rather take care of a down customer than sell a new one, because that down customer will come back and repeat a purchase," said Les Ginanni, Jr., Shaull operations manager. "A new customer, on the other hand, may never return."

Loyalty is a two-way street, said Les Ginanni Jr., and customers have every right to expect the distributor to be easily available once the purchase is consummated. That's because the contractor customer is at the mercy of his or her machines, and the dealer must be there to make sure the machine does what it's supposed to do, that is, make money for its owner.

"They trust us enough to purchase product from us," Ginanni Jr. said. "We have to ensure they stay operational. You can buy steel, or a machine, anywhere. But a machine is productive only as long as it's operating. In our region our customer base works only nine months out of the year, so it's critical that those nine months be as productive as possible."

If keeping customers operating requires lending of a machine, or tearing a new machine apart to get parts, then Shaull will do it. "If those parts aren't readily available, we'll tear a new machine down," Ginanni Jr. said. "We've always done that."

Time Is Money

"The guys out there know what the cost of downtime is to them," Ginanni Jr. said, "and we do too. If a paving operation of any size goes down, they can lose tens of thousands of dollars in one day, including trucks, flaggers, wages, and rental and traffic control equipment. And that's not including liquidated damages for not being off the job at a certain time. Our customers know that in doing business with us, we will do whatever it takes to keep them operational."

Subcontractors, such as family-owned cold milling subs, are under even more pressure, because their future reputation

Shaull's Bakerstown, Pa., facility serves western Pennsylvania from suburban Pittsburgh

is on the line if they can't execute the work in the slot that's allotted them.

"It doesn't matter how big or small a customer is," Ginanni Jr. said. "From the ma-and-pa contractors to the largest organizations, every one of these people are working to a deadline and facing penalties, economic or otherwise."

Higher Overhead, But Worth It

This emphasis on complete, unyielding customer service means that Shaull endures higher operating expenses than it might otherwise. But Shaull's owners wouldn't have it any other way.

"It results in higher overhead, but it's worth it," Ginanni Sr. said. "But it's always been that way, so it's nothing new for us."

Costs are borne in a number of ways. If a machine is out on loan, it's not available to sell. But Shaull sees that as a small price to pay in garnering customer loyalty.

"If you treat that customer right, he's going to tell another potential customer," Ginanni Jr. said. "They're doing what we're doing, working to make a living. We're all in the same boat. We've got to keep them operating, because when they're operating, they're profitable and for the most part, they come back. Without them, we wouldn't be here."

And sometimes, the reverse is true, Ginanni Jr. said: Some of those contractors wouldn't be in business if not for Shaull. In some instances Shaull has helped some contractors move into the paving industry.

Les Ginanni Sr., and Les Ginanni Jr. run Shaull Equipment & Supply Co. from their headquarters at Lemoyne, Pa.

"We've taught people how to pave," he said. "We've taken excavating contractors and showed them how to get into paving. Once a contractor sees he can handle a paving job, he's grateful. We've sold some contractors their first paver, and now they're buying the 10-foot high-production machines."

Own Machine Shop Helps

Shaull has a full-service machine shop, which assists repairs, alterations, and fabrication of parts.

"We have our own machine shop, and can make a part if necessary," Ginanni Sr. said. "This was our Mr. Shaull's philosophy. That's not feasible all the time, and we don't make any money doing it, but the customer knows the machine shop is

With unbelievably high quality standards and customer satisfaction, no one covers the bases like the Wirtgen Group. We've reshaped the game of high performance roadbuilding equipment. This team offers technically advanced paving products for constructing and maintaining highway infrastructure systems. Starting on first base is Hamm with its team of 28 soil and 35 asphalt compactors. On second base it's #1 ranked Wirtgen America with 24 models of milling and cold recycling equipment. Starting on third is the Vögele America Series with 6 models in widths of 8 to 10 feet, featuring rubber tires or rubber tracks. Finally, covering the outfield is

available if needed."

The machine shop helps Shaull implement improvements to machinery that subsequently have been adopted by the manufacturers, Ginanni Jr. said.

"We've been a top performer in the paving industry, and we see this work as part of looking out for the customer and for the manufacturer as well," he said. "If we see an improvement that will benefit our customer base, and will also improve the quality of a machine that we represent, we will go to the manufacturer and say so. We will make the parts, make the changes, and advise the manufacturer of the changes."

Roadbuilder To Distributor

The Shaull's founder, Mr. Walter H. Shaull, was himself a roadbuilding contractor. "He couldn't stand being down, so he didn't want any of his customers to be down either," Ginanni Sr. said. "He'd tear new machines down to keep a job running."

The time was World War II, and parts were not readily available. So Mr. Shaull created a machine shop to keep his own equipment running, and that machine shop became the nucleus of the roadbuilding equipment distributor.

"The machine shop helped drive Mr. Shaull's philosophy of service," Ginanni Jr. said. "Mr. Shaull took care of customers, and likewise Shaull's of today will take care of customers now and in the future."

Les Ginanni Sr. has been with Shaull Equipment for 46 years, but only within the last decade bought the business from Mr. Shaull's heirs.

Shaull Figures In Wirtgen Strategy

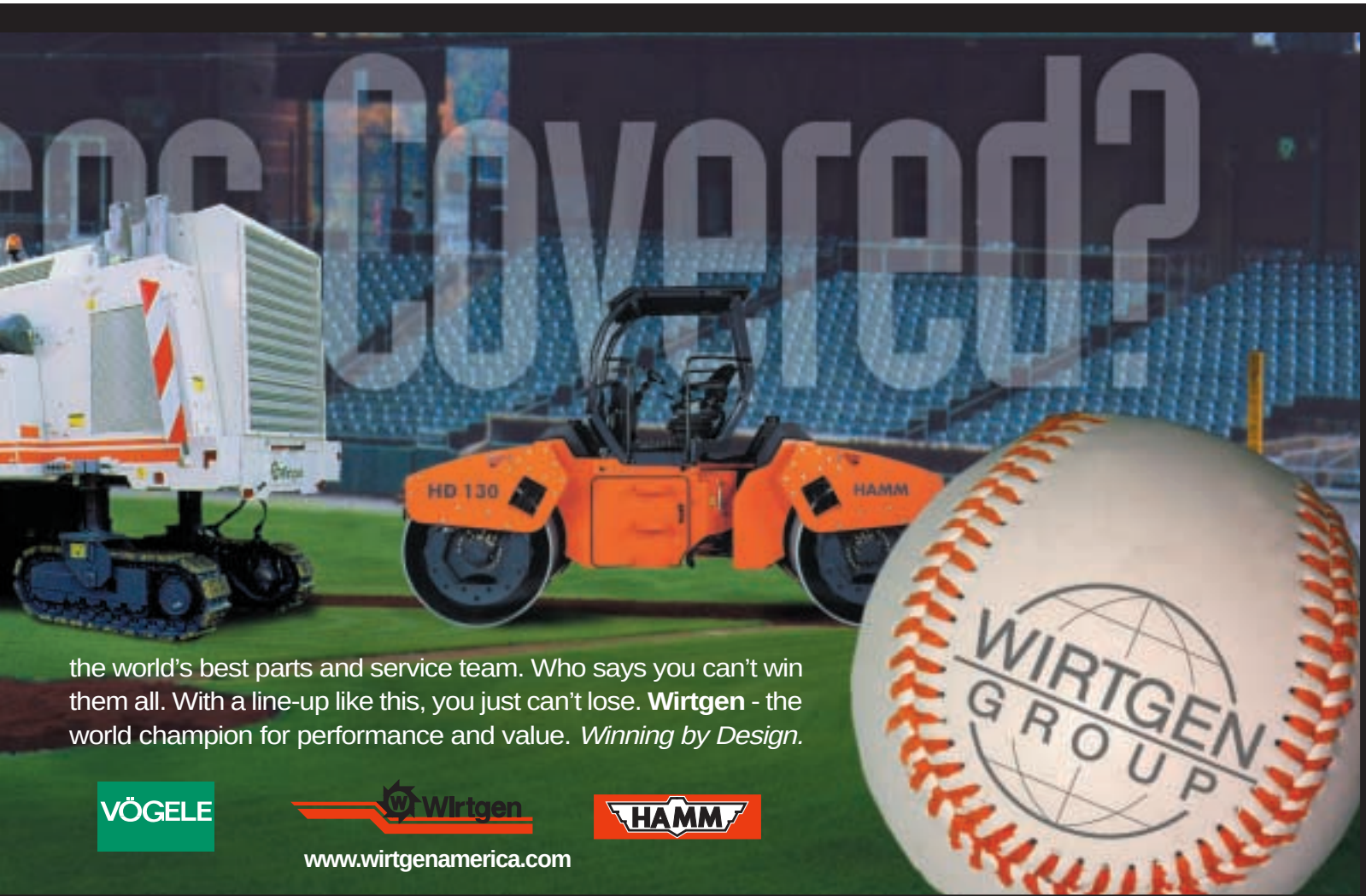
Shaull Equipment is one of a growing number of distributors who feature all three lines of Wirtgen Group road construction equipment.

Long known as a manufacturer of cold milling and in-place recycling machines, in recent years Wirtgen Group has diversified into complementary lines of asphalt paving equipment. In 1999, Wirtgen acquired the Hamm line of compactors, which are distributed in North American through Wirtgen America's Hamm Compaction Division.

And in 2001 Wirtgen Group acquired Global Asphalt Products, and now markets a U.S.-built line of asphalt pavers through its Vögele America Inc. subsidiary, based in Chambersburg, Pa.

Distributors like Shaull figure into Wirtgen's plans to expand North American sales through dealers which will sell all three lines.

"Vögele, Hamm and Wirtgen now serve the total market needs of North America's highway contractors from a single source," said Wirtgen America Inc. president Stu Murray. "From this single source we'll bring new technology forward through high-production, low-cost solutions for paving contractors."



Florida Contractor Makes First Use Of Oscillatory System

New HDO90V of Central Florida Hot-Mix compacts Superpave mix on Winter-Lake Road at intersection with U.S. 98 south of Lakeland

A Florida contractor is among the first in the nation to use Hamm Compaction Division's Oscillatory vibration technology, on projects near Lakeland, Fla. late last year.

There, The Lane Construction Corporation and its Central Florida Hot-Mix subsidiary is using a Hamm HDO90V Oscillatory compactor on reconstruction work on U.S. 98 south of Lakeland, and on adjacent paving projects.

Other Wirtgen Group equipment used by Central Florida Hot-Mix included a W 2200 cold milling machine with 12.5-foot-wide drum, and two Hamm HD 120 compactors being used as breakdown rollers on this Superpave project. An eight-wheel pneumatic roller was being used as an intermediate, followed by the HDO90V oscillatory as a finish roller.

The designation HDO90V signifies a hybrid roller of the Hamm HD 90 platform, in which the front has a conventional vibratory drum, and the rear incorporates the revolutionary Oscillatory technology.

The Oscillatory principle — now being introduced to North America — creates compactive effort through generating shear forces, as opposed to vertical amplitude.

Instead of vibrating straight up and down, Hamm Oscillatory design gives the drum a horizontal or rocking motion. This is significantly different from competing manufacturers, and is an example of how Hamm moves technology, research and design to new levels.

Decades-Old Concept

The oscillatory concept is applicable to new mix designs in the United States. "Only a short time ago North American road officials reinvented hot-mix asphalt paving practices by adapting German 'Stone Matrix Asphalt' [SMA] design," said Stu Murray, president, Wirtgen America Inc. "Hamm had invented the oscillatory compaction design 20 years ago in order to better compact those then-new SMA designs. Now, North American contractors have the opportunity to use this highly successful Hamm Oscillatory design system on their 'new' SMA and Superpave mixes."

The oscillating vibration system moves the drum in a forward and backward motion, and the drum never "bounces" or leaves the mat surface. The roller's oscillatory movement is generated inside the drum by two eccentric shafts that provide a horizontal, alternating shear force. This does three specific things during compaction:

- Compaction is done in a non-aggressive manner, that is, structures near the road and underlayment are not dam-

"Because it has both a vibratory drum in front and an oscillatory drum in rear, it is a very versatile, all-around roller for almost any compaction job."

Big W 2200 mills out inside shoulder as part of U.S. 98 reconstruction

aged, useful when rolling on or near bridge decks, or when the substructure already is an existing, compacted surface.

- As the drum never leaves the mat, a perfectly smooth surface is created, even while the roller is achieving additional compaction density.
- And the roller can compact at a lower temperature without danger of damage to the aggregate, and does not overcompact.

"This technology now is available in North America from Wirtgen America, Hamm Compaction Division," Murray said. "Because of the unique properties of the oscillatory vibration system, it truly is the ultimate intermediate and finish roller for SMA or Superpave mixes. Because it has both a vibratory drum in front and an oscillatory drum in rear, it is a very versatile, all-around roller for almost any compaction job."

First With Oscillatory

"We were fortunate to receive the first one [Oscillatory HDO90V], and we have more on order," said David H. Lakeman, Jr., plant manager, Central Florida Hot-Mix, Eaton Park, Fla. "My guys run it every day and they say the machine's the cat's meow. I've gotten nothing but good feedback on it."

For the U.S. 98 project, Lane Construction was cold milling 3 inches on the main line, and 2.25 inches on the shoulders. It also was using its milling machine to remove soil to create an inside shoulder. It was putting back 1.5 inches of ARMI (asphalt rubber membrane interlayer, to prevent reflective cracking) and paving 2.5 inches over the main line.

Approximately 42,000 tons of hot mix asphalt, produced by Central Florida Hot-Mix, was being placed on the dual-lane, 6.8-mile project, from Lakeland to Bartow, Fla.

The top lift was a Traffic Level D coarse mix, which is harder to compact to meet density, Lakeman said. This fiber-modified, PG 64-22 Superpave mix was being placed on the ARMI. "Our concern was meeting density with the ARMI below, and we wanted to show the DOT that we were doing everything in our power to meet specs. It was a concern for us and for them."

All milling and paving done at night on Florida U.S. 98 project south of Lakeland, Fla.

So on the first night of using the HDO90V, the contractor was limited to a 500 ton test strip. "We did about 300 tons, to keep it small," Lakeman said. "We kept an eye on our rolling pattern and we've been getting 100 percent densities from then

on. The key is being able to test the rolling pattern before you go out on the job, to make sure you have the pattern down."

Central Florida Hot-Mix also used the HDO90V on a state road project adjacent to the U.S. 98 project, where it compacted yet another Superpave mix. Lane and Central Florida Hot-Mix are anticipating using HDO90Vs on even larger projects this year, including Traffic Level E-mix work on Florida's I-4 between Tampa and Orlando.

"We've been very happy with the roller and with the Wirtgen machines," Lakeman said. "With our jobs in 2003 we should have plenty of time to work on our test strip for I-4 and establish our pattern."

Lane has a second HDO90V in a different region of the United States, achieving the same outstanding results with significantly different mix designs and materials in the state of Maine, Murray said.

Supervisor checks cross fall of W 2200 on U.S. 98 inside shoulder construction

Hamm HDO90V provides conventional vibration with new oscillation compaction for Central Florida Hot-Mix on U.S. 98 and adjacent HMA overlay

Hamm Oscillation Technology Big Benefit To Contractors

A growing number of construction companies are recognizing the efficiency, cost and environmental benefits of Hamm's Oscillatory Compaction System.

Unlike traditional vibratory compactors that achieve compaction by "bouncing" the drum on the ground, Hamm Compaction Division's unique Oscillatory system ensures that the roller drums maintain constant contact with the ground for faster, more effective compaction.

The result is better compaction in fewer passes, with less vibration-related wear and tear on operators and surroundings.

Hamm Compaction Division is the only manufacturer offering the proven Oscillatory Compaction System.
The advantages of this innovative system are overwhelmingly clear:

- Higher levels of compaction in fewer passes
- Less damage to the pavement and surrounding area, and
- Ability to compact at lower temperatures.

"Bonuses are won or lost with the pass of a vibratory roller," said Wirtgen America Inc. president Stu Murray. "Hamm Compaction Division's new Oscillatory technology allows unparalleled control leading into and maintaining density in the critical target density range. Innovative Hamm Oscillatory technology works, and that's why it is proving so popular in intermediate and finish asphalt compaction applications."

Achieving Optimal Density Levels

Achieving the optimal designed density level in hot mix asphalt (HMA) lifts requires precise control in the target density range (example 95 to 96 percent). On many occasions conventional eccentric/vibratory machines will "break-over" or "over-compact" in this critical target area. Control over the compaction process may be nearly impossible to achieve with the use of conventional vibrating machines in the intermediate and finish position.

Vibratory compactors now account for the majority of all compaction equipment sold worldwide, and for good reason. The vibratory system first developed in the late 1950s provides excellent results in both soil and asphalt applications.

Traditional vibratory compactors utilize an eccentric drive within the drum. Rotated at high speed, this causes the drum to vibrate, generating centrifugal forces from the drum to be passed down into the ground.

Oscillatory System Much Different

The Oscillatory system is much different. In the oscillation drum, two masses turning in the same direction cause a movement around the drum axle. The movement changes its direction of effect during one turn so that it generates an oscillating or rocking movement of the drum. On this occasion horizontal forces are transmitted from the drum into the pavement.

In recent North American comparative tests of an oscillation compactor against a vibratory compactor with conventional circular (multidirectional) exciter system, the Hamm Oscillatory machine achieved the required relative density in fewer passes than the other machines.

Working on asphalt, this Oscillatory machine clearly delivers more than 95 percent relative density, compared to less than 95 percent achieved by a traditional vibratory roller. In short, oscillation produces better compaction in fewer passes.

Furthermore, while additional passes of the Hamm Oscillatory machine produced additional compaction density, the other machines actually produced a decline in compaction density from the third pass on.

In addition, the oscillatory action can be used in lower temperature ranges without the fear of cracking the mat, unlike the violent action generated by a traditional vibratory compactor.

Efficiency Only Part of Story

Improvement in compaction efficiency is, however, only part of the story. When utilizing a circular or directed exciter system in an asphalt compaction application, over-compaction can result in the grain fragmentation of the stone. This does not happen with Oscillatory compaction.

The reduction in transmitted vibration also helps reduce wear on the machine and improves the working environment for the operator. Machine noise levels, both externally and at the operator's station, are significantly reduced, as are the vibration levels felt within the operator's working area.

Above all, the Oscillatory compaction system provides the machine operator with total control over the type and degree of compaction. For even greater flexibility, the oscillation system can be combined with a conventional vibration system in one machine. The operator can select the frequency and amplitude best suited to the material being compacted.

Hamm Compactors Work Superpave/OGFC Hybrid Interstate Pavement

Twin Hamm HD 130s compact Superpave lift on I-40 near Weatherford, Okla.

Late last summer some 140,000 tons of Superpave hot mix asphalt (HMA) pavement were being placed in conjunction with an open-graded friction course (OGFC) on an Oklahoma interstate highway.

Hamm Compactors from Wirtgen America Inc. were used exclusively for compaction on this innovative project, in which a durable Superpave base course is topped with a drainable, high-traction OGFC which also incorporates a Superpave PG binder.

In a classic mill-and-fill operation, contractor Western Plains Construction Co., Lincoln, Neb., was placing up to five Superpave mixes in the western fashion, using bottom-dump trailers and a windrow elevator to charge the paver hopper, on I-40 near Weatherford, Okla., west of Oklahoma City.

This "western style" paving permits a higher forward rate of speed and resists mix segregation, while eliminating the seams or mat discontinuities resulting from paver/dump truck bumping.

Initial breakdown compaction was being attained using two Hamm HD 130, 84-inch-wide, double-drum articulated vibratory rollers, with intermediate rolling using a Hamm GRW 18 eight-tired pneumatic compactor. This was followed by final finish rolling by a Hamm HD 110 66-inch-wide, double-drum articulated vibratory roller.

Mix was coming from a portable plant set up no more than eight minutes from the project. It's one of four owned by Western Plains.

The length of the $8 million project is seven miles each way, and is being paved 38 feet wide in each direction. "In the driving lane we milled five inches and we're putting back eight," said Bob Mommens, project superintendent for Western Plains. "In the passing lane we milled out three and putting back six." The shoulders were getting a straight overlay.

To correct a superelevation in the original pavement, 3/4-mile of the project is a full-depth removal and replacement to subgrade, including stabilization with Class F fly ash, Mommens said. There, a total of 14 inches of Superpave were to be placed as a Full-Depth Hot Mix Asphalt pavement.

Superpave No Longer Exception

Superpave — an acronym for SUperior PERforming Asphalt PAVEments — is a performance-based system of specifications for designing asphalt pavements to hold up to the demanding roadway needs of the next century.

This performance-based approach offers more durable pavements that are specifically designed with local temperature extremes and traffic loads in the equation. Superpave designs are

"Superpave is working well on higher-traveled roadways. We're finding it to be very resistant to rutting, and no harder to place than any other pavement."

thought to provide longer-lived asphalt pavements that will stand up to local climate and traffic volumes at lower costs.

Final Superpave mix design system specs, including performance based quality control, could be fully developed by 2005, according to a long range plan released by the Transportation Research Board (TRB) Superpave Committee.

"Everybody's gone to Superpave," Mommens said. "All mixes on this job are Superpave mixes. Superpave isn't any more difficult to place than other mixes, but you have a few more things you have to check and keep right."

These, he said, include air voids, such as VMA and VFA. "As far as the actual paving, with Superpave we have to get 94 percent density, which is not much different than before," Mommens said.

Superpave 'Working Well'

"Superpave is working well on higher-traveled roadways," said Jim Jewell, asphalt operations manager, Western Plains. "We're finding it to be very resistant to rutting, and no harder to place than any other pavement."

However, compaction requires attention, Jewell said. "It's temperature sensitive, and you have to pay attention to temperature to get the best compaction you can." But in his opinion, potential mix "stickiness" often reported is not an element of Superpave itself, but of polymer modifiers often used in Superpave PG binders to attain higher performance.

"Polymer modifiers cause the stickiness," Jewell said. "It's especially evident when using pneumatic rollers. Not all the Superpave binders have polymer modifiers. PG 64-22 binders are more like a base oil; they're not polymerized and make up the lower level lifts.

"Upper level lifts would use the PG 76-28 binders, which would have to be modified to meet that grading," he said.

And contractors like Western Plains have to deal with the "tender zone" in Superpave placements. "It's pretty typical for most Superpave mixes to have a temperature range from 220 to 260 deg F at which you must stay off the mat," Jewell said.

"You can roll immediately behind the paver — say, at 270 to 300 deg F — but once the pavement is in the tender zone you have to stay off," he said. "Then, once the mat cools down to 180 deg F or minus, you can pick up the rolling again. That's the best way in our experience."

Five Mixes On Project

At least five Oklahoma DOT Superpave mixes were being used on the I-40 project, some incorporating reclaimed asphalt pavement (RAP).

- Oklahoma S3 PG 64-22. This is a RAP-containing Superpave mix in the 3/4-inch aggregate band.
- Oklahoma S4 PG 64-22. This is a RAP-containing Superpave mix in the 1/2-inch aggregate band.
- Oklahoma S4 PG 76-28. This mix contains RAP and is not used as a final riding surface. This mix is underlies the OGFC, and was being placed during a visit to the project in July.
- Open Graded Friction Course (OGFC). This is a minus-half, plus-4 open-graded mix, with aggregate sitting between 3/8-in. and a No. 4 sieve.

"It's a PG 76-28 binder with polymer modifier and antistrip additive, placed 3/4-inch deep," Jewell said.

- Oklahoma S4 PG 76-28 Insoluble. This is a virgin Superpave mix used on ramps. "The insoluble has no RAP in it, and is used as the riding surface for ramps," Jewell said. "The insoluble refers to its resistance to water and moisture; 40 percent of the mixture has to be resistant to water absorption."

HD 130s compacted five different Superpave mixes on I-40 project

Hamm GRW 18 pneumatic roller provided intermediate compaction of Superpave mixes

Optimizing Compaction

And Western Plains has found its fleet of rollers from Hamm Compaction Division of Wirtgen America Inc. is optimizing its Superpave compaction in the field. "Hamm is a good roller at a competitive price," Jewell said.

A standard rolling configuration — and one used on the I-40 project at Weatherford, Okla. — is two Hamm HD 130 rollers for initial breakdown, a GRW 18 pneumatic roller as an intermediate roller, and an HD 110 compactor as the finish roller.

"It depends on the job size and the production levels we're shooting for, but there may be times we don't need the second HD 130 behind the screed," Jewell said. "But generally the set-up works for us. The heavier HD 130s are used right behind the screed, at the 270-plus temperature zone, where most of the compaction takes place. The pneumatic in the middle kneads the mix together at the medium temperature

range; and the final, surface finish rolling is done by the HD 110 in the static mode; you gain perhaps another point of density there in minus-180 deg F temperature."

"The two 130s we use all-vibratory to get as much compaction as we can while we've got heat," Mommens said. "We follow with the pneumatic. Once he starts in the morning he doesn't quit moving, he rolls all day."

However — in 95-plus deg F days in the height of summer — the contractor was in no danger of losing heat of the Superpave mix through use of the windrow and elevator. Oklahoma DOT has a temperature and segregation spec that requires temperature checks behind the screed in three different spots straight across, Mommens said. "We can't vary over 10 deg and we've never yet had a problem," he added.

While there was no incentive for early completion, there was an incentive for smoothness. "On this project, Oklahoma allowed us a limited amount of deviation per 10th of a mile," Mommens said. "From 5 to 7 inches [cumulative] is 100 percent pay. If we're less than 3 inches in deviation we get 103 percent pay; if the whole job is 100 percent or better you get an added 2 percent bonus."

The Hamms run with little interruption in the field, Jewell said. "In my experience, no news is good news," he said. "I have not heard any negative comments nor have had any major breakdowns. They're reliable and the guys like to run them." The firm owns more than 10 Hamm compactors, purchased from Lincoln, Neb., dealer Rose Equipment Inc.

"This series of Hamm rollers functions well for us," said Sam Olson, president, Western Plains Construction. "Hamm has been competitive. Our staff members can become creatures of habit — and there was a time in our organization when Hamm rollers needed acceptance — but now they're a big part of our fleet."

Western Plains has been buying Hamms for at least five years, before the line's acquisition by Wirtgen Group. "Hamm now is a stronger organization under the Wirtgen name," Olson said. "They haven't failed us and they've been responsive."

Superpave And QA/QC

On the I-40 project, in accordance with Oklahoma DOT requirements, Western Plains has instituted a full Quality Control/Quality Assurance (QA/QC) program for this project, and has a complete testing lab trailer at its portable plant.

"We do all our own testing," Mommens said. "We provide full QC/QA. We run and get paid by our own test results. We take four samples per lot, which is every 4,000 tons. We sample every 1,000 tons and the state randomly takes samples for confirmation." On average this is once every 4,000 tons.

"It works out well for us," Jewell said. "Our tests are on-target and we're getting good compaction, so we haven't had too many issues with the state. When it's working good, you don't get bothered."

In the trailer, Western Plains maintains a Brovold Superpave Gyratory Compactor, and a National Center for Asphalt Technology (NCAT) Barnstead Thermolyne Ignition Testing Oven. "We also utilize a maximum gravity apparatus," said Lyle Watermeier, quality assurance manager. "We have everything that is needed for Superpave testing purposes."

"Five years ago we had one test technician and one little lab," Jewell said. "Now we've got a permanent lab at our Lincoln headquarters, and four fully equipped Superpave lab trailers. We have six qualified testing personnel. That represents a lot of money, people and resources put into QC/QA. It's the whole game now."

One of 10 Hamm rollers owned by contractor Western Plains Construction

About the Hamm Compactors

Three separate Hamm models — the Hamm HD 130, HD 110 and GRW 18 — were used in the construction of the I-40 full-depth Superpave project near Weatherford, Okla., this summer.

- **Hamm HD 130.** Introduced to North America in 2001, the HD 130 is a 30,430 lb., 84-inch-wide double-drum, articulated roller. The largest Hamm asphalt compactor sold in the United States, it has a drum width of 84 inches and boasts a top speed of 7.6 mph. A pair of HD 130s were providing initial breakdown compaction of the Superpave directly in back of the screed.
- **Hamm GRW 18 Rubber Tired (Pneumatic) Roller.** The GRW 18 was being used to "knead" the pavement between breakdown rollers and final finish roller. The GRW 18 can accommodate a maximum operating weight of nearly 62,000 lbs. It has a generous 2-inch tire overlap, even at half of the maximum turning angle, and has four wheels each front and back (eight total). It also has a three-speed power shift transmission, smooth, jerk-free shifting with hydrodynamic drive (no chain drive), and high on-site mobility, with transport speed of up to 12.5 mph.
- **Hamm HD 110.** This 23,400 lb., 66-inch, double-drum, articulated roller was providing final, finish compaction and is a workhorse of the Hamm line in North America. Like all large HD rollers it has a 150-degree swing around and swiveling operator's seat, dual, seat-mounted joystick controls for travel and vibration, unmatched industry curb clearance (27 inches/700 mm), and a 3.5-inch hydraulic offset to either side for better maneuverability, pinching joints and increased rolling width.

Eaton Asphalt Innovates For Smoother Pavements, Greater Productivity

Eaton Asphalt's new Wirtgen W 2200 cold mills on I-71 in Carroll County, Ky. late last year

"Our relationship with the equipment dealer is truly important because folks who manufacture equipment are the real innovators in our industry. They are the experts, and in my experience they listen to what our needs are and make equipment to fill those needs."

Across the Ohio River from the Queen City of Cincinnati, an asphalt contractor is continually refining its operations, choosing its equipment for versatility, and adopting new procedures to enhance pavement quality and driver and worker safety.

And both Vögele America and Wirtgen America products are part of his plan for profits.

"We're a little bit different than other contractors in how we use equipment and operate," said Charles Bucklew, president, Eaton Asphalt Paving Co., Inc., Covington, Ky.

"Contractors are more in control of their own product than they were a few years ago," he said. "Not only are we in control of our own product, but our skilled employees are providing a much better product. And in the end, we're better contractors for it."

To serve its customers in northern Kentucky, Eaton has five asphalt plants, one at its headquarters in Covington, and also at Belleview, Walton, Verona and Corinth, Ky.

Eaton was founded in 1916 as a road oil supplier for chip seals, and later expanded into road construction and aggregate mining. In 1977 the firm was purchased by the John R. Jurgensen Co. of Cincinnati, a major road contractor (see related sidebar).

Innovation: Equipment Acquisition

Eaton's fleet includes five asphalt pavers, 13 asphalt compactors, and two cold milling machines.

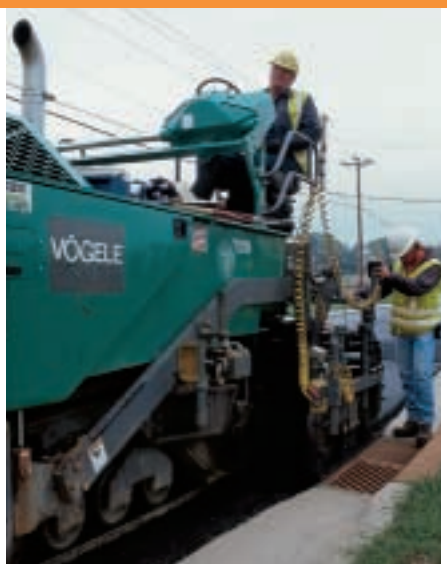
One critical function in which Eaton takes a different tack is in equipment acquisition. "We purchase equipment as individual tools," Bucklew said. "Some contractors will buy an equipment spread of paver and rollers for a particular crew. But we look at each piece of equipment as an individual tool, and buy different tools for different jobs and their requirements."

For Eaton, equipment has to be versatile. For example, Eaton evaluated a high-performance paver that worked superbly, but required use of a material transfer vehicle (MTV). Even though Eaton owns an MTV, Eaton declined to buy the paver because it would not have been usable on smaller jobs not needing the MTV.

Bucklew and Eaton rely on their equipment distributor, The McLean Company of Ohio, to provide guidance as to how new equipment can improve performance. "Our relationship with the equipment dealer is truly important," Bucklew said, "because folks who manufacture equipment are the real innovators in our industry. They are the experts, and in my experience they listen to what our needs are and make equipment to fill those needs."

Retirement of aging equipment is the first reason that Eaton will acquire a

Eaton forces place Commonwealth of Kentucky spec hot mix asphalt on privately owned service road of new shopping center at Independence, Ky.



New 1110 RTB paver from Vögele America Inc. at work for Eaton Asphalt Paving at Independence Town Center, Ky.

piece of new equipment. "We replace equipment when it costs more to maintain than to buy new," he said.

The next reason is business growth. "We try to match the growth of our firm to our market area, without overgrowing it," he said. "We want our equipment acquisition to match our ability to serve contracts."

And Eaton's next criterion is innovation in equipment. "We look at what's out there that's new, and how long it will last," he said. "If it fills the void and need, and the price is competitive, then we look at the technology. If it's the latest and the greatest, then that's what we buy."

Innovation: Screeds

While he lauds the migration of steel tracks to rubber tracks in pavers, Bucklew said the biggest innovations in pavers are taking place in screeds. "Screeds have had the biggest innovation," Bucklew said. "Our industry is judged on ridability, smoothness and compaction, and screed performance makes a big difference in the kind of machine we buy.

"In many cases we can make as much money, or more, from bonuses for ridability, densities and the volumetrics of Superpave, than we can from the actual bid," he said. "So it makes sense for us to do the best we can in equipment acquisition that will boost smoothness and ridability."

In 2002 Eaton broke with tradition and acquired an 1110 RTB paver from Vögele America Inc., Chambersburg, Pa. The machine is supplied with a Vögele screed that is helping Eaton attain the specs it needs to earn incentives.

"Most screeds are 19-ft., 6-in., and this screed extends to a full 20 feet, and that was a plus," Bucklew said. "The way it's built is a little more beefed-up and it holds its grade at full width. The paver's been a great tool and the performance has been very good for us."

Innovation: Reclaimed Asphalt

Early-on Eaton embraced asphalt recycling and reuse of reclaimed asphalt pavement (RAP), and as a result is well-suited to capitalize on the mill-and-fill projects common on local highways.

"We've been using RAP since the early 1980s," Bucklew said. "RAP is very important to us. There are limitations as to the amount we can use, but we try to use RAP on a daily basis in every asphalt plant."

To support this application Eaton has RAP crushing and stockpiling systems at each plant. "We're convinced it makes a better product, although the higher the percent of RAP used, the higher the RAP quality and proper sizing has to be. And when you get to quantities of up to 30 and 40 percent, then we have to change the liquids that we're using."

In summer 2002 Eaton doubled the size of its cold milling fleet by acquiring a W 2200 cold milling machine from Wirtgen America, Inc. via its distributor, The McLean Company. Their machine has a drum width of 96 inches vs. standard 86.6 inches.

Innovation: Optimized Safety

To optimize worker safety in an era of crushing traffic loads, Eaton rigorously requires all employees to wear hard hats, whether or not there is an overhead hazard. And although it's not required by either Ohio or Kentucky DOTs, as with many other contractors, Eaton has moved from orange safety vests to enveloping day-glow yellow-green vests.

"The safety people tell us that they are the top-of-the-line in vests, and I understand the chartreuse color is more recognizable," Bucklew said. "We've had some resistance from employees because the vests are hot during the summer months. But because we are doing so much work at night, we want to make sure we're doing more than is necessary to ensure safety. It's part of our uniform, and it's what we wear."

Innovation: Night Work

Night work is taking a bigger part of the construction program in Kentucky, and Eaton is adapting to the new order night work brings.

"It takes time to build highways," Bucklew said. "It's very labor-intensive, but people want rebuilt highways 'right now' and without congestion. The industry has done a good job in delivering highways faster, but it still takes time."

Now the night time is being claimed for road construction. "We tried about 15 years ago — before it became the vogue — to do night paving," Bucklew said. "But we were told by the highway departments that it wasn't possible. Now, when we pick up a proposal, night work is the first thing we see."

Night work requires a whole different philosophy, Bucklew said. "The steel industry and the military run 24 hours a day," he said. "Our highway construction industry is probably the last one to have shifted to night work, but we've gotten past the issues of quality of night work and worker and driver safety at night."

But night work is complicated by the fact that many of the services which the contractor would have during daytime are not available at night. "Just going to the local rental shop to rent a vibratory plate compactor is not possible at night," he said. "Our company has to provide a lot more services in advance to get the job done."

For example, instead of benefiting from having the repair shop open as during the day, Eaton has to provide a big shop truck and mechanic on-duty with crew at the site all night. "We have to provide more services for our people to get the job done," Bucklew said. "And that's expensive and must be built into the bid price if the competition will allow it."

If night work persists in the years ahead, as a long-term innovation, Bucklew sees contractor work forces evolving to meet the need. "If we have to do night work continually long-term, we'll probably wind up with a different work force that requires more supervision, because you can't send a crew out all by itself at night."

In the meantime, he said, clerical and office staff which work in the day also may end up working at night. "We will wind up with two different work forces to do the same job."

Innovation: Total Closure

Another innovation Bucklew foresees is complete closure of highways where feasible, with accompanying total reconstruction of roads over a weekend, as was accomplished in summer 2002 in Portland by the Oregon DOT.

"They did a similar project in Louisville, in which I-65 was completely shut down and rehabilitated over consecutive weekends," Bucklew said. "The potential problem is that it must be planned way ahead of time, months in advance, with everybody on board, including local officials, the news media, and the highway users. Without the advance work it could be a total failure."

Despite the quick appeal of a total highway shutdown to contractors, there are elements that are less appealing on closer inspection.

Intermediate hot mix asphalt course is placed at Independence Town Center in Northern Kentucky prior to friction course

Eaton's W 2200 has 96 -wide drum, ideal for high-volume interstate work on I-71 in northern Kentucky

"Incentives and disincentives must be part of the package for contractor buy-in," Bucklew said. "It's very difficult for a contractor to shut down or commit all his other operations in order to concentrate all forces at one time for just one project.

"Many times customers look at contractors as though they've 'popped up' for that one job, and that's not true," he said. We're a business, here 365 days a year. Throwing all our forces on one job takes us away from all our other customers."

Eaton Asphalt's Parent Has Award-Winning Record

The parent company of Kentucky's Eaton Asphalt Paving Co., Inc. — National Asphalt Pavement Association (NAPA) member John R. Jurgensen Co. of Cincinnati, Ohio — itself has a strong record of adherence to quality in constructing award-winning asphalt pavements.

For the year 2001, Jurgensen received a NAPA Quality in Construction Award for the its milling, reconstruction, widening, safety upgrade and overlay project of approximately 12 miles of I-71 in Hamilton and Warren counties in Ohio.

To allow traffic to move in the heavily traveled area, the contractor kept an additional lane of traffic open in each direction during much of the construction. Despite the difficulties of bringing in materials, and the addition of several million dollars of work, John R. Jurgensen Co. met the original project deadline.

The firm won another 2001 Quality in Construction award for the night milling and overlay of I-70 in Montgomery County. That job involved tight coordination of lane closures, material delivery, temporary striping, and lane reopening to maximize production and minimize road closures. During paving, the company used a pickup machine to produce a smooth, high-quality pavement.

NAPA's 2001 Quality in Construction Paving Awards recognize the exemplary quality HMA pavement projects throughout the United States. For 2001, awarded during NAPA's annual meeting in 2002, NAPA had a record 96 award winners representing 32 states.

State-Owned Hamm Roller Gets Call In National Chip Seal Test

A Hamm GRW 6 pneumatic roller owned by the Minnesota Department of Transportation was called to a higher purpose as it was put to work seating chips as part of a national test of performance of pavement sealers and binders in different climate zones.

The roller was seating igneous chips in a spray-applied modified asphalt emulsion, in a control section against which the performance of more sophisticated products will be measured in the years to come. The relatively gentle action of the pneumatic roller is ideal for this purpose.

The sealer/binder applications on a low-volume road in southern Minnesota were part of a practical Foundation for Pavement Preservation (FP2)-sponsored workshop on sealers, rejuvenators and binders Aug. 21-22, in Bloomington, Minn.

Hamm GRW 6 roller of Minnesota DOT seats crushed stone in chip seal

That FP2-sponsored workshop was held in conjunction with the second meeting of the Midwest Pavement Preservation Partnership, an informal group of central states banded together to enhance their pavement preservation activities.

FP2 is the nation's leading proponent of pavement preservation. FP2 maintains that proper pavement preservation means application of the right treatment, to the right road, at the right time, and communicates this principle to the top management levels of government agencies, as well as to field personnel.

Prolonging Pavement Life

Pavement preventive maintenance is the application of various surface treatments early in the life of a pavement to reduce the rate of wear and tear and extend the pavement's overall service life.

It's akin to the preventive maintenance we perform on our cars, such as changing the oil at regular intervals to prevent serious engine wear. Research shows that for every $1 spent on pavement preservation, state departments of transportation save at least $6 in future road rehab and reconstruction costs.

The research is being funded by the Federal Highway Administration and FP2, with in-kind participation from FP2's private sector partners.

Test sections of different surface treatment applications have been placed at multiple sites throughout the United States, and more are on the way. These will be studied over a five-year period.

A survey of the use of spray-applied sealers and rejuvenators among the 50 states has been conducted and is being compiled. Preliminary results are available from FP2's web site at http://fp2.org.

And field workshops in different regions are taking place as FP2 seeks to transfer this technology to end users.

Field test sections in each of the climatic zones consist of

five test sections representing four material types, and a control or untreated section. Each test section will represent one product. Initially, test sections will consist of two 100-foot-long test sections with 400-foot transitions between each test section.

In later years additional applications are planned within the transitions, which will address the effect of application timing and the effect of a second cycle of treatment. These additional 100-foot sections would be placed two, four and six years after the initial application.

The application intended to address the effect of a second cycle of treatment would be placed 100 feet in length in the fourth year. This would consist of placing the sealer over the second 100 feet of the first application.

Study Of Surface Treatments

The oxidative aging of pavements begins at the time of construction and continues throughout a pavement's life, FP2 reports. However, most oxidative aging occurs within the first two to fours years of service life.

This results in the top one-half inch of the pavement surface becoming more brittle than the underlying material due to the oxidative actions of water, ultra violet, and environmental forces. This can result in raveling and or premature cracking, which often begins at the pavement surface.

Maintenance personnel in many agencies have combated this aging process by applying spray-applied treatments using distributor trucks, FP2 says. Two major types of spray applied treatments are commonly used; products that seal the surface, and products that rejuvenate the surface.

Sealers consist of products such as SS-1h or CSS-1h that are applied to seal pavement surfaces against intrusion of air and water, and to eliminate or minimize raveling of the fine aggregate due to aging of the asphalt binder.

Treatments can begin immediately after construction, but more typically occur many years later when some form of distress is observed. Sealers have been used in approximately two thirds of the states.

Rejuvenators are products such as Reclamite or Pass Oil that are formulated to penetrate the pavement and then enhance the properties of the asphalt binder of the existing the pavement, FP2 says. These treatments are most commonly used in Western states where ultraviolet exposure appears to promote greater oxidation.

For more information, visit http://fp2.org/research.htm.

Chip seal is control section among more exotic surface treatments as part of national performance tests of surface treatment sealers and binders

Distributor truck places oil and is followed by chip spreader in advance of Hamm GRW 6 roller

About the Hamm GRW 6 Pneumatic Compactor

The GRW 6 pneumatic compactor from Hamm Compaction Division features an operating weight of 9,850 lb. and ballasted weight of up to 30,000 lb.

It features a distinctive futuristic styling that provides the best possible combination of efficiency, comfort and all-round visibility. Its infinitely variable hydrostatic drive to the rear wheels provides working speeds of up to 7.2 mph and a maximum travel speed of up to 14.5 mph.

An oscillating front suspension system ensures the five rear and four front 7.50-15 12 ply rear tires maintain contact with the asphalt surface, eliminating bridging of soft spots.

For more information, visit http://www.wirtgengroup.com.

Surface Miner Cuts Equipment Costs, Weather Delays

Wirtgen surface miners revolutionize crushed stone extraction

A Wirtgen 2500 SM surface miner is providing substantial cuts in mobile equipment costs for an Arkansas cement plant quarry, while keeping the quarry open and producing in all kinds of weather.

In doing so it is improving quarry roads, eliminating drilling, blasting, loading and primary crushing, and enabling the quarry to reconfigure drainage to its best advantage.

"When I began my career, in the coal industry, I was told that to be successful in open pit mining, you had to control three things, the haul roads, the drilling and blasting, and pit drainage," said Stephen B. Gartshore, P.E., quarry superintendent. "This machine does all three for us."

The Wirtgen line of four surface miners cut, crush and load rock in one machine pass, thus producing reduced-size material which can immediately be conveyed without additional crushing.

Originally, the soft (1,800 psi) limestone marl was broken loose by two Cat D-11 dozers with ripping shanks. The loose material was picked up by a fleet of Cat 657 scrapers. But this was problematic for a number of reasons.

"We used to rip the material with dozers, and load with self-loading scrapers," said Terry Kerby, plant manager. "The problem was, you had to have a certain amount of material already ripped and ready for the scrapers, and if you had a downpour, whatever had been ripped would turn to mud, and had to be spread around to let dry, or we'd spend at least eight hours ripping fresh material so we could begin loading again.

"We'd end up losing one or two shifts before we'd be back up to production," he said. "With the 2500 SM, rain flows right off the quarry floor and as soon as it stops raining, we're back in production."

Immediate Cost Savings

Because they were self-loading, the scrapers incurred large costs due to pit-related tire damage. "There was a lot of maintenance," Kerby said. "It's also difficult to control grade when ripping with a dozer, and this contributed to the water problems we were having. With the surface miner, I have nothing broken up or exposed. The quarry floor is solid rock, and water drains instantly into a sump."

Originally, Ash Grove mated two, 40-ton haul trucks with the surface miner, but soon the productivity required two more. Now four trucks are used, with tailgates mounted at the rear of the hopper to increase capacity.

And the plant is realizing big benefits in fuel consumption, estimating a 58 percent reduction in fuel cost per ton of limestone as a result of the surface miner. "We've had a tremendous operational reduction in diesel fuel costs, in addition to lower maintenance, tires and power costs," Kerby said.

Also, there's been a reduction in fugitive dust generated. "The dozers and each scraper would generate dust as it operated, and there was no way to control it with a water spray," Kerby said. Now, the 2500 SM contains its own spray system and water trucks easily control dust on the haul road.

The 2500 SM cuts in straight lines, 15 to 17 inches deep, and does a complete U-turn at the end of its pass. Haul trucks follow alongside and are fed from a belt conveyor.

The haul trucks dump at a primary crusher ahead of a 4,200-ft. covered conveyor to the raw feed storage area at the

Ash Grove's 2500 SM runs 10 shifts per week, feeds cement plant running around the clock

Big 2500 SM feeds presized limestone into one of four 40-ton haul trucks

Wirtgen 2500 SM cleanly removes layers of limestone, permits greater control of quarry floor for superior drainage

plant. But because the material comes already crushed to minus 5-inch size from the 2500 SM, the primary is no longer needed.

"The surface miner almost eliminates the need for the primary crusher," Kerby said. "The only reason why we're going through the crusher right now is that it's already in the circuit. Very little crushing is done at the secondary crusher as well, and we can make it finer if we want, by changing pick spacing or the speed of the drum."

While the cement plant runs 24 hours a day, raw limestone mining is conducted in 10 shifts per week. The plant staggers shifts to provide seven-day mining to iron out surges in raw limestone feed, with two shifts Monday, Tuesday and Wednesday, and a single day shift the other four days.

About the 2500 SM

The new Wirtgen 2500 SM offers flexibility and supreme performance when mining soft or hard material without blasting.

With a weight of 80 tons, an engine output of 1,000 HP and a cutting depth of 23.6 inches (60 cm), this miner is even more powerful than its proven predecessor, the 2600 SM.

An additional plus is the mechanical drum drive, which transfers the available engine power to the cutting drum with the highest possible efficiency.

The machine has a working width of 8.2 feet (2.50 m) and can cut an impressive 1,800 tons per hour when mining coal.

Cutting depth and slope angle can be precisely defined via an integrated leveling system. The machines can optionally be equipped with a laser-controlled cutting depth adjustment, wire-rope sensors. or contact-free triple sensors (Multiplex system).

For transport, the miners can be dismantled into individual modular components. Their modular design makes it possible to adjust the cutting drum and drum drive to each given operating condition, and to varying rock materials to be mined, so the surface miners can be efficiently employed in road and tunnel construction as well as in mining raw materials and mineral rock.

For more information, contact Wirtgen America's surface mining specialist Detlev Van Der Veen at 303.567.0236, mobile 303.570.8351.

W 350 will be shown at World of Asphalt

Wirtgen Group At World Of Asphalt

Road construction equipment lines from Wirtgen Group — asphalt recycling equipment from Wirtgen America, Inc., compaction products from Hamm Compaction Div., and asphalt pavers from Vögele America Inc. — will be exhibited at World of Asphalt 2003 in Nashville.

WOA delegates will start the event at an open house at Wirtgen America's North American headquarters in suburban Nashville Monday evening, March 17.

On display at Booth 2104 will be:

- Wirtgen W 1200 cold milling machine, a 37,148-lb. machine with 48-inch cutting width
- Wirtgen W 600, a 26,450-lb. machine with 24-inch cutting width
- Wirtgen W 500, a 24,911-lb. machine with cutting widths of 20 to 24 inches
- Wirtgen W 350, a 6,173-lb. machine (without weights) with a 14-inch cutting width
- Hamm HD 120 asphalt compactor, a 78-inch-wide, double-drum roller with operating weight of 26,675 lb.
- Hamm HDO90V a 66-inch, double-drum, articulated compactor featuring Hamm Oscillation compaction technology, and
- Vögele America 1110 RTB, a 21 ft., 6 in.-wide machine with rubber track drive.

Wirtgen Supports Smithsonian Exhibition With Major Grant

Wirtgen America, Inc. is participating in the American Road & Transportation Builders Association (ARTBA) and National Asphalt Pavement Association (NAPA) support for a new Smithsonian exhibition on transportation.

In November 2003, the Smithsonian's National Museum of American History will open a new exhibition titled "America on the Move". It will be the largest, most significant exhibition on transportation in an American museum.

The $20 million exhibition is being funded in part by grants of $1 million each from the foundations of ARTBA and NAPA. The combined $2 million sponsorship represents the largest single commitment ever to a public education program by the highway industry.

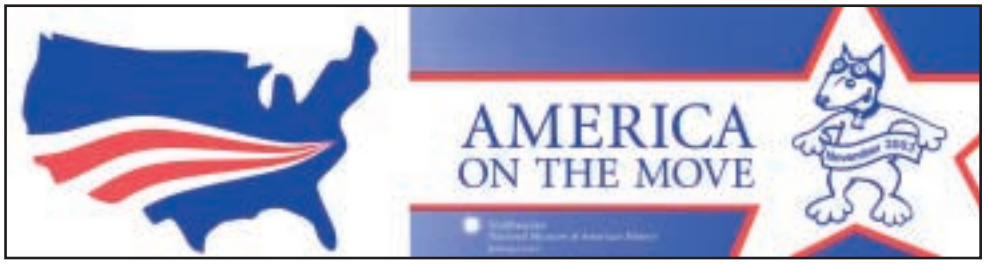
Wirtgen America is participating by contributing $15,000 to both ARTBA's and NAPA's commitments, for a total of $30,000.

"Wirtgen America is proud to stand with these associations in supporting public awareness of transportation," said Stu Murray, president of Wirtgen America. "America on the Move will reach highway users of all ages with a message of the importance of transportation and the role of roads and highways in our history."

The 26,000-square foot exhibition will focus on transportation history since 1876. While covering rail and maritime transportation, the exhibition will give full play to the Eisenhower System of Interstate Highways and the role of local pavements in our daily lives.

In addition to ARTBA and NAPA, the U.S. Department of Transportation has provided initial support for the exhibition. More information about the museum is available at http://americanhistory.si.edu.

Smithsonian's "America on the Move" will open in November



Hamm Parts Order Fulfillment Makes Major Gains

Emergency and stock service parts order fulfillment rates for Hamm Compaction Division of Wirtgen America, Inc. have made major gains since early 2001.

Orders filled completely on the same day for "emergency" parts hit an average of nearly 95 percent (94.6 percent) for 2002, compared to an average 85 percent for 2001. These orders are shipped via air courier for next-day delivery.

Orders filled completely in five days for non-emergency "stock" parts also hit an average of over 90 percent (90.1 percent) for 2002, compared to an average 83.7 percent in 2001. These are shipped via ground to replenish equipment distributor's spare parts inventory.

This compares with about 70 percent average time to fill parts orders on a partial line-item basis, not complete, in mid-2000.

"In mid-2000, if a distributor ordered 10 items, they would be able to fill only about seven out of 10 items," said Rich Enners, senior vice president, Hamm Compaction Division. Today if a distributor ordered 10 items on an emergency order we would be able to fill all 10 items, on average, 95 percent of the time. We've made great strides since then on behalf of our customers."

The No. 1 reason to improve parts fulfillment is to improve customer support, Enners said. "We are dramatically improving our ability to get a customer's machine up and running as quickly as possible in the unfortunate event of a breakdown."

The improvement in parts orders filled complete is the result from two initiatives, continual analysis of historical demand using a new parts planning software, and the deliberate stocking of "critical parts". "Critical parts" are defined as those that can prevent a machine from operating.

"We've been making changes to the way we forecast parts inventory, and tweaking the system, to get better results," Enners said. "We're analyzing parts demand on a more frequent basis, so we can be sure we have parts on the shelf when the customer needs them. And we've made a conscious decision to bring in specific 'critical parts' even though we may have little or no demand for that particular part in the past."

In addition to changes in parts planning, Hamm has made improvements in the warehouse to better-ship parts the same day. "Our philosophy is that if we get an emergency order by 6 p.m., we'll ship that day, even if we have to stay later," Enners said. "We've also been able to extend the period of time when overnight couriers pick up our parts, so our customers can have the part the next day." This compares with some manufacturers that will have a cut off time of 3 p.m.

Also, the need for certain parts changes throughout the year, and Hamm periodically fine-tunes its inventory to keep them available at all times.

"We learned that we have to review the parts forecasting technique on at least a quarterly basis, because some models of product in the field are growing in sales," Enners said. "We do a methodical review of demand, which can be done electronically, and then change the stocking parameters for those parts."

Hamm parts fulfillment for emergency, same-day shipment hit 95 percent by end of 2002

A new philosophy of *Genuine Customer Concern* has been introduced to Hamm, and this also is driving improved parts order fulfillment.

"'Genuine Customer Concern' is a culture we're adopting internally in all facets of the Hamm organization," Enners said. "We're doing it to ensure total care for the customer with respect to product support, of which parts is just one aspect. No banners or rhetoric, we're just establishing a 'customer-centric' focus."

Ed Kearney Joins Wirtgen As Director Of Engineering

In mid-March, Ed Kearney, P.E., joined Wirtgen Group as Director of Engineering, Technical Services. Kearney will serve as Wirtgen's in-house expert for cold recycling, foamed asphalt mix, hot recycling, and asphalt paving procedures and processes.

He is a Notre Dame grad with a M.S. in materials engineering from Rensselaer Polytechnic Institute, Troy, N.Y. Kearney worked for the NYS DOT for 15 years, eight of them in its Engineering Research and Development Bureau, and seven with the office of chief engineer.

His work experience includes nine years with The Asphalt Institute as senior district engineer. For the past 13 years he's developed cold in-place recycling, NovaChip paving, micropaving and slurry seal processes for Gorman Brothers Inc., a major contractor in the Northeast.

"Ed has extensive material and applications background with all three of our product groups," said Stu Murray, president, Wirtgen America Inc. "Ed will travel on our behalf, speaking to various associations, DOT engineers, highway designers and specifiers, and our extensive customer base, bringing Wirtgen's advanced technologies to the forefront of the public arena." He'll also be involved with job site materials management and best paving practices.

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