FALL 2011
Volume 23, Number 2

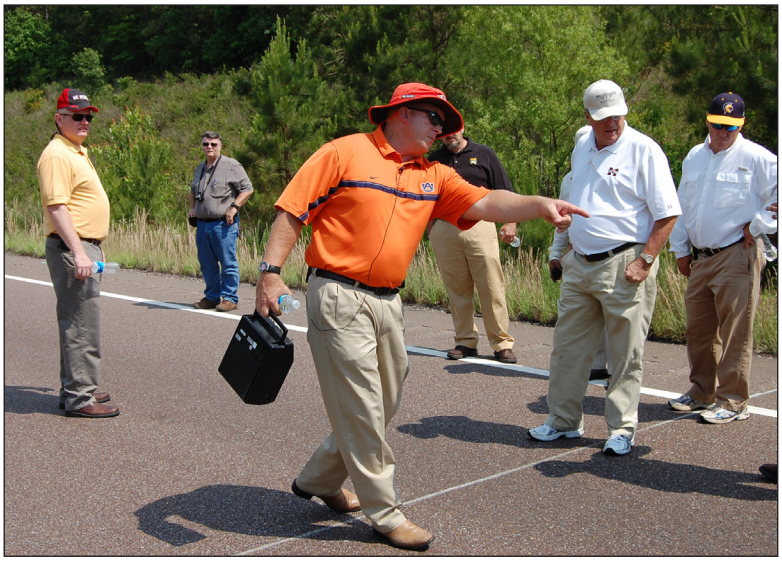
Asphalt Technology News

In This Issue

25 YEARS 1986 - 2011
National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

Test Track Fourth Cycle Nears Completion

The fourth research cycle at the NCAT Pavement Test Track is almost complete, as trafficking reached 10 million equivalent single axle loads (ESALs) in September. The current cycle began in 2009, when 17 of the track's 200-ft. test sections were either reconstructed or rehabilitated, while the remaining sections were left in place to allow for additional traffic loading. Evaluations address a variety of structural and surface performance objectives. Following the conclusion of trafficking, forensic investigations will be performed, and research findings presented at the 2012 Pavement Test Track Conference in February.



Test Track Manager Buzz Powell gives a walking tour of the 1.7-mile Pavment Test Track during the 2011 sponsor meeting in May.

Test Sections Being Evaluated

The six-section group experiment (GE) forms the core of the structural research effort, which relies on embedded instrumentation to measure pavement response to traffic loading. All GE sections have a total asphalt thickness of seven inches, with six inches of dense-graded aggregate base and a stiff subgrade underneath.

One of the biggest surprises of the 2009 research cycle is the excellent performance of the GE test sections.

Sustainable technologies being evaluated within the GE include full-depth warm-mix asphalt (MeadWestvaco's Evotherm® DAT technology and the Astec Double-Barrel Green® foaming process), high reclaimed asphalt pavement (RAP) content (50 percent) and a porous friction course (PFC). Sponsors of the GE are highway agencies from Alabama, Florida, North Carolina, Oklahoma, South Carolina and Tennessee, as well as the FHWA.

As a complement to the GE, there are also four privately sponsored structural sections. The Kraton section contains highly polymer-modified mixes, allowing the section to be designed with a reduced total asphalt thickness of 5.75 inches. Two Shell Thiopave® sections use a sulfur technology to replace a percentage of the liquid asphalt in the binder and base layers. In the Trinidad Lake Asphalt section, pelletized natural asphalt makes up 25 percent of the total binder in the mix.

Along with the GE and complementary sections, there are six additional structural sections sponsored by Alabama, Florida and Oklahoma. These sections are being used to evaluate perpetual pavement design, rehabilitation strategies and methods to reduce surface cracking. The two Alabama sections have been in place since 2003, while the Oklahoma sections were built in 2006. The Florida sections were placed in 2009, with a goal of improving the quality of PFC surfaces by studying tack coat methods.

All surface performance sections are built on perpetual foundations to ensure that surface distresses are materials-related. FHWA, Georgia, Mississippi, Missouri, Cargill, Polycon and Oldcastle Materials Group currently sponsor a total of 10 surface performance sections, four of which have been left in place from previous testing cycles. Evaluations include binder modification with ground tire rubber (GTR), stone-matrix asphalt (SMA) aggregate specifications, long-term performance of an all-gravel PFC and long-term durability of 45 percent RAP mixes.

—Continued on Pg. 2

Mark Your Calendar: 2012 Test Track Conference Scheduled

Make plans to attend the Pavement Test Track Conference, scheduled for February 28–29, 2012, at the Auburn University Hotel and Dixon Conference Center located in Auburn, Ala. This two-day event will showcase the most recent findings from the NCAT Pavement Test Track and will include a tour of the track and its lab facility. Participants will also hear how track research is being put into practice around the country. Registration and exhibitor information can be found at www.ncat.us.

—Continued from Pg. 1

Pavement performance is tracked weekly using an inertial profiler to measure the International Roughness Index (IRI), macrotexture and rut depth. Also, sections are visually inspected for signs of cracking, and any observable cracks are carefully mapped. Performance data for each test section is available at www.pavetrack.com.

One of the biggest surprises of the 2009 research cycle is the excellent performance of the GE test sections. Previous experience on the track has shown that sections with the same pavement layer thicknesses had fatigue cracking well before 10 million ESALs; however, none of the new GE sections have shown any forms of distress to date. Although the GE section with the PFC surface does appear to make a structural contribution, higher strain levels in the field may be indicative of a value that is lower than that of a conventional mix. As a rehabilitation surface in another experiment, PFC mix was found to extend the performance life of underlying dense mix with a history of cracking susceptibility (especially when placed with a spray paver). Another significant rehabilitation finding resulted from the use of the thinner Kraton mix as a maintenance treatment in a nearby section that had failed rapidly following conventional rehabilitation.

Test track research is also contributing to further understanding of laboratory performance tests and modeling predictions. The NCAT lab has conducted a battery of tests on the mixes from the test sections, and researchers have carefully analyzed data using the conventional pavement design approach and mechanistic-based methods. One of the key findings is that some of the tests used to assess cracking performance use unrealistic strain levels that result in different performance rankings compared to observations in the field.

Inertial Profiler Certification

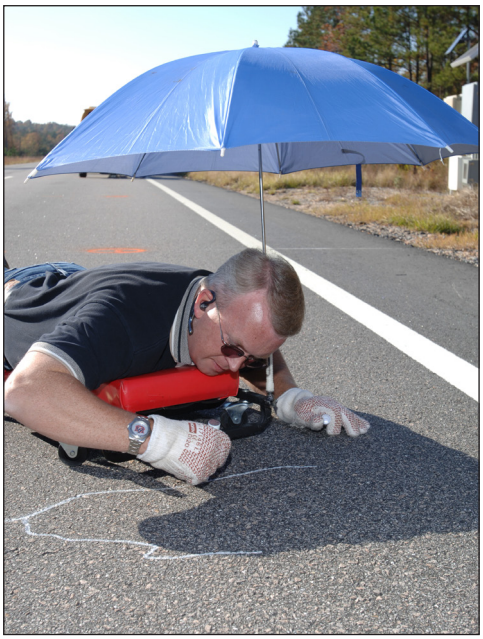
During the interim period between the end of trafficking this fall and the beginning of construction next spring, the track will be used as the test bed for an inertial profiler certification program sponsored by the Alabama Department of Transportation (ALDOT). Validations of inertial profilers from various manufacturers will be made using measurements on the inside lane at the track. Several nearby states have indicated that they will also accept certification results from this program, which will be used by ALDOT to build a qualified products list. Contractors may also take advantage of a corresponding inertial profiler serial number and technician certification program at the test track this winter.

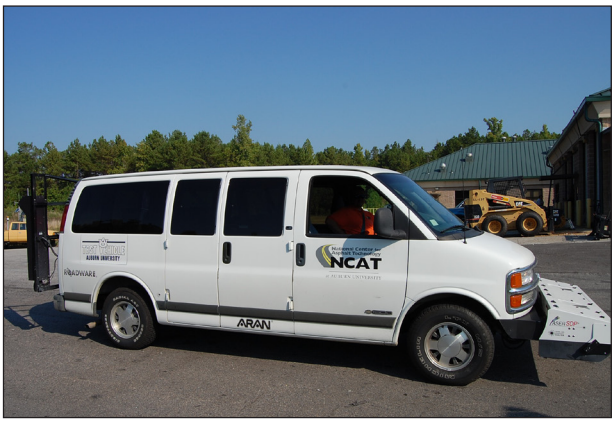
Fifth Cycle to Begin Summer 2012

Plans are being made for the next research cycle at the test track. Removal of discontinued sections is planned for next spring, and construction of new sections should be complete by the end of summer, allowing trafficking to begin in August 2012.

The focus of research for the test track's fifth cycle will be exploring ways to help transportation dollars go further. Pavement preservation techniques will likely be a key component of the research plan, including thin overlays and inlays, microsurfacing, chip seals and other surface treatments. Alternative binders and binder modifiers, such as GTR, are also expected to be a research focus. Another area of concern is the durability of drainable surface courses, specifically improving joint performance, eliminating raveling and evaluating tack coats. High percentages of recycling—both RAP and recycled asphalt shingles (RAS)—will also be a major focus of the 2012 track.

Since its original construction in 2000, the NCAT Pavement Test Track has been providing practical solutions for building and maintaining long-lasting, cost-effective roads. Federal and state agencies, as well as private sector organizations, benefit from the timely, real-world research conducted at the track. For more information on becoming a test track sponsor, contact Buzz Powell at 334.844.6857.





(Left) Test Track Manager Buzz Powell maps cracks on the NCAT Pavement Test Track.

(Top) Buzz prepares to take the Automatic Road Analzyer (ARAN) van out on the track to measure roughness, rut depth and macrotexture of test sections using full lane-scanning lasers.

Research Synopses — A Brief Overview of NCAT Technical Reports

NCAT engineers spend a great deal of time writing technical reports, documenting every aspect of a research project. The asphalt paving community also spends a lot of time reading these reports, which is necessary to thoroughly understand a study and its results. Industry engineers and managers also need the information to be able to confidently make data-based changes in their own operations.

Sometimes, however, there is just not enough time to read the entire report. This is why NCAT has begun writing research synopses of many of its technical reports, especially those focusing on the most relevant, widespread problems facing the asphalt paving industry today.

NCAT research synopses are typically one-and-a-half to two-page summaries of full-length technical reports. They are broken down into sections that discuss the 1) problem driving the research, 2) research objective, 3) description of the study, 4) key findings, 5) conclusions and recommendations, and sometimes, 6) suggestions for further research. One or two key graphics are included to help clarify the study.

"In today's world of information that floods our inboxes, these brief synopses provide a quick overview of our work at NCAT for a number of key audiences," says Jay Winford, chairman of the NCAT Applications Steering Committee.

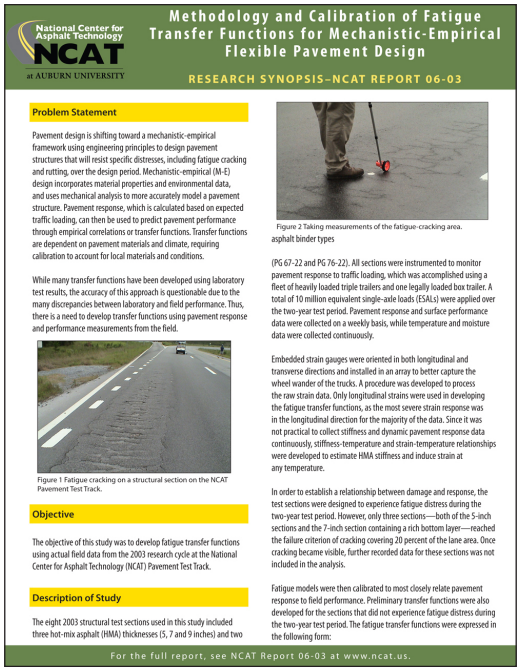
And who are these target audiences for research synopses? Winford says they include high-level decision-makers within state highway agencies and private industry executives, who may be too busy to review a lengthy technical report, as well as managers and engineers who want a quick preview of a study before delving into the details.

The language in research synopses is generally less technical, which allows people without an engineering background to understand the study and the economic benefits of its findings. Synopses on the use of reclaimed asphalt pavement (RAP) and PG grade-bumping, for example, are extremely useful because of the potential economic impact of these studies, Winford says.

"I have heard some NAPA (National Asphalt Pavement Association) members say that because of the research synopses, they have a better feel for the research and conclusions being developed at NCAT, along with the financial implications of these conclusions," he adds.

Synopses do not completely take the place of their full-length counterparts, however. The reports are still an important, detailed source of information for "seasoned asphalt technologists who have been directly involved in asphalt research," Winford says.

NCAT currently has 18 research synopses on topics that include recalibrating of the asphalt layer coefficient, mixing and compaction temperatures of binders, using RAP in stone-matrix asphalt mixtures, bond strength between asphalt pavement layers, and working with open-graded friction course mixtures. All the synopses can be accessed at http://www.ncat.us/info-pubs/research-synopses.html.



National Center for Asphalt Technology at AUBURN UNIVERSITY

Methodology and Calibration of Fatigue Transfer Functions for Mechanistic-Empirical Flexible Pavement Design

RESEARCH SYNOPSIS–NCAT REPORT 06-03

Problem Statement

Pavement design is shifting toward a mechanistic-empirical framework using engineering principles to design pavement structures that will resist specific distresses, including fatigue cracking and rutting, over the design period. Mechanistic-empirical (M-E) design incorporates material properties and environmental data, and uses mechanical analysis to more accurately model a pavement structure. Pavement response, which is calculated based on expected traffic loading, can then be used to predict pavement performance through empirical correlations or transfer functions. Transfer functions are dependent on pavement materials and climate, requiring calibration to account for local materials and conditions.

While many transfer functions have been developed using laboratory test results, the accuracy of this approach is questionable due to the many discrepancies between laboratory and field performance. Thus, there is a need to develop transfer functions using pavement response and performance measurements from the field.

Figure 1 Fatigue cracking on a structural section on the NCAT Pavement Test Track.

Objective

The objective of this study was to develop fatigue transfer functions using actual field data from the 2003 research cycle at the National Center for Asphalt Technology (NCAT) Pavement Test Track.

Description of Study

The eight 2003 structural test sections used in this study included three hot-mix asphalt (HMA) thicknesses (5, 7 and 9 inches) and two

Figure 2 Taking measurements of the fatigue-cracking area.

asphalt binder types

(PG 67-22 and PG 76-22). All sections were instrumented to monitor pavement response to traffic loading, which was accomplished using a fleet of heavily loaded triple trailers and one legally loaded box trailer. A total of 10 million equivalent single-axle loads (ESALs) were applied over the two-year test period. Pavement response and surface performance data were collected on a weekly basis, while temperature and moisture data were collected continuously.

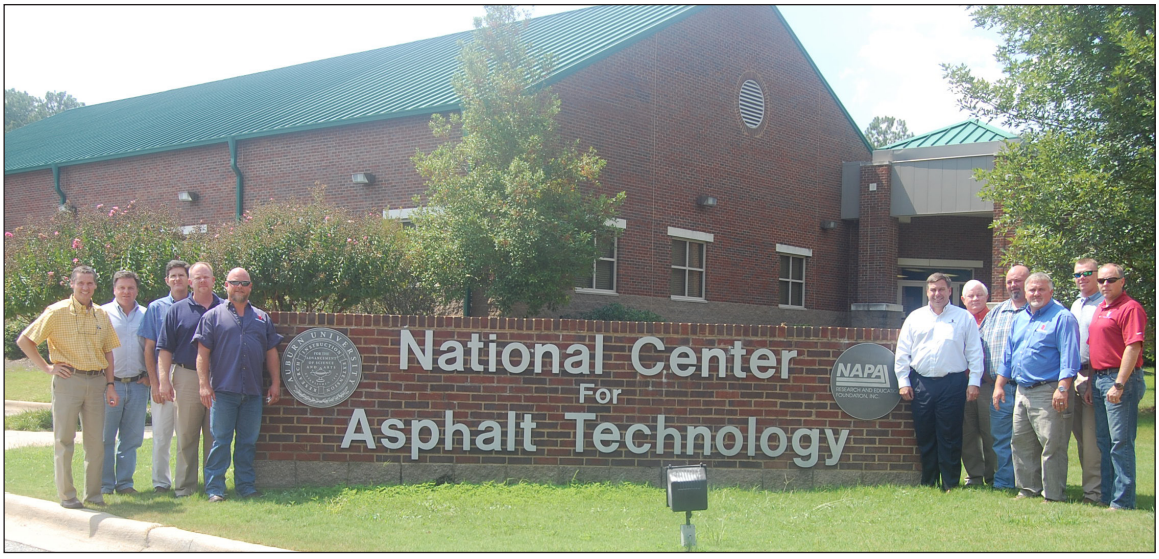
Embedded strain gauges were oriented in both longitudinal and transverse directions and installed in an array to better capture the wheel wander of the trucks. A procedure was developed to process the raw strain data. Only longitudinal strains were used in developing the fatigue transfer functions, as the most severe strain response was in the longitudinal direction for the majority of the data. Since it was not practical to collect stiffness and dynamic pavement response data continuously, stiffness-temperature and strain-temperature relationships were developed to estimate HMA stiffness and induce strain at any temperature.

In order to establish a relationship between damage and response, the test sections were designed to experience fatigue distress during the two-year test period. However, only three sections—both of the 5-inch sections and the 7-inch section containing a rich bottom layer—reached the failure criterion of cracking covering 20 percent of the lane area. Once cracking became visible, further recorded data for these sections was not included in the analysis.

Fatigue models were then calibrated to most closely relate pavement response to field performance. Preliminary transfer functions were also developed for the sections that did not experience fatigue distress during the two-year test period. The fatigue transfer functions were expressed in the following form:

For the full report, see NCAT Report 06-03 at www.ncat.us.

Example of an NCAT research synopsis.

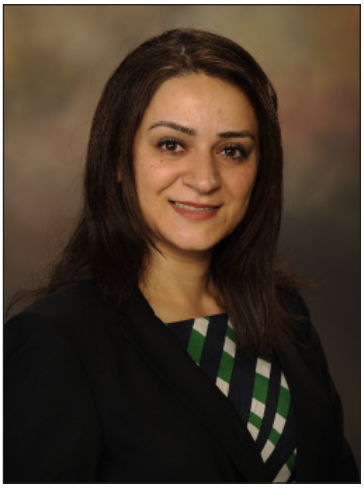


Roadtec Inc. visited NCAT on Aug. 30, 2011, to learn more about the center, specifically NCAT's testing procedures. The company said the visit was an effort to keep its sales team educated on the asphalt industry in order to better serve its customers.

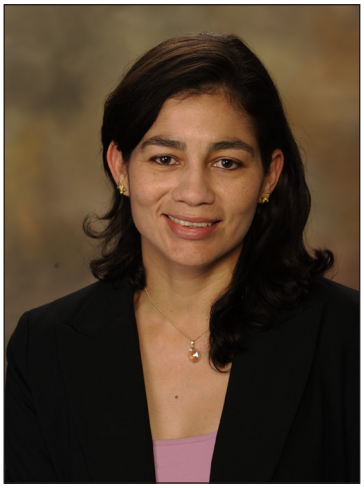
Roadtec, based in Chattanooga, Tenn., develops asphalt paving equipment.

New faces, research interests round out NCAT staff

The National Center for Asphalt Technology welcomed two new staff members this summer, Assistant Research Professor Maryam S. Sakhaeifar and Lead Engineer Carolina Rodezno. Both women come to us with a strong asphalt technology background and unique research interests that complement those of other NCAT engineers.



Maryam S. Sakhaeifar
Assistant research professor



Carolina Rodezno
Lead engineer

Meet Maryam

Growing up in Tehran, Iran, Maryam S. Sakhaeifar was fascinated by the buildings, bridges and highway systems in the region. Coupled with inspiration from her father to enter a scientific field, this fascination evolved into an interest in a civil engineering career.

In 2002, Sakhaeifar earned her bachelor's degree in civil engineering from the University of Tehran and, in 2005, her master's in geotechnical engineering from the Iran University of Science and Technology. As a geotechnical engineer for two consulting firms in Tehran, she worked on anti-seismic soil design, industrial steel and reinforced concrete structures. This work drove her to study the field of pavement engineering in the U.S. and led her to pursue a doctorate in pavement materials engineering at North Carolina State University.

"One thing I enjoy most about my job is that no day is the same and that the breadth of what can be accomplished seems unlimited."

-Maryam S. Sakhaeifar

While in North Carolina, she was involved in state-of-the-art projects to develop procedures and models for studying the phenomenological characterization of bituminous materials. Sakhaeifar sees it as her mission "to bridge the gap between academia and engineering practice by disseminating research to engineers in the field" and to see recent research put to use. She hopes to make this happen at NCAT.

Sakhaeifar joined the NCAT research staff this June. She is the lead on pavement management systems (PMS) and pavement preservation projects, and she is teaching a course on PMS at Auburn University this fall. She brings to the table a strong background in pavement mechanics and artificial neural network analysis. Her strong analytical background complements those of other NCAT researchers who are involved with the practical aspects of HMA.

So far, she has enjoyed gaining hands-on experience in pavement engineering at NCAT and helping to analyze HMA mixture properties at the NCAT Pavement Test Track. "The thing I enjoy most about my job is that no day is the same and that the breadth of what can be accomplished seems unlimited."

As a pavement engineer, she also likes contributing to important decisions that determine what key pieces of infrastructure are built and where they are built. She says she hopes to see more research into sustainable solutions to these infrastructure projects—particularly highway systems.

Maryam also hopes that interest in the field of pavement engineering will grow as more people realize the importance of safe, long-lasting pavements.

"Since I see the field as a way to help people on a large scale, I am excited at the prospect of bringing more people, particularly women, into pavement engineering," she says.

Meet Carolina

Carolina Rodezno's special interest in asphalt pavements developed after completing her bachelor's degree in her native country of Nicaragua and receiving a scholarship from Arizona State University to pursue a master's in transportation and materials engineering.

"While earning my master's degree, I became interested in asphalt pavement because of its complexity as a structural material and also because of the challenges of forecasting its performance over time," Rodezno says. She also recognized how important highway infrastructure performance is to the success of each country's economy.

"I became interested in asphalt pavement because of its complexity as a structural material and also because of the challenges of forecasting its performance over time."

-Carolina Rodezno

With these new interests in mind, Rodezno continued on the same path for her doctorate, focusing on advance material characterization of pavement materials and pavement design. In 2010, she completed her dissertation on the development of pavement performance criteria using advance laboratory testing. She remained at ASU as a post-doctoral researcher, where she had the opportunity to help Brazil improve its highway infrastructure. Rodezno traveled to Sao Paulo this summer to help prepare a framework for the city's future implementation of the Mechanistic-Empirical Pavement Design Guide (MEPDG).

Her education and real-world experience brought her to NCAT in September. She says NCAT's worldwide leadership role in

—Continued on Pg. 10

NCAT invites your comments and questions, which may be submitted to Karen Hunley at karen.hunley@auburn.edu. Questions and responses are published in each issue of *Asphalt Technology News* with editing for consistency and space limitations.

Chris Jones, Wiregrass Construction
What is the maximum amount of time that warm-mix asphalt (foam method) has been stored in a silo? At what temperature was it originally placed in the silo?

Pat Upshaw, Florida Department of Transportation
What types of asphalt mixes/asphalt binders/pavement designs are other states using at Interstate weigh station areas that are subject to heavy, slow-moving truck traffic?

Darin Tedford, Nevada Department of Transportation
The Nevada DOT is experimenting with warm-mix asphalt. Statewide, we require 1.5 percent hydrated lime to be applied to the aggregates, which are wetted to approximately SSD moisture and stockpiled for a minimum of 48 hours before use. Do any other states have experience with incomplete drying of aggregates in the drum and related moisture-sensitivity issues?

Mark Woods, Tennessee Department of Transportation
What are the other state DOTs' thoughts on intelligent compaction (IC) and potential implementation? Would you be willing to forego or lighten your field density specification if IC rollers were being used on a project and IC data was submitted daily?

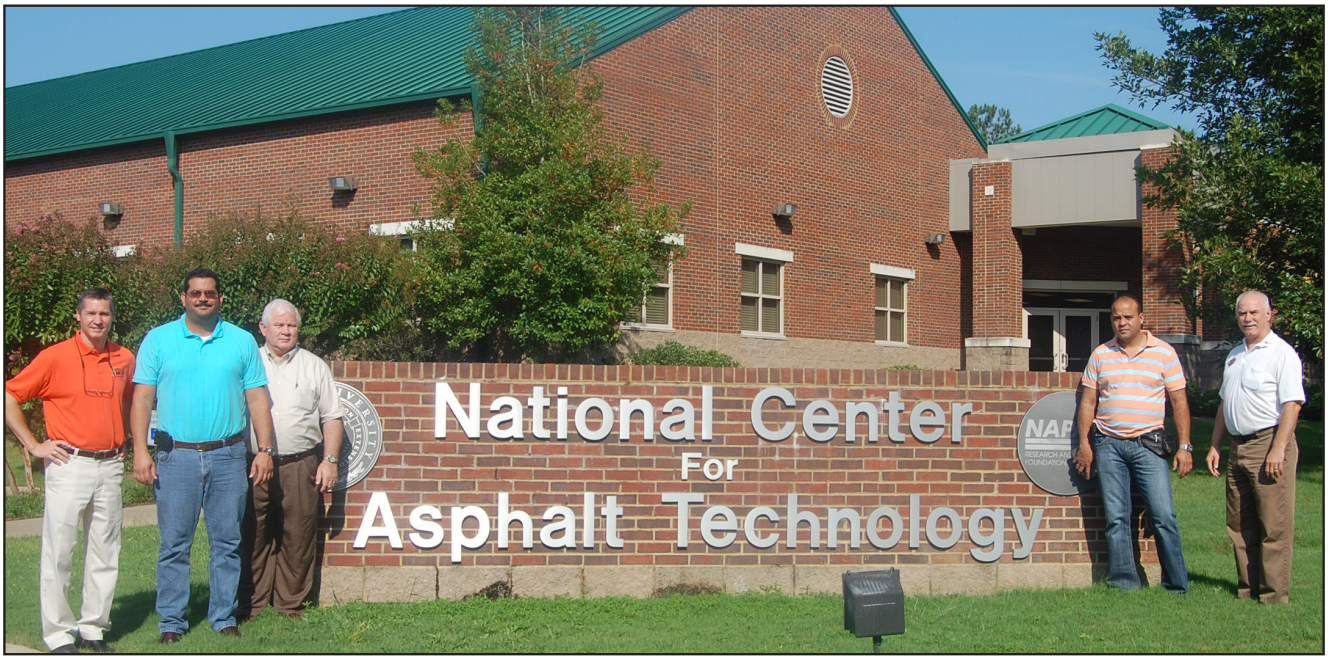
Has any state seen any satisfactory bid numbers, in terms of cost per square yard, for any type of in-place recycling? Has anyone considered alternate contracts such as mill, surface, and binder versus hot-in-place (HIP) and surface? Thoughts?

Mike Heitzman, NCAT
Are any states having to import aggregate to meet hot-mix asphalt (HMA) surface friction requirements? What tests are performed to evaluate friction properties of new aggregate sources?

What states are making plans to implement Asphalt Mixture Performance Tester (AMPT) requirements for HMA mix designs?

What states are using ground penetrating radar or some other form of non-destructive testing for forensic investigations?

Don Watson, NCAT
Is anyone aware of research regarding whether it is best to remove the aggregate with cut faces from cores before testing Gmm, Pb or gradation?



Two representatives from the Materials Testing Office of the Puerto Rico Highway and Transportation Authority visited NCAT on Aug. 23–25 to attend the Asphalt Mixture Performance Tester (AMPT) training course sponsored by the National Highway Institute (NHI) and the Federal Highway Administration (FHWA). They also wanted to learn more about sponsoring a section or participating in a group experiment on the upcoming Pavement Test Track cycle. Their organization also participates in the Southeastern Superpave Center pooled fund.

From left to right: Randy West, NCAT director; Andres Alvarez-Ibanez, Puerto Rico; Don Watson, NCAT; Miguel Ortiz-Gonzalez, Puerto Rico; and Mike Heitzman, NCAT.

Asphalt Forum Responses

The following responses have been received to questions shared in the Spring 2011 Asphalt Forum.

1. **It would be interesting to hear how other states approve hot-mix asphalt (HMA) mix designs prior to production. More specifically, what materials are submitted/tested (if any), and what is the department ultimately trying to evaluate? (Mark Woods, Tennessee DOT)**

Denis Boisvert, New Hampshire DOT
New Hampshire tests all the raw materials going into the mix to verify gradation, asphalt cement (AC) content and air voids. Checkpoints are verified each season for mix designs that continue to be used.

David Powers, Ohio DOT
New designs are approved by review of the entire job-mix formula (JMF) submittal packet to assure proper mix types for the application, approved materials and accurate design data are used. Sample submittal requirements depend on mix type. We have found the most useful sample is a loose mix for maximum specific gravity. The degree of time spent on mix design review depends on mix type and application, contractor history with accuracy and history with samples meeting requirements. Since contractors do not often perform entire mix designs (there are many shortcuts), we have learned that a proper review is essential to minimizing issues at production startup. We are still surprised at how often inaccuracies in submittals, failing submittal samples and startup issues exist, even after years of experience with contractors creating designs.

Greg Sholar, Florida DOT
The Florida DOT receives pre-batched aggregates and a sample of the asphalt binder to be used for the project. FDOT mixes and tests the samples for volumetrics, fine aggregate angularity, moisture sensitivity, sand equivalent, Gsb of RAP, ignition oven calibration factor and gradation. If FDOT's test results compare with the contractor's test results within allowable tolerances, then the mix design is conditionally approved pending successful production in the field.

Darin Tedford, Nevada DOT
The Nevada DOT accepts aggregates and asphalt from contractors and performs mix designs in the central lab. The designs are then verified by the contractor placing a field-trial mixture.

James Williams, Mississippi DOT
In Mississippi, the contractor is responsible for designing the mix, and the DOT central lab verifies the mix before production. We require the contractor to submit raw aggregate batched to meet the proposed job-mix formula (JMF) and the proposed brand and grade of binder. We check aggregate gradations and gravities, and also check all volumetrics of the mix. The mix is then tentatively approved pending acceptable field production and performance.

2. **Has any agency used bonded wearing courses (i.e., Novachip process) and seen a noticeable improvement in performance? (Greg Sholar, Florida DOT)**

Denis Boisvert, NHDOT
We have placed several projects using Novachip. We were satisfied with its performance. Although cost was higher, it outperformed the surface treatment methods that were compared to it (chip seal and rubber chip). We have not evaluated its performance against our HMA pavements.

Mark Woods, Tennessee DOT
Tennessee has various sections throughout the state. Some sections have been placed in areas with higher accident rates. We are mostly satisfied with their performance.

Darin Tedford, Nevada DOT
No.

3. **Has any agency experienced problems with end-of-load segregation and, if so, how is this being rectified? (Greg Sholar, Florida DOT)**

Denis Boisvert, New Hampshire DOT
The requirement of mobile transfer vehicles has dramatically improved our segregation issues, including temperature segregation, which we have only recently begun to study. This is our third season under the specification.

David Powers, Ohio DOT
The Ohio DOT would love to know how to stop this problem. We have some people in Ohio claiming the use of folding wings is acceptable practice. There is often a quality disconnect at the project level.

Mark Woods, Tennessee DOT
Tennessee has a special provision that specifies a material transfer device. This provision is applied to all Interstate projects and higher-priority state routes. The only approved devices are those that have a significant amount (more than one truck load) of capacity.

—Continued on Pg. 7

—Continued from Pg. 6

Darin Tedford, Nevada DOT
The Nevada DOT requires a material transfer vehicle with internal storage capacity to be used on all jobs. Also, our contractors mainly use belly-dump haul trucks.

James Williams, Mississippi DOT
The Mississippi DOT requires an approved material transfer device on all surface lifts to deal with end-load segregation.

4. Has any agency placed asphalt mixture wearing courses with performance grade (PG) 82-22? If so, were compaction aids like Sasobit added? Were there any issues with construction? (Greg Sholar, Florida DOT)

Denis Boisvert, New Hampshire DOT, and Darin Tedford, Nevada DOT, both reported that no such courses have been placed in their states.

Mark Woods, Tennessee DOT
We have had various sections with PG 82-22, but we have not used any compaction enhancers. We have had issues with pumpability on some projects, but on other projects it hasn't been an issue at all.

James Williams, Mississippi DOT
We have placed some mix with PG 82-22 and found that, depending on haul time and weather conditions, obtaining the required density can be problematic due to temperature loss. We believe that we can obtain equivalent or better performance from a stone-matrix asphalt (SMA) rather than using a highly modified binder.

5. Have any agencies implemented the multiple stress creep recovery (MSCR) test for asphalt binders? Has the test eliminated any binders that would otherwise be acceptable? (Don Watson, NCAT)

Denis Boisvert, New Hampshire DOT; Greg Sholar, Florida DOT; Mark Woods, Tennessee DOT; and Darin Tedford, Nevada DOT, all said they not have yet implemented the MSCR test.

David Powers, Ohio DOT
At this time, we are only collecting data. We are also investigating the asphalt beam cracking device as a low-temperature measure for cracking.

James Williams, Mississippi DOT
We have not implemented the MSCR test for binders, but we are actively testing our binders and building a database to identify if we would be failing binders that are currently acceptable.

6. Have any agencies investigated the recyclability of asphalt rubber mixtures manufactured with ground tire rubber? Have any environmental studies been conducted to evaluate plant emissions where ground tire rubber has been used in mixture production? (Don Watson, NCAT)

Denis Boisvert, New Hampshire DOT
We just placed our first rubber asphalt mix in nearly 15 years.

Greg Sholar, Florida DOT
The Florida DOT funded research in the 1990s related to both topics. A summary of the project on crumb rubber recycling can be found at http://www.dot.state.fl.us/research-center/Completed_Proj/Summary_SMO/FDOT_717.pdf . You may email gregory.sholar@dot.state.fl.us to receive a copy of the other report.

Mark Woods, Tennessee DOT
The Tennessee DOT has had only a few trial crumb rubber projects, so we do not have any data reflecting the recyclability of those mixes. We are looking into this.

Ohio

We have just implemented specifications that allow tear-off shingles. We had allowed shingle manufacturing waste for more than 12 years. Details can be found at our website: http://www.dot.state.oh.us/Divisions/ConstructionMgt/OnlineDocs/Pages/ProposalNotesSupplementalSpecificationsandSupplements.aspx. (Note: Supplemental Spec 800 contains section 401.04 material requirements, and Supplemental Specification 1116 covers recycler requirements.)

We have updated post-blended SBR latex plant injection requirements to include automated equipment requirements. See Section 402 in the above link for Supplemental Spec 800.

New Hampshire

We had acceptance of qualified foamer WMA technologies in January 2011. Six were initially listed on our qualified technology list (QTL). We also had acceptance of all qualified WMA technologies shown on the NorthEast Asphalt User Producer Group qualified list in June 2011. The New Hampshire DOT is now allowing any technology on the list, plus any technology evaluated by other states under the adopted evaluation program. We added one chemical and one wax technology to the QTL.

Florida

Effective January 2012, the Florida DOT will implement an end-of-load segregation specification based on studies done in Florida. Areas will be first identified visually, and then three 6-inch diameter cores will be obtained in the segregated area. If the in-place density is less than 90 percent Gmm, the area will have to be removed and replaced.

Tennessee

The Tennessee DOT (TDOT) is currently discussing raising the minimum-allowable asphalt content for our 12.5-mm nominal maximum aggregate size (NMAS) "411-D" surface mixture from 5.3 to 5.7 percent. This is the mixture that is used almost exclusively on interstates and most state routes. We expect this specification change will only affect a small proportion of designs statewide. Allowable air voids during production will also be lowered slightly to account for this change.

TDOT's Materials Division intends to recommend that design guidelines for emulsion application rates be adjusted from 0.02 gal/yd2 on all surfaces to 0.07 and 0.10 gal/yd2 for non-milled and milled surfaces, respectively. These recommendations will affect estimated quantities. TDOT's special provision for density acceptance by core sampling, SP407DEN, will be adjusted so that both longitudinal joint and mainline density will no longer be specified with single minimum values but instead with a table of target values and incentives. An incentive will be applied for lots in which the target value is achieved, and disincentives will be applied for lots with excessively low or high density.

Nevada

The Nevada DOT has begun to allow 15 percent reclaimed asphalt pavement (RAP) in Type 2 and Type 2 coarse (Type 2C) mixes. RAP is allowed in all layers of the structural section on all categories of roads.

Missouri

Missouri DOT changed its binder specification, Section 1015, to include an option to produce binder in accordance with AASHTO MP 19. About three years ago, we added a special provision that allowed modification of binders using ground tire rubber (GTR) cross-linked with transpolyoctenamer rubber (TOR) with multiple stress creep recovery (MSCR) as an option to elastic recovery that requires polymer modification. Sections S6 and S7 of the current cycle on the NCAT Pavement Test Track include a comparison of mixtures with styrene-butadiene-styrene (SBS) and GTR modification. Excellent performance of the GTR-modified mixture after 18 months allowed us to move ahead and add GTR modification to the Missouri Standard Specifications. In moving GTR modification into our specification, we elected to offer the option of MP 19 for any binder. We allow PG 64-22 Grade H and Grade V in lieu of PG 70-22 and PG 76-22, respectively.

Most polymer-modified binders are now being supplied using the MP 19 protocols due to formulation changes that allow suppliers to manufacture the binders at a lower cost. Three projects are under contract to use permeability as the measure of density. Two are completed, and the other will be completed in the first half of 2012. The falling head permeameter developed under NCAT Report 99-01 is used as the testing device. One of the basic objectives of density measurements is to produce a long-lasting, somewhat impermeable pavement. Each mixture, by its composition, has a particular point of reaching impermeability. Designing mixtures with permeability in mind will hopefully reduce the compactive effort required for placement. By measuring permeability, the goals are to reduce permeability in Missouri's pavements and provide an accurate, non-destructive test. The projects completed so far also used cores for density measurements and indicate that the pay factors for either method are roughly equivalent. It was found that "fresh" plumber's putty provides a consistent, satisfactory seal with this method.

NCAT Wall of Honor Debuted at 25th Anniversary Celebration

Visitors to the National Center for Asphalt Technology can now get a sense of how NCAT became a leader in asphalt pavement research and outreach before hearing any presentations or seeing any state-of-the-art equipment. They will see the new NCAT Wall of Honor displayed just steps away from the building entrance.

The Wall of Honor recognizes the founders of NCAT and others who have helped fulfill the center's mission of world-wide dissemination of asphalt research, education and information. The 18 inaugural honorees are recognized with individual plaques featuring a carved portrait and short statement of their contributions to NCAT. A brass title plate on a mahogany base and bronze "Wall of Honor" lettering complete the display, which is located in the hallway to the main laboratory.

NCAT Director Randy West said he hopes the wall will "inspire professionals who work at NCAT and visit the center to become the next group of leaders in this industry."

Each Wall of Honor member was recognized with a duplicate of his portrait plaque in a ceremony that was part of NCAT's 25th Anniversary Celebration on Aug. 8.

"Celebrating 25 years of world-class research is a great milestone, but it would not have been possible without the dedication of so many individuals during those years," said NCAT Board Chairman Dan Gallagher, who presented the plaques at the ceremony.

Members of the Wall of Honor include past Board of Directors chairmen, long-time members of the board, and members of the NCAT Applications Steering Committee and the NAPA Research and Education Foundation. Others include former NCAT administrators, as well as supportive leaders within private contracting companies and state highway agencies. Gallagher said he appreciates that the Wall of Honor includes several individuals who worked hard to make Auburn University NCAT's home.

"Auburn has always been supportive of NCAT, and I can't think of a better choice for its location," he added.

Gallagher also said that the outstanding level of commitment from NCAT supporters in both the asphalt pavement industry and academia made the selection of the first members for the Wall of Honor difficult. The NCAT Board of Directors chose the initial 18 honorees by voting on a list of wall nominations submitted by the board chairman and vice chairman. More members may be added in the future through the same selection process.

Additional members would need to have exhibited the same dedication as the inaugural members did in carrying out NCAT's mission and enhancing asphalt pavements through NCAT research.

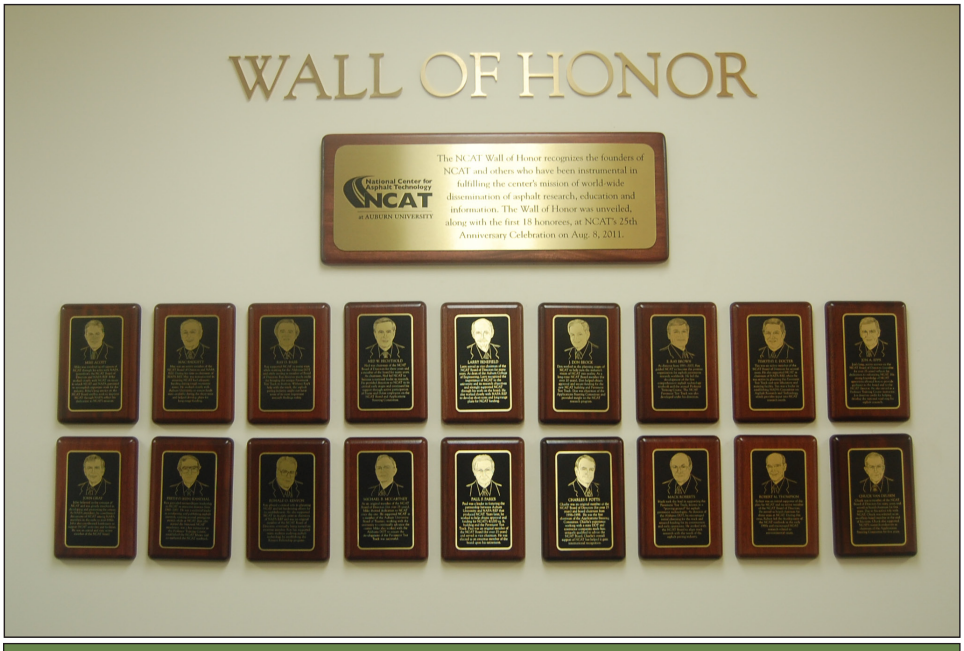
"NCAT is known as a center that has a real impact on improving pavements, and those improvements benefit all Americans," West said. "This reputation is due, in part, to these people."

Wall of Honor Members

The NCAT Wall of Honor recognizes the founders of NCAT and others who have been instrumental in fulfilling the center's mission to be a world leader in asphalt research. The first 18 honorees are:

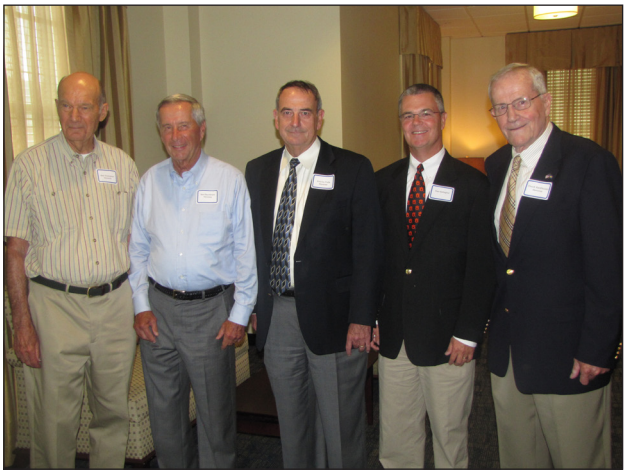
Mike Acott
Mac Badgett
Ray D. Bass*
Ned W. Bechthold
Larry Benefield
J. Don Brock
E. Ray Brown
Timothy E. Docter
Jon A. Epps
John Gray*
Prithvi (Ken) Kandhal
Ronald D. Kenyon*
Michael B. McCartney
Paul F. Parks
Charles F. Potts
Mack Roberts
Robert M. Thompson
Chuck Van Deusen

**deceased*



The Wall of Honor, debuted at the NCAT 25th Anniversary Celebration on Aug. 8, is displayed at the main NCAT building in the hallway leading to the laboratory.

Wall of Honor members (Back row, L–R): Bob Thompson, Chuck Van Deusen, Mack Roberts, Larry Benefield, Tim Docter, Don Brock, Ray Brown and Mitch Pate on behalf of Ray Bass. (Front Row L-R): Paul Parks, Ned Bechthold, Prithvi (Ken) Kandhal, Mac Badgett, Michael Mc Cartney, Jim Zeigler on behalf of Ronald Kenyon, Charlie Potts and Mike Acott. Not pictured: John Gray (deceased).



NCAT Board of Directors chairmen (L–R): Bob Thompson, Ned Bechthold, Charlie Potts, Dan Gallagher (current chairman) and Chuck Van Deusen.

Honoree Mike Acott accepts his Wall of Honor plaque from NCAT Director Randy West.

Honorees Ray Brown (left) and Chuck Van Deusen at the reception before the awards presentation.

(L–R): Mack Roberts (honoree), Larry Lockett (retired ALDOT state materials engineer), Mike Harper (ALDOT assistant chief engineer) and Mitch Pate (NCAT technician and grandson of honoree Ray Bass).

New faces, research interests round out NCAT staff

—Continued from Pg. 4

hot-mix asphalt research aligned with her own research interests. The state-of-the-art research laboratory and NCAT Pavement Test Track were also a draw as "tools that facilitate innovative research."

Since one of her research interests is working with new and sustainable pavement materials, Rodezno will likely take the lead on research projects that involve modified asphalt mixtures, such as asphalt rubber mixes. She will also work on issues related to pavement temperature, including the Urban Heat Island effect, pavement reflectivity, thermal models and how temperatures affect mixture properties.

Rodezno may also have an assistant role in projects involving warm-mix asphalt (WMA) and open-graded friction course (OGFC), as she expresses interest in expanding her work in these areas. That's a large part of what she says she looks forward to at NCAT—the opportunity to foster new research interests and formulate ideas for new research projects.

"I am very excited to join NCAT and be a part of this great research group," she says.

NCAT offers a variety of training opportunities to fit your needs. To register for a class or for more information, please visit our website at www.ncat.us or call Don Watson at 334.844.7306.

NCAT completes 22nd Professor Training Course

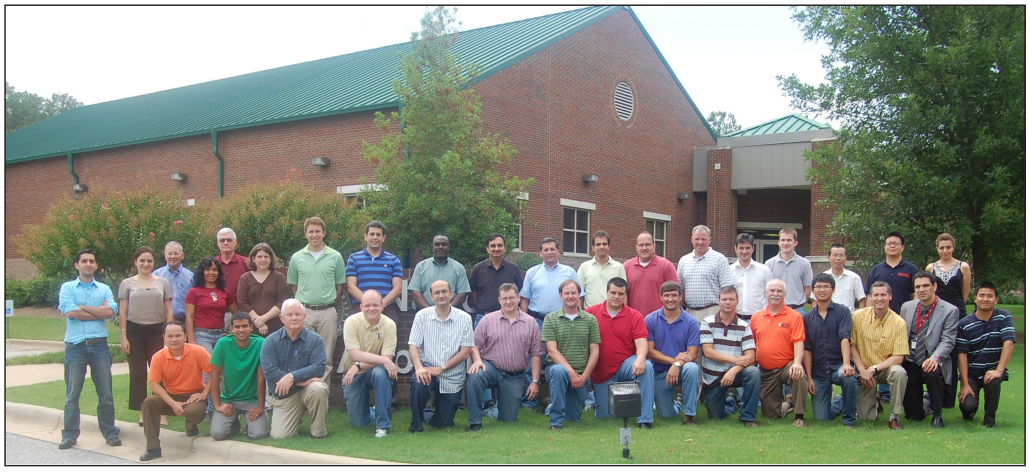
The National Center for Asphalt Technology hosted its 22nd Professor Training Course in June. Held each summer, it prepares civil engineering faculty to teach courses in hot-mix asphalt technology. The 2011 class included 26 attendees representing 16 universities and 12 states as well as the Federal Highway Administration, India and Venezuela.

The eight-day course was taught by NCAT engineers along with special guest speakers from industry, academia and government. Classroom lectures covered materials, mix design, pavement design, construction, performance and maintenance/rehabilitation. Current topics such as warm-mix asphalt and the use of higher percentages of recycled asphalt pavement (RAP) were also part of the classroom discussions. Laboratory sessions included demonstrations of aggregate and binder testing, as well as quality control and performance tests.

Tours rounded out the course, adding practical perspective and allowing attendees to view multiple facets of the asphalt industry. Local tours included the NCAT Pavement Test Track and the East Alabama Paving asphalt plant in Opelika. At the end of the course, participants traveled to Chattanooga, Tenn., to visit the Astec, Roadtec and Heatec manufacturing facilities.

Since the first course was held in 1988, more than 400 professors from all 50 states have returned to their colleges and universities equipped to train the next generation of pavement engineers and technologists. All attendees receive a copy of the NCAT textbook and other materials needed to teach a course in asphalt technology, and many develop long-term working relationships.

Check the NCAT website (www.ncat.us) for information on registration for the next Professor Training Course in June 2012.



Standing (L–R): Shahriar Najafi, Maryam Sakhaeifar, Mo Shahin (instructor), Maylin Corros, Ray Brown (instructor), Pamela Turner (instructor), Benjamin Bowers, Mohammad Khasawneh, Joseph Owino, Nadeem Ahwer, Mario Candia, Maziar Moaveni, Steve Cooper, Robert Schmidt, Flavio Padula, Jeff Withee, Gongyun Liao, Yu Qian, and Goli Nossoni

Kneeling (L-R): Nam Tran (instructor), Jidendra Kumar Thakur, Don Watson (instructor), Will Lindquist, Sherif El-Badawy, Kyle Riding, Jason Moore (instructor), Brandon Batz, Grant Julian (instructor), Jason Nelson (instructor), Mike Heitzman (instructor), Sheng Zhao, Randy West (instructor), Arash Motamed, and Yuanjie Xiao

Online Learning Opportunities

Auburn University's Office of Continuing Education, in cooperation with NCAT and the Department of Civil Engineering, offers a variety of online professional development courses on hot mix asphalt and other civil engineering topics. Continuing education credits are available. Course titles include:

- Asphalt Binder Tests and Specifications,
- Asphalt Pavement Preservation and Rehabilitation,
- Hot Mix Asphalt Compaction,
- Hot Mix Asphalt Delivery and Placement,
- Hot Mix Asphalt Paving Construction Specifications & Quality Control/Assurance and
- Pavement Management Systems.

Visit the Auburn Continuing Education website at **www.eng.auburn.edu/distance-learning/ce/distance/courses/civil.html** for a list of courses and detailed course information.

ENN1104NT1

735 Extension Loop, Auburn, AL 36849-7350

Nonprofit Org.
U.S. Postage
PAID
Permit #9
Auburn, AL 36849

National Center for Asphalt Technology,
277 Technology Parkway, Auburn, Alabama 36830-0550
Phone: 334.844.NCAT (6228) Fax: 334.844.6248

Randy West, Director, NCAT
Karen Hunley, Editor, NCAT
Courtney Jones, Writer, NCAT
Cheryl Cobb, Associate Editor, College of Engineering

ASPHALT TECHNOLOGY NEWS (Library of Congress Catalog No. ISSN 1083-687X) is published by the National Center for Asphalt Technology (NCAT) of Auburn University. Its purpose is to facilitate the exchange and dissemination of information about hot mix asphalt technology, trends, developments and concerns. Opinions expressed in this publication by contributors and editors, the mention of brand names, the inclusion of research results, and the interpretation of those results do not imply endorsement or reflect the official positions or policies of NCAT or Auburn University.