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Industry Shares in Superpave Implementation

Partnership is one of the key buzzwords of the 1990 s. Far from being a cliché, however, the concept of partnership is crucial to the improvement in quality that all of us are seeking. In this era of partnership, the involvement of the highway industry in Superpave implementation is recognized as essential to the successful application of the new technologies. The North Central Superpave Center (NCSC) was established with the goal of involving industry. The Steering Committee comprises both state and industry representatives from each state and province in the region. Currently, the industry members of the Steering Committee represent the asphalt pavement associations of their respective states or contractors in the region. Those members are shown in the sidebar at the right. Efforts are now underway to identify industry representatives from those states that do not have asphalt pavement organizations. The Technical Committee, which is called on to address specific technical issues, will consist largely of experts from industry, academia and government.

Industry involvement in the NCSC has been discussed at previous meetings of the Steering Committee. The state members of that committee expressed their recognition of the need for industry participation, but did not feel industry groups should be required to assist in funding the NCSC s operation. (The

NCSC will be funded in large part by the states paying an annual base fee. Additional funding will be provided by the states for research projects, some training programs and other auxiliary activities.) Various facets of industry already provide support for many other organizations, such as the National Asphalt Pavement Association, Center for Aggregate Research, Asphalt Institute, etc. Therefore, at this time, the industry groups are not being asked to pay a membership fee to participate in the NCSC.

Industry participation is, however, being sought in other ways. Industry is welcome and encouraged to share in the exchange of information that is one of the NCSC's primary functions. Of more than 500 people who receive copies of this newsletter, well over 80 percent of them represent industry in one way or another. Of 40 people trained to date in courses taught by NCSC personnel, half have been contractors. The industry representatives on the Steering Committee have equal voices with their state counterparts in guiding the NCSC's operations and priorities. Each study advisory committee that is formed to oversee particular research projects conducted by the NCSC will include industry representation.

Industry representatives are considering ways they can voluntarily participate in the financial support of the NCSC. Mr. Lloyd Bandy, Executive Director of the Asphalt Pavement Association of Indiana, is working with his counterparts in other states to identify particular functions or activities they can sponsor. Funding of the printing and distribution of this newsletter, hosting meetings, financing research projects and other items are being discussed.

Industry is also involved in the NCSC through the North Central Asphalt User/Producer Group (NCAUPG). The NCSC staff is currently working with the NCAUPG Executive Committee on ways to strengthen those ties and coordinate activities.

The NCSC staff gratefully acknowledges the support and active participation of industry in the Center. Without the backing of industry, Superpave implementation cannot be successful. Without the involvement of industry representatives, the Superpave center cannot fulfill its mission.

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NCSC Steering Committee Industry Representatives

ILLINOIS ⌋ Mr. Marvin Traylor
Illinois Asphalt Pavement Association
Springfield (217) 523-2241

INDIANA ⌋ Mr. Lloyd Bandy
Asphalt Pavement Association of Indiana

Indianapolis (317) 632-2441

IOWA [u](#) Mr. Gail Jensen
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KENTUCKY [u](#) Mr. Dean Blake
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Superpave 2000 Open House

A National *Superpave 2000* Open House being hosted by the Indiana Department of Transportation (DOT) is scheduled to be held in Indianapolis, Indiana, August 21-22, 1996. This Open House will showcase Superpave implementation efforts by the Indiana DOT and other states, provide updates on Superpave software, and Westrack validation work. In addition, there will be discussions on the use of reclaimed asphalt pavement (RAP), Superpave aggregate specifications, industry perspective on Superpave implementation, and the use of Superpave mix design and analysis procedures on a hot mix asphalt (HMA) warranty project. Attendees of the Open House also will have the opportunity to visit Superpave construction projects and a Superpave laboratory. The Open House is directed to state and local agencies, asphalt and aggregate representatives, and contractors. The Open House is being sponsored by the Federal Highway Administration, Indiana Department of Transportation, Asphalt Pavement Association of Indiana, Indiana Mineral Aggregates Association, and the North Central Superpave Center.

For more information about the Open House or to be included on the mailing lists for registration information, please contact Sandi Robles or Mary Huth of Accent on Indianapolis at (317) 632-8687 or (317) 632-5848 (fax). When you call, be sure to refer to *Superpave 2000*.

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JHRP Tradition Continues

One thing that the FHWA looked for when selecting sites for the regional Superpave Centers was a good working relationship between the potential host state DOT and an engineering university in that state. While many states in the North Central region have established effective and productive arrangements with their universities, the relationship between the Indiana DOT and Purdue University is distinguished by its longevity and efficiency. Their venture, the Joint Highway Research Project (JHRP), has long been recognized as an outstanding example of how states and universities can pool their resources to mutual benefit.

That long-standing partnership was expanded to include industry in 1992 when four industry representatives were added to the governing board. The industry members of the board represent the aggregate, hot mix asphalt, concrete and construction industries. Industry representatives are also included on each study advisory committee to guide research on particular problems.

The JHRP was established by the Indiana State legislature in 1937. The program is governed by the Joint Highway Research Project Board, which is currently chaired by Mr. David M. Pluckebaum, Indiana DOT Deputy Chief Engineer. Professor Kumares C. Sinha, Head of the Transportation Area at Purdue, serves as the Director of the Board.

Through the JHRP, the State can utilize the resources of the University for transportation-related

research and development, implementation and technology transfer. Over 500 research projects have been completed by the JHRP since its inception. The 82nd Annual Purdue Road School was held in 1996; this meeting of state and local highway personnel is one of the major technology transfer activities of the JHRP.

The NCSC is currently being overseen by JHRP. This allows the NCSC to operate through the University with no overhead being charged, at least for the first two years of operation. University resources are being used to handle accounting, payroll, procurement and other functions. The University connection also allows the NCSC to make use of University services at greatly reduced fees. This newsletter, for example, is printed by Purdue Printing Services. Also, the WWW page we are establishing will operate through the Purdue Engineering Computer Network (see page seven for our new WWW address). These are just a few of the ways that the NCSC can take advantage of the benefits of working through the JHRP.

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State Support for Superpave

The AASHTO Standing Committee on Highways of the United States unanimously approved a resolution in support of the five regional Superpave Centers at its meeting in April. The resolution cites recommendations from the AASHTO Task Force on SHRP Implementation which strongly encourage states to take an active role in their regional Centers. The resolution also acknowledges the backing of the FHWA and states that the FHWA has determined that support of the Centers is in the national interest and has authorized states to use 100 percent SPR (State Planning and Research) funds to participate in their respective Superpave Center.

The Committee on Highways resolved that each state should be encouraged to participate in their regional Superpave Center through funding support, oversight of operations, and through supplying loaned staff in order for the nation's highways in every region to be benefitted by the maximum possible advancement of the Superpave system.

The five regional Superpave Centers appreciate the strong support demonstrated by this resolution. We are all committed to helping to achieve the goal of successful implementation of the Superpave system to improve the performance of our nation's highways. The support of the states, other government agencies and industry is essential to making Superpave work.

A full copy of the text of this resolution is available upon request from the NCSC.

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Equipment News

Boart Longyear demonstrated a new gyratory compactor at the Asphalt Institute last month. The hydraulic device was designed to meet the Superpave specifications and weighs about 490 pounds. A built-in sample ejector is included. The Asphalt Institute plans to test the compactor for conformance to the specifications. Pending favorable results of that testing, the device may be on the market in a few months.

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North Central Region Moves Toward Superpave Implementation

The 12 states and two Canadian provinces of the North Central region are making the commitment to implement the Superpave specifications. Most states report that they will be adopting the Superpave binder specifications effective January 1, 1997, and have set target dates for instituting the Superpave volumetric mix design procedure as well. The status of implementation varies widely across the region, however. State Steering Committee members outlined the status of implementation in their states for this article. The summary of their responses is presented in the table on pages four and five of this Newsletter. More detailed comments related to implementation in each of the states are given below. Please keep in mind that these plans and proposals are evolving and are subject to change.

The **Illinois Department of Transportation (DOT)** is one of the leaders in the implementation of the Superpave Gyratory Compactor (SGC); their investment in the SGC and training was summarized in the January 1996 issue of FOCUS, the FHWA's newsletter on SHRP implementation. Illinois will not adopt the binder specification entirely in 1997, but will have nine demonstration projects in 1997. In 1996, the Illinois DOT will require the use of Superpave binder and the asphalt ignition oven on four demonstration projects.

The **Indiana DOT** will construct seventeen projects using the Superpave binder and mix specifications in 1996; three of these projects will involve mix analysis procedures (formerly known as Superpave Level 2). The Indiana DOT plans to implement Superpave mix design for all major interstate projects in 1997, all secondary roads in 1998, and all projects in 1999. Two regional binder laboratories will assist with production testing of Superpave binders.

The **Iowa DOT** will implement the binder specification in 1997 and is discussing the possibility of implementing the volumetric mix design procedure in 1998 or 1999. Last year's Superpave projects used

the Marshall hammer for field control, a practice that may continue for some time because contractors in Iowa were recently required to buy Marshall hammers for Iowa's Quality Management program. The Superpave designs are done cooperatively by the State and contractors.

The **Kansas DOT** will be working to implement both the Superpave volumetric mix design procedures and a Quality Control/Quality Assurance program by 1999. Contractors in Kansas are getting with the program as well; one has a full lab up and running, and two others will probably get set up this summer. Kansas has also been researching some test methods, including fine aggregate angularity and microwave binder aging.

The **Kentucky Transportation Cabinet** is placing mix for a research project this year which requires the use of several different binder modification techniques to meet the same PG grade. The project will include the use of an air oxidized asphalt and in-line polymer modification. Kentucky is also working on instituting a Quality Management specification on about 50 jobs this year and all jobs next year.

The **Manitoba Department of Highways** is in the midst of a transition to Superpave, but does not yet have firm deadlines for their shift. They are working closely with asphalt suppliers on binder implementation. Low temperature issues continue to be of great interest. They are currently looking at the conventionally graded materials their suppliers produce and determining what PG grade those materials meet. Manitoba is looking to the SPS-9 projects for verification of the mix design procedures. They are also experimenting with the SGC.

The **Michigan DOT** is planning many projects using the Superpave binder specification in 1996 and will adopt the specification in 1997. They plan to implement the mix design specification no later than the year 2000. One of Michigan's projects this year will include the use of RAP. Materials from that project will likely be used in a regional pooled fund study on the use of RAP planned to begin this summer.

The **Minnesota DOT** has used mixture volumetrics for years, but they will be changing their specifications to include more rigorous VMA requirements and will institute the moisture sensitivity test. A proposal is under discussion to institute the Superpave mix design as early as 1998. Minnesota is working with Iowa and Wisconsin to select standard PG grades to use consistently in the region. The three states share common suppliers and have similar environmental conditions. Two grades for new construction and one grade for use with RAP or over jointed or cracked pavement will likely be selected.

The **Missouri Highway Transportation Department** has found that contractors are having to be more selective in the aggregates that they use for Superpave mixtures. The State does all of the mix designs and shares the information with contractors. Missouri is implementing a QC/QA plan this year on two Superpave projects.

The **Nebraska Department of Roads** wants to implement Superpave but was one of the last states to receive all their pooled fund equipment. This is also the first full-fledged year using QC by the

contractors. Contractors just purchased Marshall hammers, so it will be some time before the state requires them to purchase SGC s. Even if Superpave mix design is adopted by 2000, field control still may be by Marshall.

The **Ohio DOT** has formed a Superpave evaluation team including the State, FHWA, and hot-mix, aggregate and asphalt industry representatives to look at Superpave s potential effects on Ohio asphalt pavement longevity. The DOT is letting several projects that allow some modifications to the Superpave specs and include quality control testing with both the Marshall hammer and SGC. The specs also allow mixes designed for roads with heavy traffic to pass through the restricted zone if satisfactory results are obtained from Loaded Wheel testing.

Saskatchewan Highways & Transportation is working with Manitoba on the design of an SPS-9 this summer, which will include a section with recycled mix. Saskatchewan has an SGC in operation, but does not yet have the binder equipment. Implementation of the binder specification will take some time and some convincing--suppliers are having a hard time meeting the low temperature grades. They hope that the SPS-9 experiment will give confidence in and understanding of the process.

The **South Dakota DOT** has not yet developed a plan for Superpave implementation. They just recently received their last piece of binder equipment. Therefore, they will not fully implement the binder specification next year, but will likely allow AC or PG grades. They have specified one small, highly modified job this year.

The **Wisconsin DOT** should be well into Superpave volumetric mix design by the year 2000. They are currently planning to place about 800,000 tons of Superpave mix between now and the year 2000. An SPS-9 project scheduled for 1997 will include different cross sections and different PG grades.

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Superpave Implementation Survey

STATE/ PROVINCE	BINDER SPECIFICATIONS			SP VOLUMETRIC MIX DESIGN			CURRENT PRACTICES	
	Implementation Plans	# Projects 1995	# Projects 1996	Implementation Plans	# Projects 1995	# Projects 1996	QC/QA	Mix Designs
ILLINOIS	1997 (1)		4	1996		4	yes	State/U of I
INDIANA	1997	6	17	1997-99	6	17 (2)	yes	Contractor
IOWA	1997	4	1	1998-99 (3)	2	1	yes (4)	Contractor/ State

KANSAS	1997	1+	3	1999	1	3 (5)	1996 (planned)	Contractor
KENTUCKY	1997	3 or 4	2 or 3	2000 (tentative)	1	2 or 3	(6)	Contractor
MANITOBA	uncertain	1	1	uncertain	0	1?	Province	Province
MICHIGAN	1997	6-7	10	No later than 2000	1	1-2	yes	(7)
MINNESOTA	1997	1	4	1998 (8)	1	4	yes	Contractor
MISSOURI	1997	Several	4	(9)	0	4	2 jobs in 1996	State
NEBRASKA	uncertain	0	0	uncertain	0	0	yes	Contractor
OHIO	1997	±5	6 (10)	(11)	1	6 (10)	yes	Contractor/ Consultant
SASKATCHEWAN	uncertain	0	1	uncertain	0	1	yes	Contractor
SOUTH DAKOTA	uncertain	0	1	uncertain	0	1 (12)	(13)	State
WISCONSIN	1997	0	2 or 3	2000	3-4 ramps (14)	2 or 3	yes	Contractor

Notes:

- (1) 1997-99 demo projects with binder and mix design; contractor designs in 1998
- (2) 3 projects with mix analysis and verification
- (3) Tentative
- (4) Started quality management 3 years ago
- (5) Several more SP projects in 1997
- (6) Quality management ±50 projects in 1996; all in 1997
- (7) Contractors do conventional; state and contractor worked together on SP design
- (8) Proposal under discussion
- (9) No explicit target date set; many changes being implemented
- (10) Projects let; may not be constructed in 1996
- (11) Date being discussed
- (12) Probably SP design
- (13) Embarking on QC/QA now
- (14) These projects worked out very well

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National Pooled Fund Study on Superpave Validation Begins

Twenty-three states have committed well over \$500,000 to a national pooled fund study directed at *Validation of the Superpave Asphalt Mixture Specification Using Accelerated Testing* (FHWA Pooled Fund Study 176). Representatives of the participating states met in West Lafayette in May to discuss the experimental design for the program.

The recommendations of the Accelerated Pavement Testing (APT) Expert Task Group (ETG) served as

the starting point for the deliberations. After much discussion, the group identified a short list of factors to study, including:

- Sensitivity of Mix Performance to Voids in the Mineral Aggregate (VMA)
- Effect of Fine Aggregate Angularity (FAA) on Mixture Performance
- Performance Comparison of Gradations Finer and Coarser than Superpave Gradations
- Effect of Binder Grade on Rut Depth

Principal investigator Mr. Brian Coree, Materials Research Engineer with the Indiana DOT, will develop an experimental design for the study focusing on the first three factors above. Work at Turner-Fairbank is addressing the binder issue. Additional work elements may be added as the study proceeds.

The NCSC will cooperate with the research by performing Superpave mix designs and analysis on the experimental mixtures. The NCSC will also coordinate a regional study on FAA with this project.

The study will be conducted at the APT facility in West Lafayette. Mixtures are placed and compacted in the APT using full-sized construction equipment. The facility, developed under the direction of Dr. Thomas D. White, Professor of Civil Engineering at Purdue University, can accelerate loading damage by 1,000 times.

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Mix ETG Recommendations

The Mixture Expert Task Group (ETG) met in March to discuss any outstanding issues related to Superpave implementation. Discussions focused primarily on refinement and standardization of testing. Mr. Jim Gehler of the Illinois DOT reported on the results of a round robin conducted in Illinois using the Superpave Gyratory Compactor (SGC). Illinois is the leader in the adoption of the SGC for field compaction. Results of testing using 13 different gyratories showed standard deviations of the bulk specific gravity of 0.025 at N_{ini} , 0.010 at N_{des} and 0.005 at N_{max} .

Mr. Bob McGennis, Director of the Superpave Center at Austin, reported on a draft of the Ruggedness Evaluation on TP4, Standard Method for Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the SHRP Gyratory Compactor. McGennis presented the results from four laboratories; data for a fifth lab will be added before the final report is released. Results to date indicate that the tolerance on the compaction angle ($\pm 0.02^\circ$) is reasonable; a transfer bowl is preferable, but not necessary, for mold loading; the tolerance on compaction pressure (± 18 kPa) is too high; precompaction using a blunt-nosed rod is ineffectual; the tolerance on equiviscous compaction temperature (± 0.030 Pa-s) is reasonable; the tolerance on specimen height (± 1 mm) is too narrow; and,

for binders similar to those used in this evaluation, the 30-minute compaction temperature equilibrium period can be included in the four hour aging period for mixture volumetrics determinations.

The group discussed a comparison of short-term aging times at different material thicknesses. Based upon the results of a study using 11 mixes with varying degrees of absorption, the ETG is recommending that short term aging be changed to two hours at 50 kg/m². A note will suggest using four hours for highly absorptive aggregates.

In other business, the group also formed a subcommittee to look into the use of solid additives with the binder and how these fit into the Superpave system; discussed the need for research on the test for moisture sensitivity; reviewed progress of several efforts investigating the use of a mixture strength test/proof test for volumetric mix design; reviewed the N-Design experiment; and considered issues related to fine aggregate angularity, the provisional standards, test standardization, the restricted zone and control points, and the use of RAP.

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Tips and Techniques

Mr. Pat Jacomet of CSR American Aggregates responded to our request for information on laboratory tips and techniques for Superpave testing. Jacomet reports on a device called the Gyro Loader, which they developed to load a gyratory compaction mold in one lift with reduced segregation. Jacomet says, "Early in our experiences with the gyratory compactor, we felt there was a need to develop an apparatus for loading the asphalt mix into the compaction mold after the short term aging period. We wanted an apparatus that would allow us to load the mold in one continuous motion without segregation. It had to be quick and easy (to reduce temperature loss and time spent by the technician) and it had to reduce the segregation that occurs during scooping (the fines tend to stick to the curing pan and thus end up on the top of the specimen). Finally, and most importantly, it had to conform to the AASHTO TP4 mold-loading procedure."

The Gyro Loader is the result of their experimentation and innovation. Jacomet describes the Gyro Loader as a self-standing, wing-shaped piece of rolled stainless steel with a tapered discharge end to fit into the top of the mold. The device allows the technician to transfer material from the aging pan into the loader, level the sample and distribute it evenly, then load the mold in one motion.

Preliminary results of the ruggedness testing of AASHTO TP4, Standard Method for Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the SHRP Gyratory Compactor, indicate that the Gyro Loader and scoop methods can both be used without causing significant effects. Use of the scoop, in at least one case, apparently had a significant effect on the results because the operator took a long time and meticulous care in avoiding segregation during loading. With

timely loading of the mold, however, such effects should not occur. These results indicate that the Gyro Loader is an acceptable method for loading the mold. In some cases, at least, the method may be preferred in some labs or by particular operators. If you would like more information about the Gyro Loader, please contact the NCSC.

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NCSC Announces Course Schedule for 1996

The NCSC has planned a number of training courses to be offered through the remainder of 1996. Planned courses include binder training and mix design training. The training schedule, shown to the right, is subject to change depending on demand.

The Binder Course is designed to provide classroom overviews of the binder specification and test methods followed by hands-on laboratory work with all of the binder test procedures except direct tension. The course is based on materials developed by the National Asphalt Training Center. This three-day course is primarily for binder lab technicians who will be performing these tests on a routine basis. Course size is limited to twelve people.

The Mix Design Course offers a thorough presentation of the Superpave mix design system and includes overviews of the binder specification and mix analysis. The majority of this three-and-a-half-day course focuses on the Superpave Gyrotory Compactor (including hands on work), mixture volumetrics and the mix design procedure. The course concludes with a workshop session on the calculations used in the mix design process. For new mix design technicians, an additional half-day can be provided to detail measuring specific gravities, mixing samples, and other steps that are only reviewed during the primary course. Course size is limited to twelve people.

Additional courses can be scheduled based on demand. The NCSC staff is also available to travel to your facility to provide training for groups. If your organization needs customized training or envisions courses other than those outlined here, please contact the NCSC to discuss your ideas. We would be happy to work with you to meet your needs.

For registration information, contact Julie Smith at the NCSC Mixture Branch. Before July 1, please call (317) 494-5025 or fax (317) 463-1364; after July 1, call or fax (317) 463-2317. Registrations will be accepted for specific course dates, but it is recommended that you indicate a second choice in case the class you prefer is full. Registration will be closed three weeks prior to the class date to allow confirmations to be sent to attendees.

TRAINING COURSES

Tentative Date	Course Title
September 16-19	Binder
October 21-24	Mix Design
November 18-21	Mix Design
December 2-5	Mix Design

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Calendar of Events

July 11-12	Superpave Centers Coordination Meeting West Lafayette, Indiana INVITATION ONLY
August 21-22	Superpave 2000 National Open House Indianapolis, Indiana
October 23-24	North Central Asphalt User/Producer Group Meeting West Lafayette, Indiana
October 24-25	NCSC Steering Committee Meeting West Lafayette, Indiana

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E-mail your comments to: ncsc@ecn.purdue.edu

Last modified: March 20, 2007