International Society for Asphalt Pavements

The ISAP Reporter

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ISAP Chairman's Report—Gerald Huber

What Will The Future Bring?

If only we could see the future! That has been the wish of generations from the beginning of time. Now, we may not be able to see the future but still we can guess with some reasonable assurance what the future will bring for highways in the world.

Highways are linked to economic prosperity. In the United States the vision of highways allowing people and goods to move easily across the nation developed in the 1920s. Early "interstate" highways were built from the 1920s to the1940s but the ultimate realization of the vision was passage of the Interstate Highway Act of 1956. Completed by 1970 the new highway system allowed an economic boom to occur in the last third of the twentieth century.

In Europe, national motorway systems were built in the last half of the twentieth century. Formation and enlargement of the European Union included the linking of national motorway systems into a Trans-European motorway network.

The People's Republic of China is constructing a motorway system. The government recognizes that continued economic growth is dependant on improved movement of goods. Truck traffic dominates on the motorways completed to date.

But two growing concerns of motorway networks are congestion and safety. Congestion is choking the free movement of goods. Doubling or tripling the size and weight of trucks would increase efficiency but size differential between trucks and cars prevent such improvements. Crashes disrupt traffic flow. Deaths on motorways are already increasing and crashes further degrade the efficiency as traffic comes to a halt.

So what will the future bring? Although no one knows for sure motorways will be re-configured. Trucks will travel separately from cars. Truck sizes and weights will increase dramatically. Domestic freight will become more containerized and will flow between modes more easily. Freight distribution centers will interface between rail freight and large inter-regional trucks with local delivery trucks.

Today, we design perpetual pavements. Tomorrow, our perpetual pavements will need to carry much heavier loads. Today, Superpave has changed the way we look at asphalt. Tomorrow, our mix design and construction methods will need to be tied to performance.

The International Society of Asphalt Pavements advances the knowledge of asphalt pavement technology. Conference proceedings from the 2004 conference remain the most complete compendium of knowledge on the subject. The 2006 ISAP Conference in Quebec, Canada will feature the latest information from the world on the subject of asphalt pavements. ISAP has a role in the future of asphalt pavements.

What will the future hold? We may be sure of one thing. Asphalt pavements will continue to create economic prosperity in the world.

2006 ISAP Conference—Quebec August 12-17,2006

The 2006 ISAP conference will feature a rich and diversified technical program. The pre-conference technical program will be held during the weekend preceding the conference week and will include a series of short courses and special sessions on topical issues related to asphalt pavements. These activities will be held at the continuous education center of Laval University, a few kilometres from the conference center.

The main technical program will include plenary sessions as well as general technical sessions. A plenary session on technical issues related to asphalt pavements will be held every morning of the conference week. Invited speakers will present specific perspectives on each of the following themes :

- Hot mix asphalt: state of the practice and trends
- Structural design of Asphalt Pavements : state of the practice and trends
- Study of pavement performance; How can we benefit from the available approaches?
- Pavement recycling: seeking the right balance

The general technical sessions will include full paper presentations regrouped in 5 parallel sessions in accordance with one of the following themes.

- Developments in Asphalt Pavement Materials
- Structural Design for New and Existing Pavements
- Pavement Performance
- Pavement Investigation and Analysis
- Highway Operations

The call for paper has attracted 350 abstracts from authors coming from 33 different countries. The main conference program can accommodate 180 presentations and an additional 100 papers can be presented in posters sessions. The abstracts are currently under review based on the following main criteria: Relevance with respect to the conference themes, Topicality, Chance to obtain a good quality paper. Early in September, successful authors will be invited to submit full papers based on the review ranking and available space.

Visiting Quebec is a special experience and everyone will be given an opportunity to enjoy it to the fullest. We will be setting time aside at the end of each work period for the delegates to explore the city and its surroundings, with events such as a cocktail party at the *Palais des Arts,* guided city tours (walking and/or bus), and a cruise on the St. Lawrence River or to the Island of Orleans. Naturally, the social program will also include the traditional welcome reception and conference banquet. The reception will be held in one of the foyers at the Quebec Convention Centre. The foyers with their large windows provide a generous amount of natural light. They offer an exceptional panoramic view over the Laurentians, part of Old Québec City and the Saint-Jean-Baptiste's quarter. The banquet at *Espaces Dalhousie* is a spectacular, unique setting, only steps away from the St. Lawrence River. The charm and beauty of Québec City's harbour area. Each will feature the finest in Quebec cuisine.

Pre- and/or post-conference tours will also be offered to give delegates a chance to further explore the city and surrounding area. The possibilities are endless. In fact, the hardest part will be choosing from the many options, which include extended city tours, whale watching, hiking in spectacular valleys, exploring traditional Aboriginal villages, golfing, cycling, rafting, etc. The accompanying persons program will feature visits to museums, the Citadel, Battlefields Park, and local cathedrals and churches—not to mention the great shopping.

Delegates will be delighted by how reasonable it is to stay, dine out, travel and shop in Québec City. There are numerous possibilities for lodging in the vicinity of the convention centre, from five-star hotels to charming inns and bed and breakfasts. Every effort will be made to accommodate delegates' wishes.

The official conference hotel is the Quebec City Hilton. On Quebec's Parliament Hill, Hilton sur Vieux-Québec stands amid history and charm across from the gates to the Old City, with indoor access to the Convention Centre.

For further information on the Conference, please visit the website at:
www.icap2006.fsg.ulaval.ca

ISAP Membership News

The ISAP Board of Directors has adopted an Association Membership Category. Asphalt associations from around the world now have the opportunity to be ISAP members.

With ISAP membership an Association is:

- Allowed one at-Large Board member. In addition, Association members can hold individual ISAP membership and serve in other elected positions as individual members
- Rights to print and distribute electronic versions of the ISAP newsletter to all Association members within their organization
- Association designated representatives receive ISAP member rates to Conferences and other ISAP events. The Association must verify and provide a list to ISAP before early registration deadline.
- ISAP will promote Associations Events dealing with technology transfer and education through its Newsletter and website.
- The National Asphalt Paving Association (NAPA), The South African Bitumen Association (SABA) and The Japan Road Contractors Association (JRCA) are now ISAP Association Members

Other membership categories include Student, Voting, Patron and Corporate.

The Annual Board of Directors and Membership meetings are tentatively scheduled for Saturday, January 21, 2006 in Washington D.C., USA. This is just preceding the TRB Annual Meeting. The TRB meeting has been scheduled for January 22-26, 2006. Please mark your calendars for this date. More information for ISAP members will follow.

In addition, the ISAP Board of Directors is pleased to announce that election of Dr. Gerhard Kennepohl to Honorary Membership in ISAP. His work in developing the webpage and on the membership committee has been very beneficial to ISAP.

Congratulations Gerhard!

An Honorary Membership plaque will be presented to Gerhard at the ISAP Annual Meeting in January 2006. The other ISAP Honorary Members are:

Kornelius Wester, John Gray, Ralph Haas, Ronald Hudson, Carl Monismith, Peter Pell, Fred Finn, R. Gary Hicks

For further information on ISAP, including further membership information, please refer to the ISAP website at:

The Japan Road Contractors Association News

The Japan Road Contractors Association reported on its Guidebook on Permeable Pavements for Roadways at the 15th International Road Federation World Meeting 2005 in Bangkok.

In June 2003, the Law on Prevention of River Floods in Specified Cities was enacted in Japan. This Law requires run-off control measures for any facilities (including roads) of a certain dimension that inhibit rainwater from infiltrating into the ground. Thus, permeable pavements, "through which rainwater goes into the ground" or "which have structures storing rainwater temporarily and draining it afterwards", have more attention than ever.

Although permeable pavements have been widely used for sidewalks in cities, they have been used less for roadways since the permeating water was considered to adversely affect the durability of pavements and there is little documented for roadways applications.

Under the circumstances, the Technical Committee of the Japan Road Contractors Association compiled the Guidebook on Permeable Pavements for Roadways from the viewpoint of road contractors to be used for construction works of permeable pavements which were expected to increase, using the technical information and data concerning the planning, design, materials, construction, and performance.

Besides permeable pavements for roadways, the Technical Committee has devoted the main part of its work to research on the utilization of industrial byproducts as pavement materials and an investigation on so-called natural pavements using such materials as soils, grasses, chipped woods, barks and so forth.

Association of Asphalt Paving Technologists (AAPT) Update

The 2006 AAPT Annual Meeting and Technical Sessions are scheduled for March 27-29, 2006 at the Hyatt Regency Savannah hotel in Savannah, Georgia. Fifty paper offers were received in the first week of August. Each paper has been sent to 5 members for review.

Considering the reviews and content the Board of Directors will select papers to be presented at the Technical Sessions. In addition, a Symposium Sessions in "Asphalt Concrete Quality Management" is being developed by Mike Anderson and Rich May. A Government Engineers forum will also be scheduled as part of the meeting. In addition, there will be a new International members meeting on Monday Evening.

The final program will be available later this fall. Please stay up-to-date by visiting the AAPT website.

The Proceedings of the 2005 AAPT Annual Meeting and Technical Sessions, Volume 74, will be available In October 2005. Each AAPT member receives one free copy of the volume. The cost of the volume to others is $90.00.

Also, AAPT currently has 8 CDs which contain the proceedings from 1959-1998. Each CD contains 5 volumes and the cost for members is $25 and non-members is $100. Contact the AAPT office or website for further information.

Membership applications for AAPT are also available on the AAPT website:

www.asphalttechnology.org

News from the U.S. National Asphalt Pavement Association (NAPA)

NAPA National Asphalt Pavement Association

A SUMMARY OF PAVEMENT RELATED RESEARCH

On August 10, 2005, President Bush signed SAFETEA-LU into Public Law. The new law includes new pavement research programs and funding that will greatly benefit the HMA industry. The following is an in-depth summary of SAFETEA-LU's research, deployment and education provisions specifically related to the HMA industry. For more information, contact Jay Hansen, NAPA's Vice President for Government Affairs at jhansen@hotmix.org.

Congressional Findings

(1) Research and development are critical to developing and maintaining a transportation system that meets the goals of safety, mobility, economic vitality, efficiency, equity, and environmental protection.

(2) Federally sponsored surface transportation research and development has produced many successes. The development of rumble strips has increased safety; research on materials has increased the lifespan of pavements, saving money and reducing the disruption caused by construction; and Geographic Information Systems have improved the management and efficiency of transit fleets.

(3) Despite these important successes, the Federal surface transportation research and development investment represents less than one percent of overall Government spending on surface transportation.

News from the U.S. National Asphalt Pavement Association (NAPA)

A SUMMARY OF PAVEMENT RELATED RESEARCH, Contd.

(4) While Congress increased funding for overall transportation programs by about 40 percent in the last Transportation bill, Transportation Equity Act for the 21st Century, funding for transportation research and development remained relatively flat.

(5) The Federal investment in research and development should be balanced between short-term applied and long-term fundamental research and development. The investment should also cover a wide range of research areas, including research on materials and construction, research on operations, research on transportation trends and human factors, and research addressing the institutional barriers to deployment of new technologies.

(6) That it is in the United State's interest to increase the Federal investment in transportation research and development, and to conduct research in critical research gaps, in order to ensure that the transportation system meets the goals of safety, mobility, economic vitality, efficiency, equity, and environmental protection.

Congressional Principles Governing Research and Technology Investments

COVERAGE- Surface transportation research and technology development shall include all activities leading to technology development and transfer, as well as the introduction of new and innovative ideas, practices, and approaches, through such mechanisms as field applications, education and training, and technical support.

FEDERAL RESPONSIBILITY- Funding and conducting surface transportation research and technology transfer activities shall be considered a basic responsibility of the Federal Government when the work--

(A) is of national significance;

(B) supports research in which there is a clear public benefit and private sector investment is less than optimal;

(C) supports a Federal stewardship role in assuring that State and local governments use national resources efficiently; or

(D) presents the best means to support Federal policy goals compared to other policy alternatives.

ROLE- Consistent with these Federal responsibilities, the Secretary shall--

(A) conduct research;

(B) support and facilitate research and technology transfer activities by State highway agencies;

(C) share results of completed research; and

(D) support and facilitate technology and innovation deployment.

PROGRAM CONTENT- A surface transportation research program shall include-

(A) fundamental, long-term highway research;

(B) research aimed at significant highway research gaps and emerging issues with national implications; and

(C) research related to policy and planning

STAKEHOLDER INPUT- Federal surface transportation research and development activities shall address the needs of stakeholders. Stakeholders include States, metropolitan planning organizations, local governments, the private sector, researchers, research sponsors, and other affected parties, including public interest groups.

COMPETITION AND PEER REVIEW- Except as otherwise provided in this chapter, the Secretary shall award, to the maximum extent practicable, all grants, contracts, and cooperative agreements for research and development under this chapter based on open competition and peer review of proposals.

PERFORMANCE REVIEW AND EVALUATION- To the maximum extent practicable, all surface transportation research and development projects shall include a component of performance measurement and evaluation. Performance measures shall be established during the proposal stage of a research and development project and shall, to the maximum extent possible, be outcome-based. All evaluations shall be made readily available to the public.

TECHNOLOGICAL INNOVATION- The programs and activities carried out under this section shall be consistent with the surface transportation research and technology development strategic plan developed under SAFETEA-LU.

News from the U.S. National Asphalt Pavement Association (NAPA)

HMA VISIONS: 2005 and BEYOND

(summary of an article from the HMAT Magazine Sept/Oct 2005 by David Newcomb. P.E., Ph.D)

Introduction

The changes that have occurred in Hot Mix Asphalt technology over the last 30 years have resulted in many new products, analytical tools, and testing procedures. The future will hold many more changes for the industry in terms of the technological sophistication that must be employed to address the needs of the markets.

Driving Forces

Technology in HMA industry will confront several important driving forces:

- Transfer of responsibility from agencies to contractors for pavement quality, innovation, and in some cases, project delivery
- Higher energy prices and price volatility
- Need for resource conservation and sustainable construction
- Market demand for longer lasting, more durable pavements
- Increasing public demands in terms of performance, smoothness, noise reduction and aesthetics
- Environmentally friendly pavements and construction processes
- Safety issues, both while traveling and in the work zone

*To obtain a copy of Hot Mix Asphalt: Visions 2005 and Beyond, visit the NAPA web site at **www.hotmix.org** or call **888-468-6499** and ask for Judy Hornung, Publications and Information Services Coordinator. This publication is 49 pages and is available for $10.*

Virtual Superpave Laboratory

`The National Asphalt Pavement Association (NAPA) has published the Virtual Superpave Laboratory (VSL), a computer-based learning tool for training engineering students, practicing engineers and technicians in laboratory procedures and data analysis of Hot Mix asphalt testing. This interactive CD will increase the expertise of agency, consultant and contractor personnel responsible for making decisions concerning HMA mix design, quality control and acceptance.

The virtual Superpave Laboratory gives a visual introduction to Superpave laboratory tests. Users will lean about the theoretical concepts behind the test and will be able to conduct hands-on manipulation of the data. Using the VSL provides a basic level of understanding of Superpave for all who specify, design and build asphalt pavements. Material testers can become familiar with laboratory testing procedures. Use of the CD can increase understanding of testing procedures, reduce time lost to misunderstanding and increase confidence of lab personnel.

You can order this item online at www.Hotmix.org or by calling, toll-free, 888-468-6499. Site licenses are available by contacting Margaret Cervarich NAPA Vice President for Marketing and Public Affairs at that same telephone number or by e-mailing: mbvc@hotmix.org

NCAT TEST TRACK FINDINGS 2005

Ray Brown, Buzz Powell, Randy West, David Timm and Don Watson

The NCAT test track was designed and constructed to develop and evaluate better ways to design and construct hot mix asphalt (HMA) pavements. In the five years the track has been in service, several findings have been identified and implemented by individual states.

The test track research has been conducted for two cycles with the second cycle scheduled to be completed before the end of 2005. Each cycle includes ten million Equivalent Single (18-thousand pound) Axle Loads (ESALs) applied to the test sections. The first cycle began in 2000 with loading of 46 test sections. This level of loading is representative of twenty years of traffic on many rural interstate-type highways.

When the second cycle began in 2003, eight sections were removed and reconstructed to provide different structural thicknesses. Some of the structural sections had modified asphalt and others non-modified. Fourteen of the other sections were milled and overlaid and the remaining sections were left in place to evaluate the effect of two more years of traffic (another ten million ESALs) and environmental conditions.

A number of findings from the test track research have been identified and adopted. Some of the areas in which findings have been implemented include:

- fine-graded vs. coarse-graded mixtures
- effect of binder grade on rutting
- evaluation of structural characteristics of HMA pavements
- performance of SMA mixtures
- performance tests to predict rutting
- validation of accelerated loading facilities
- effect of aggregate properties on performance

Fine-Graded vs. Coarse-Graded Mixtures

With the transition toward Superpave specifications in the mid 1990's, most agencies began to emphasize the use of coarse-graded mixtures. The Superpave requirements encouraged the use of coarse-graded mixtures, especially for high volume roadways, since gyratory N(initial) criteria made it very difficult for fine-graded mixtures to meet the specification requirements.

However, research conducted at WesTrack indicated that fine-graded mixtures performed significantly better than coarse-graded mixtures in rutting and fatigue resistance. This was somewhat surprising since Superpave encouraged the use of coarse-graded mixtures. Since the inception of Superpave, some coarse-graded mixtures have experienced permeability problems. This high degree of permeability is generally attributed to a lack of adequate density, and it has been a problem for many coarse-graded projects. Therefore, many states had concerns about which type of mixture (coarse-graded or fine-graded) should be used. The results of several side-by-side comparisons at the NCAT Test Track have shown that the amount of rutting one might expect is approximately the same for coarse-graded and fine-graded mixes as shown in Figure 1. For each mix the higher asphalt content is an "over-asphalted" mix.

The states of Alabama, North Carolina and Florida have changed their specifications to allow more fine-graded mixes be used on their high volume roadways. The track showed that these mixes would provide good resistance to rutting and would also minimize the risk of permeability problems. The contractor is now given the option to use either fine-graded or coarse-graded mixes, and the decision is usually to place fine-graded mixtures since they are more workable and easier to compact.

Effect of Binder Grade on Rutting

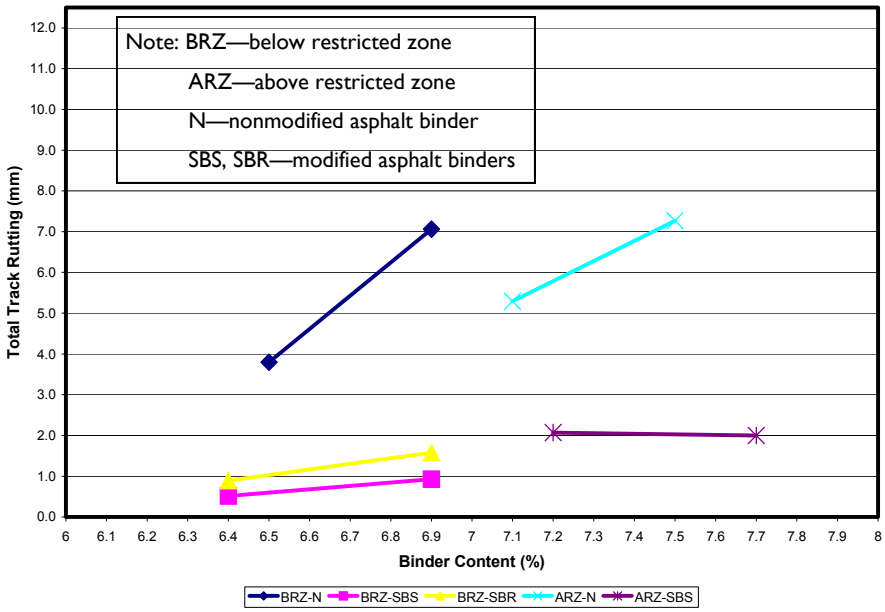
Superpave guidelines recommend that the high temperature PG grade be bumped for higher traffic in order to minimize rutting. One of the purposes of the first cycle at the track was to look at the effect of bumping the high temperature grade. There were several sections where the only variable was the grade of binder. The results from the first cycle of testing indicated that on the average, there was more than a 50 percent reduction in rutting when the high temperature grade was bumped two performance grades (from PG 64 to PG 76). As a result of this information some states have increased the number of projects where grade-bumping is specified. For example, the Florida Department of Transportation now specifies the use of PG 76-22 under the conditions given in Table 1.

Table 1. Florida's Policy for Use of PG 76-22 in Structural Layers

Traffic Level (ESALs)*	Recommended Use
10 to <30 million	Top structural layer
≥30 million	Top two structural layers

NCAT Summary, contd.

Figure 1. Effect of Asphalt Binder and Gradation on Rutting Resistance



Evaluation of Structural Characteristics of HMA Pavements

Eight structural sections were built in 2003 that included variations in thickness of HMA and in the binder grades used. At the time this report was prepared, these structural sections had been subjected to more than eight million ESALs. The instrumentation of these sections has allowed stress and strain measurements to be made under live traffic conditions and will allow correlation of these stress states to performance. Pavement response measurements from sections are providing an initial validation experiment upon which states can refine their existing pavement structural design guides through more representative layer coefficients and consider adoption of emerging mechanistic-empirical methodology via the measurement of seasonal stresses and strains.

The Oklahoma Department of Transportation believes that information from the new structural sections will prove valuable in shaping their pavement design process. Using this information to support the perpetual pavement design concept could save millions of dollars by ensuring that pavements are not over-designed but are designed sufficiently thick for long life.

Performance of SMA Mixtures

SMA mixtures have been used in the United States (U.S.) for almost 15 years with very good results. Since SMA was adopted in the U.S., one of the requirements has been to use only crushed stone. In some cases, this has precluded the use of crushed gravels. For those states that only have sands and gravels available, this requires hauling in aggregates from other states and often makes SMA too expensive to use. Evaluations were conducted at the track using crushed gravel in SMA mixtures and it was determined that the SMA mixture had less cracking than a similar mixture designed using Superpave requirements. As a result of this finding, the State of Mississippi has now begun placing gravel SMAs in an effort to maximize long term performance while using local gravel materials.

Georgia invests heavily in SMA mixes for heavy traffic applications. Their research test sections at the track were intended to serve as a life cycle cost analysis in which environmental and traffic conditions are identical for both SMA and Superpave mixtures. While both sections have exhibited exemplary rutting performance (less than 2 mm with no statistical difference between the two), the Superpave section has demonstrated an increase in surface macro-texture since the time of construction. This difference in texture is indicative of the loss of fines associated with weathering. The Superpave section has also begun to exhibit centerline cracking. In contrast, the higher binder content SMA section has exhibited only a slight change in macro-texture and it does not appear to be at risk for cracking. Continued traffic on these sections is intended to confirm these observations.

Performance Tests to Predict Rutting

There is great interest in the pavement engineering field to identify a reliable test that can predict rutting performance. NCAT conducted several performance tests on the mixtures placed at the track including dynamic modulus, repeated load tests, and wheel tracking tests. While significant rutting was not observed at the track, it is believed that sufficient rutting was observed to determine if trends between some of the performance tests and rutting exist. The results showed that the dynamic modulus had no correlation with rutting. The confined repeated load test and the wheel tracking tests did have similar trends to actual test track rutting.

NCAT Summary, contd.

As a result of the testing at the track, the Oklahoma DOT has gained confidence in their newly-implemented Asphalt Pavement Analyzer specification. That confidence would have taken 10 or 15 years to develop without the use of the Test Track.

Validation of Accelerated Loading Facilities

Two sponsors of the track, Florida and Indiana, also utilize accelerated loading facilities. The NCAT test track offers an excellent opportunity to calibrate the accelerated loading devices to results expected on the roadway.

Indiana's participation included work to validate the testing performed with Purdue's automated accelerated pavement test (APT) device. Materials from the same source as those used at the NCAT Track were used to produce mixtures and construct sections at the Purdue APT test facility. Purdue's indoor facility was then used to apply accelerated loading through a mechanized loaded truck tire. It was found that relative differences in rutting between various test sections measured at the Purdue facility were similar to the differences observed at the NCAT Track, which validated the use of their APT for conducting local rutting comparison studies at reduced cost. The State of Indiana is now evaluating the ability of the APT to predict pavement response data for various pavement structures that have been built at the track.

The state of Florida has validated their HVS with various sections at the track. The Florida DOT validated the HVS for a number of mix types and they continue to look at the comparison of results between the test track and the HVS. Currently the comparisons between the track and the HVS have been very good.

Effect of Aggregate Properties on Performance

Aggregate tests generally do not correlate well with performance. One property, Los Angeles Abrasion, has been used to classify aggregate quality for many years. Some aggregates have been excluded from use in the State of South Carolina because they exhibited a loss in LA abrasion that exceeded the State's specification requirements. One of these sources of aggregates was used in an HMA mixture and placed on the track for evaluation. No significant production problems were encountered during the construction of this section, no significant difference in macro-texture changes were observed, and rutting performance was similar to that of other sections with acceptable materials. Based on the results of these tests, South Carolina has changed their specifications to allow the use of this aggregate source with higher LA abrasion loss material.

South Carolina also evaluated another source of aggregates that had little record of use. Based on work at the track the DOT determined that this aggregate polished and therefore was not acceptable for use in surface mixes. Testing the aggregate on the test track allowed the aggregate to be safely tested without any of the liability that may have been experienced with placing and testing it on an active highway.

Mississippi and Tennessee constructed sections to look at blending limestone into gravel mixes to determine its effect on performance. At the conclusion both states verified that they can make mixes with all-crushed gravel that will provide good performance if they control the mix properties and use good construction practices. As a result of this study Mississippi increased the amount of limestone allowed in a mixture from 30% to 50%.

Summary

Implementation of findings from research at the NCAT test track has resulted in a considerable savings to each state through the use of improved materials, mixtures, design, or construction procedures. Testing is continuing and additional findings will be developed as the tests progress.

The NCAT test track, through accelerated loading, has provided answers to many questions that would have taken years on the highway system and would have created safety problems during the research period. The test track has offered a safe, accelerated method to accomplish hot mix asphalt research.

For further information on NCAT, go to their website at: www.ncat.us

Asphalt Pavement Research in Canada: The Next Generation

Canada's asphalt pavement researchers have developed over more than 50 years a well-established track record of participation and contribution to development of asphalt pavement technology. Dr. Norman W. McLeod is an outstanding and worldwide, recognized example. The purpose of this article is to give a brief overview of the next generation of asphalt pavement researchers across Canada.

Major research projects are traditionally centered at the universities, but significant contributions are also coming from the user agencies and the paving industry. This short introduction is not intended to be comprehensive, but rather an exposition of upcoming developments and events, including the 10th International Conference on Asphalt Pavements, which will be hosted next year by Canada in Quebec City.

Beginning our expedition across Canada from the East, we find our first asphalt pavement researcher, **Dr. Donath M. Mrawira** at the University of New Brunswick. He received his Ph. D. from the University of Waterloo (1997) and has a special interest and expertise in pavement management systems, highway and pavement design, pavement evaluation and performance modeling. The most recent projects and publications include: New measurements of thermal properties of Superpave asphalt concrete (TRB 2004), A quality management system for a highway mega-project in Province of New Brunswick (TRB 2002) and Thermal properties and transient temperature response of full depth asphalt pavements (TRB 2002).

Dr. Guy Dore continues in Quebec a well-established tradition of asphalt pavement research with a dedicated group of researchers at Universite Laval and at the SERUL Experimental Road Site, which is located on the Laurentian Plateau, 60 km North of Quebec City. The test track is used currently for various low-temperature pavement and low-volume road research projects. Specific subject areas of interest for study and recent publications include: Development and validation of the thaw weakening index (Intern. J. of Pavement Eng., 2004), Characterization of the impact of tires on pavement behaviour (Canadian J. of Civil Eng. 2004); and Monitoring pavement response during spring thaw using fiber-optic sensors (2002). **Mr. Pierre Langlois** at the Quebec Ministry of Transportation is conducting research towards the development of long lasting and quiet pavements, development of ultra thin pavements and publication of a booklet on the hot-mix design method used in Quebec for autumn 2005. An English version will be available for summer 2006.

Moving on to Ontario, we meet **Dr. Susan Tighe,** at the University of Waterloo, teaching and directing with enthusiasm a formidable group of graduate students. As Associate Director of CPATT (featured on page 13) and Canada Research Chair in Pavement and Infrastructure Management, her research interests include: pavement engineering and modeling, long life pavements, safer roads, and the development of infrastructure management systems. At Carleton University in Ottawa **Dr. Abd El Halim** is leading the development of materials and construction related pavement technology. Recent publication include: Evaluating effects of surface cracks on moisture induced damage (CTAA 2004), Improving frictional properties of pavement surfaces through mix design (CTAA 2003), and Factors affecting long term pavement performance of pavement overlays in Canada. Also in Ottawa at the National Research Council, **Dr. El Hussein H. Mohamed** focuses with his group of researchers on urban road applications. Typical projects are: Extending modeling of unbound granular materials beyond resilient behaviour by incorporating permanent deformation in the development of guidelines for utility cuts, establishing a mechanistic characterization technique to quantify the dynamic modulus in asphalt concrete mixes, and evaluating crack sealants.

On the road to Western Canada, we visit **Dr. Ahmed Shalaby,** Associate Professor at the University of Manitoba in Winnipeg. He is linking such physical properties as resilient and dynamic moduli to mix design and performance, evaluating crack sealants at low temperatures, and automating pavement condition surveys. Recent publication include: Comparing back-calculated and laboratory resilient moduli of bituminous paving mixtures (Canadian J. of Civil Eng. 2004), Criteria for selection of crack sealants (TAC 2005), and Optimizing visual and automated pavement condition surveys using neural networks (TRB 2005).

Asphalt Pavement Research in Canada: The Next Generation, contd.

Dr. Curtis F. Berthelot, Associate Professor, at the University of Saskatchewan is working in the area of pavement engineering, design and evaluation. Recent published papers are: Effect of manufactured fines on physical and mechanical properties of Saskatchewan dense graded hot mix asphalt pavements (CTAA 2004) and Rutting performance of SHRP SPS-9A test site in Saskatchewan (CTAA 2003).

At the University of Calgary in Alberta, **Dr. Ludo Zanzotto,** Professor and Bituminous Materials Chair, is together with his productive group of experts continuing to make major contributions to the characterization and understanding of fundamental properties of asphalts. Typical examples, selected from a large slate of recent publications are: Creep and recovery in asphalt modified by radial SBS (TRB 2005), Dielectric permittivity and shear viscosity in PMA (5th Intern. Symposium on Asphalt Rheology 2004), and Low-temperature properties of conventional and polymer modified asphalts evaluated by failure energy and secant modulus from DTT (Materials & Structures 2005). Also at the University of Calgary is **Dr. Lynne Cowe Falls**, Associate Professor, whose research interest includes transportation infrastructure management, intelligent transportation systems (ITS) and pavement performance evaluation. She has also conducted extensive research on asset valuation, and her 2004 PhD thesis at the University of Waterloo, titled "Evaluation of Asset Valuation Methods for Civil Infrastructure" provides a comprehensive expose on the subject.

Co-operative research programs and partnerships between universities, user agencies and the paving the industry for mutual benefit, exists mostly in the areas of product development and field performance evaluation, as can be demonstrated by the following examples:

Nabil Kamel, Petro-Canada conducted joint projects with the University of Wisconsin, which produced such important papers as Glass transition and thermal cracking of modified asphalt binders, CTAA 2003, Critical evaluation of using Superpave volumetric mix design with modified binders (TRB2005), and Using the Superpave compactor to design mixtures with modified asphalt binders (CTAA 2005).

David Hein, Applied Research Associates, conducted in partnership with the Canadian National Research Council, and others such projects as preventive maintenance for municipalities, seasonal variation of subgrade modulus, and adaptation of the AASHTO design guide to local condition. The resulting research publications include: Decision making for maintenance and rehabilitation of municipal pavements (TAC 2004) and the Effect of seasonal Variation on the resilient modulus of unbound materials (TAC2005).

You will have the opportunity to meet and hear from the Canadian researchers in person at the upcoming 10th International Conference on Asphalt Pavements, August 12 to 17, 2006 in Quebec City.

The University of Waterloo's CENTRE FOR PAVEMENT AND TRANSPORTATION TECHNOLOGY is a three-way partnership between the public, private and academic sectors.

Creation of a Centre for Pavement and Transportation Technology (CPATT) at the University of Waterloo was made possible by a long track record of research in the area and a $9million (Can.) funding package from the Canada Foundation for Innovation, The Ontario Innovation Trust, McAsphalt Industries Limited, The Regional Municipality of Waterloo, Ministry of Transportation Ontario, Ontario Research and Development Challenge Fund, Stantec Consulting Limited, Cement Association of Canada, Greater Toronto Airports Authority, Ontario Hot Mix Producers Association and The University.

CPATT is involved in an integrated program of field and laboratory research, with the following key objectives:

- Focus on emerging and innovative technologies
- State-of-the-art research infrastructure
- Increasing the talent pool of skilled people
- Sustained partnerships

The focus areas directed toward these objectives include structural design, construction and maintenance technology, materials engineering, field evaluation methods, equipment, instrumentation and data processing, intelligent transportation systems and safety, risk and reliability and computational methods and modelling (see Figure 1).

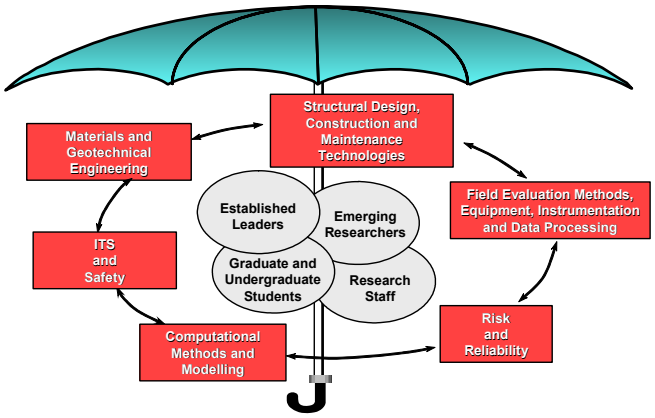


Figure 1

CPATT's new and upgraded central lab facilities include the John J. Carrick Pavement Engineering Laboratory (Figure 2), with a full complement of cold temperature test capabilities and asphalt testing for all SHRP and AASHTO requirements, and a field laboratory (Figure 3) with monitoring equipment, instrumentation and data logging for wireless transmission to the central lab.

Figure 2

Figure 3

CPATT, Contd.

The field lab is situated at CPATT's main test site at The Regional Municipality of Waterloo's waste management facility. This test site, constructed in 2002, includes several asphalt mix designs (conventional, polymer modified, Superpave and stone matrix), embedded sensors for strain, moisture profiles and deflection, trenchless and trenched installations of high density polyethylene pipe and geogrid reinforcement. As well, periodic monitoring of surface deflections (FWD), roughness profile (IRI), surface distress and other measurements are carried out. Traffic loading is primarily by heavy, Caterpillar truck haulers with up to 40 ESAL's with each pass. A large amount of student involvement has occurred and performance analysis and proof testing of instrumentation technologies are major parts of the initiative.

Satellite test sections are also a major part of the CPATT initiative and to date include fast track concrete repairs at Pearson International Airport in Toronto, "quiet" pavement sections with The Regional Municipality of Waterloo and City of Toronto intersection replacement with instrumented concrete slabs. Future sites being planned will include instrumented long life/perpetual pavement sections on Hwy. 402 near Sarnia with The Ministry of Transportation Ontario.

CPATT has sought research and professional collaborations with individuals and organizations both in North America and abroad. An example is CPATT's sponsorship in June, 2003 of the First International Asphalt Pavement Technology Colloquium, with participation by practitioners and researchers from such institutions NCAT, TRL, Pioneer Road Services in Australia , University of Illinois, Texas A & M University and various Canadian agencies. Proceedings from The Colloquium are available from CPATT (Ms. Shelley Bacik, Research Administrative Officer) for a nominal fee.

Finally, who are the key players in CPATT? In addition to the partners mentioned. Three University of Waterloo individuals are well known in ISAP. Dr. Ralph Haas, Founding Director of CPATT, and the Norman W. McLeod Engineering Professor at Waterloo is also founder and past Chairman of the Board of ISAP, Dr. Gerhard Kennepohl, Adjunct Professor at Waterloo, a founder of ISAP and currently a Board member as well as a member of the Executive Committee of ISAP, is Senior Technical Advisor, and Dr. Susan Tighe, Associate Professor and Canada Research Chair in Pavement Engineering and Infrastructure Management is Associate Director of CPATT (Figure 4).

Ralph Haas

Susan Tighe

Gerhard Kennepohl

Figure 4

CTAA 2005 Annual Conference—November 6-9, 2005 Victoria, British Columbia

The Canadian Technical Asphalt Association will be celebrating its 50th Anniversary at the annual conference being November 6-9, 2005, in Victoria, British Columbia, Canada. The Association hosts a technical conference each year at which between 20 and 25 technical papers are presented on various topics. These papers are published yearly in Proceedings, a hard covered book, and have a distribution worldwide.

Please find included a summary of our technical program. Also, a link to our web page, www.ctaa.ca which will provide some travel information.

Tentative Technical Program For 2005 CTAA Conference

Monday, November 7th, 2005, Morning Session
"Improving Canadian Performance of SMA's by Maximizing Best Practices"
James Scherocman, Susan Tighe
"A Long Term Performance Investigation of Superpave"
Brent Middleton, Lynne Cowe Falls
"Evaluation of Low Temperature Properties of Asphalt Crack Sealants Using the Direct Tension Tester"
Huachan Zhai, Delmar Salomon
Monday, November 7th, 2005, Afternoon Session
"A Full Scale Demonstration Project to Evaluate Asphalt Pavement – Highway 6, British Columbia"
Art Johnston, Mike Oliver, Bert Pulles
"Investigating the Effect of Binder Characteristics on the Fatigue Life of Asphalt Concrete Pavement"
K. Kandil, H. Baaj
"Progress of Cold Mix Processes in Canada"
Keith Davidson
"Les structures de chaussées flexibles fortement sollicitées"(Flexible Pavement Structures for High and Heavy Traffic)
Yvan Paquin, Marc Proteau
"N_{Design} Determination for the Stone Matrix Asphalt Mixture"
Mathieu Meunier, Danial Perraton
"Importance of Viscosity in Modified Binder"
Bruno Turenne, Quoc Dinh Duong, Hua Qin Liu
Tuesday, November 8th, 2005, Morning Session
"The Effect of RAP and Proportion on the Properties of Asphalt Mixtures and Binders"
Xinjun Li, Mihai O. Marasteanu, Timothy R. Clyne & Roger Olson
"The Bailey Method – Achieving Volumetrics and HMA Compactability"
Vince Aurilio, Bill Pine, Paul Lum
"Micro-Surfacing Projects Conducted by the British Columbia Ministry of Transportation, 1998-2004"
Ludvik Mazuch, Michael F. Oliver
"Elastic Recovery and Phase Angles of Polymer Modified Asphalts"
Susanna Ho, Daryl MacLeod, Ludo Zanzotto
"Evaluation of Performance Data from Repeated Load Test"
Leslie Ann Myers, Jagan Gudimettla, Charles Paugh
"Using the Superpave Gyratory Compactor to Design Mixtures with Modified Binders"
Nabil I. Kamel, Dong-Woo Cho, Hussain U. Bahia
Tuesday, November 8th, 2005, Afternoon Session
"The Environmental Road of the Future: Analysis of Energy Consumption and Greenhouse Gas Emissions
Pierre T. Dorchies, Michel Chappat, Julian Bilal
Contractor's Workshop
Theme: TBA

CTAA Tentative Schedule, continued

Wednesday, November 9th, 2005, Morning Session
"Rutting and Intersections – Curses and Cures in Alberta"
Dave Palsat, Ken Yeung, Hugh Donovan, Art Johnston, Hamid Soleymani
"The Use of Simple Performance Tests in the Development of Rutting Resistance Criteria for Superpave Mixes in Ontario"
Ludomir Uzarowski, Susan Tighe, Michael Maher, Leo Rhottenburg
"Seal Coat Systems in Canada: Performance and Practice"
Keith Davidson, Gary Houston, Peter Linton, Jean-Martin Croteau
"Estimating Asphalt Pavement Texture Depth Using Superpave Gyratory Specimens"
Steve Goodman, Yasser Hassen, A.O. Abd El Halim
"Use of Digital Imaging to Evaluate HMA Surface Texture and Aggregate Coverage on Surface Treatment"
Alan Carter, Mary Stroup-Cardiner
"Development of ISO-Stiffness Blending Charts for the Selection of Reclaimed Binder Content"
Glen A. Malpas, Suriyanarayanan Sadasivam, N. Paul Khosla
Wednesday, November 9th, 2005, Afternoon Session
"Field Strain Criteria for Asphalt Mixes at the CPATT Test Road"
Ota Vacin, Susan Tighe
"Evaluation and Mitigation of Asphalt Surface Course Top-Down Cracking"
John Emery
"Sustainable Pavements – Making the Case for Longer Design Lives for Flexible Pavements"
Michael Maher, Gary Moore, Ludomir Uzarowski, Vince Aurilio
"Development of ISO-Stiffness Blending Charts for the Selection of Reclaimed Binder Content"
Glen A. Malpas, Suriyanarayanan Sadasivam, N. Paul Khosla

narc Nottingham Asphalt Research Consortium

Nottingham Centre for Pavement Engineering Update

It has now been 4 years since the opening of the Pavement Research Building (PRB) that houses the Nottingham Centre for Pavement Engineering (NCPE). The new laboratory provides cutting-edge technical facilities for testing bound (both bitumen and cement bound) and unbound pavement materials. NCPE encompasses university research activities in pavement and rail track engineering and provides a commercial testing service to the highway industry. At the end of this academic year (August), Professor Steve Brown OBE, FREng will step down as Director of NCPE and hand over the reigns to Professor Andy Collop, although the University won't be losing that vast experience and knowledge as Professor Brown will return in the autumn as an Emeritus Research Professor.

In 2004 NCPE was delighted to have it's Platform Grant, funded by the Engineering and Physical Sciences Research Council (EPSRC), renewed until 2008. This is underpinning funding for internationally-leading groups that allows retention of key postdoctoral staff and the freedom to provide the stability and flexibility to permit longer-term research and international networking. It has allowed NCPE to take a strategic view on its research which has resulted in the identification of a number of key areas for future growth. As part of this strategy, NCPE has recently been successful in obtaining funding (from EPSRC) for an X-Ray Computed Tomography (CT) scanner. This device has now been installed and commissioned and will be used to investigate the internal microstructure of both bound and unbound materials.

One of the areas highlighted for growth is constitutive modelling. NCPE currently has a large 3-year project with Delft University of Technology, the main goal of which is to develop and validate a comprehensive constitutive model for asphalt which will be implemented in the Finite Element (FE) software CAPA-3D developed at Delft. NCPE are also involved in current research utilising the Discrete Element Method (DEM) to model deformation in idealised asphalt at the particle scale. This research is funded by the Nottingham Asphalt Research Consortium (NARC).

Another active research area is durability of asphalt where NCPE has been undertaking work for the UK Highways Agency aimed at developing a combined ageing/moisture sensitivity test, known as the Saturated Ageing Tensile Stiffness (SATS) test. This work forms part of a larger programme of activity where more fundamental work related to durability is also being pursued.

The Nottingham Asphalt Research Consortium: a Successful Academia-Industry Link

narc Nottingham Asphalt Research Consortium

Professor S F Brown

The University of Nottingham

The Nottingham Asphalt Research Consortium (NARC) was launched in December 1997 as a 'Club' to facilitate dialogue between academia and industry, to provide support for research students and to run short technology transfer courses. The idea came from the highly successful BITUTEST research programme, which ran at Nottingham from 1992 to 1995 and involved close collaboration between the University and a large number of organisations in the public and private sectors. The project lead to the development of practical tests to measure the mechanical properties of asphalts using the Nottingham Asphalt Tester (NAT) and it also advanced knowledge on the stiffness, permanent deformation and fatigue characteristics of asphalts and their durability. The tests were taken on by industry and became incorporated into draft standards that are widely used. This work materially assisted the UK in moving towards the use of performance-based specifications for asphalts.

The collaborative aspects of this project, involving research in a large number of laboratories and regular discussion meetings with all participants, facilitated excellent dialogue between the research team at the University and the outside organisations. At the end of the project, the University team considered that this form of dialogue should, if possible, be continued and thought was given to a suitable way to bring this about.

Consequently, in March 1997 a meeting was called at Nottingham to discuss the formation of an 'Asphalt Club' to be based on principles similar to those used successfully by other engineering disciplines at Nottingham and other Universities to facilitate dialogue between industry and academia. This meeting was well attended and the technical discussion focussed on collaborative research and also outlined the research currently in progress at the University. A draft constitution for a formal organisation was discussed and it was agreed that the University should proceed with making the necessary arrangements.

The first formal meeting of NARC took place on 11th December 1997 with 22 organisations each paying an annual subscription of £600 as founder members. There were three academic members. In addition to the University of Nottingham, the Universities of Cambridge and of Edinburgh were involved through their Transportation Research and non-destructive testing groups respectively. Edinburgh withdrew in 2000 because of staff changes. A formal constitution was approved and a Management Committee established to represent members' interests and plan future activities. Stephen Brown and Andrew Collop took on the roles of Director and Secretary respectively and the Management Committee was chaired by Steve Biczysko. The Committee has been appointed annually with representatives from the principal sectors of the membership organisations. Gordon Airey succeeded Andrew Collop as Secretary in 2001 and David Cebon has represented the Cambridge interests.

The NARC constitution states that:

'The aim of the Consortium shall be to organise liaison between Universities, industry, government, professional bodies and educational establishments and to advance the scientific, technical and practical development and application of asphalt and related pavement materials…'

The key activities involve three informal technical meetings per year, financial support for research students to work on projects approved by the members' and organisation of well-targeted short courses for industry. These activities have continued and been augmented over the years by occasional research symposia involving speakers from overseas and assisted by sponsorship from the Highways Agency.

The technical meetings have covered a wide range of topics with two or three speakers invited, generally from member organisations, to make presentations and stimulate discussion. The topics have included:

NARC article, contd.

- Performance-based specifications
- Polymer modified bitumens
- Value engineering
- Technology transfer
- Dynamic loading
- Recycling
- Non-road applications of asphalt
- Novel applications of asphalt
- Geosynthetics
- Versatile pavement design

In addition, there have been regular presentations summarising the research being carried out at the Universities and brainstorming sessions to identify futures research needs. Members who have attended important international conferences have presented summaries of the key topics and most significant papers. In addition, selected papers published by the university members have been made available.

A key feature of each meeting is the item on research being undertaken by the NARC funded students, who make short presentations and answer questions on their work. To date, two projects have been completed; one at Nottingham (Stuart Dunhill) and one at Cambridge (Alex Ossa) and each student has been awarded a PhD. A further student (York Lee) is currently working at Nottingham and a new studentship is due to start at Cambridge in October 2005.

The programme of one-day short courses has, after a shaky start in December 1999, become well established, each organised by one of the members. The aim has been to arrange up to four courses per year and to repeat any that are over-subscribed.

The two research symposia were well attended and allowed UK asphalt pavement engineers to learn about international developments in key areas. The first, held in June 2000, dealt with dynamic loading of pavements and the application of accelerated full-scale pavement testing (APT) to research and development. Speakers were drawn from the USA, South Africa, France and the UK. They demonstrated the importance of considering dynamic load factors in pavement design and the influence of different suspension systems on trucks. The APT presentations showed that, despite the high capital cost of the facilities, this technique has shown benefit:cost ratios of 10:1 and been extremely useful in providing confidence for the introduction of new materials and design concepts within a short time-scale.

The second symposium was held in May 2003 and focussed on recent developments in the USA and Switzerland. The topics again included accelerated pavement testing and also the new pavement design guide under development for AASHTO.

Administration of all NARC activities is undertaken by the clerical staff of the Nottingham Centre for Pavement Engineering and all meetings except one to date have been held at Nottingham.

The membership of NARC quickly rose to 31 at the end of the first year and then stabilised at about 34 with a few changes each year but a regular core of members, whose staff attend and actively participate in the meetings, courses and symposia.

NARC article, contd.

The funds available from subscription income for research have only been at a level to provide support to post graduate students and there has been much debate about the nature of the research that this support can provide. Inevitably, the students lack experience and the requirements of the PhD degree are such that they have to focus on fairly narrow areas and work at a fundamental level on new developments. This is somewhat at variance with the immediate needs of industry, which are usually short term and applicable to current design and construction issues. Nonetheless, the NARC support has provided excellent training for the students involved and has added to the font of knowledge used to advise future practical developments.

The first project, conducted by Stuart Dunhill, was initially directed at the design and maintenance of lightly trafficked roads but it quickly became apparent that this was too wide a topic for his studies and the eventual thesis was entitled 'Quasi-static characterisation of asphalt mixtures'. The work advanced knowledge on load-associated deterioration mechanisms in asphalt and involved collaboration with Delft University of Technology in The Netherlands. An executive summary of the research was provided for NARC members and copies of the PhD thesis were made available on request. The key features of the work involved advances in the theoretical modelling of asphalt for future application to pavement analysis using the finite element method. A particular feature was the development of simple tests in direct tension and compression to provide the key parameters required as input to the model. The tests were conducted on specimens of typical Dense Bitumen Macadam and Hot Rolled Asphalt surfacing materials. This research forms part of the wider activities at NCPE in developing techniques for the prediction of pavement deterioration, which could be incorporated into asset management tools.

The research conducted at Cambridge by Alex Ossa was entitled 'Deformation behaviour of bitumen and bituminous mixes'. He extended earlier research on theoretical models intended to predict the deformation of bitumens and of mixtures with varying proportions of aggregate. Both normal and polymer modified bitumens were tested. The experiments included monotonic, pulsed and cyclic load tensile tests on the binders and the use of a simple spherical indentation test. In all cases, good agreement was obtained between theory and experiment. The tests on mixtures were in compression using monotonic, pulsed and cyclic loading and involved both uniaxial and triaxial conditions. The theory was extended to accommodate the inclusion of aggregate and, again, good theoretical predictions were obtained. Other work included a different theoretical approach using micro-mechanical modelling, which compared reasonably with the experiments. This fundamental research could be useful when extended to real practical mixtures as a basis for prediction of permanent deformation and, hence, rutting potential.

The current research of York Lee is entirely theoretical and concerns use of the Discrete Element Method to model the deformation of asphalt mixtures. The materials are represented by a series of interconnected spheres and the contacts are modelled using visco-elastic parameters based on the well-known Burger's rheological model. The theory is being used to predict the response of idealised asphalt mixtures tested in earlier research.

Publications arising from the NARC funded research are listed below.

It will be apparent that NARC has, over its first eight years, provided a variety of benefits to its members and a vital link between research and practice in asphalt paving technology, together with a window on international developments. It has also provided high quality and challenging research training to the young engineers who have been in receipt of NARC studentships and, through their work, lead to some important research advances which will be of use to the industry in future.

NARC Article, contd.

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Bergounioux, S, Ossa, EA, Deshpande, VS and Cebon, D. 'Monotonic and cyclic behaviour of polymer modified bitumens', Int. J. Road Materials and Pavement Design, Vol 5 – Special Issue, 2004.

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Airey, G.D., Collop, A.C., Dunhill, S.T. and Scarpas, A. 'Experimental Determination of Dynamic Plasticity Model Parameters for Asphalt Mixtures.' Proceedings of the International Symposium on Computational and Experimental Material Characterisation Techniques for Pavement Engineering, Corfu, 2003.

Leading Nottingham pavement engineering academic retires from post after 42 years

The Director of Nottingham Centre for Pavement Engineering at The University of Nottingham has retired after 42 years service.

Professor Stephen Brown OBE FREng will continue to be active in research and as a specialist consultant working with the University, with Scott Wilson Pavement Engineering (SWPE), a University spin-off company, and in a private capacity.

During his career he has pioneered the use of a more scientific approach to the design and maintenance of road structures and the improvement of road building materials, working closely with industry in the UK and overseas, notably in the USA.

His team have recently been heavily involved in rail track research and consulting with support from the Royal Society, industry, and the Engineering and Physical Sciences Research Council.

Professor Brown is currently leading a team from SWPE and the University who have been appointed by the US National Research Council to conduct an independent, in-depth evaluation of the new highway design method, which has been developed there through a major research project over the past seven years.

His involvement with highway engineering activities began in 1972 and he is currently Second Vice President of the leading American learned society for asphalt pavements(AAPT). He has received a number of awards for his research and consulting activities in the UK.

His career at The University of Nottingham has included periods as head of Civil Engineering, Dean of Engineering and Pro-Vice-Chancellor for Research and Industry.

He will be succeeded, from August 31, at the Nottingham Centre for Pavement Engineering by Professor Andrew Collop who, with a staff of nearly 40, will continue to lead international quality research in pavement and rail track engineering, which currently attracts £1.2 million annually in external grants and contracts.

Upcoming Events

2005

September 11-14	American Public Works Association www.apwa.net	Minneapolis, MN
October 17-19	National Conference on Noise Control Engineering www.inceusa.org	Minneapolis, MN
November 1-3	Quiet Asphalt Conference herlconf@ecn.purdue.edu	Lafayette, IN
November 6-9	CTAA Annual Conference www.ctaa.ca	Victoria, B.C., Canada
November 23-25	Moisture Induced Damage of Asphalt Mixes Www.isap-tc-conmod.org	Delft, Netherlands
December 12-15	Southeast Asphalt User/Producer Group	Nashville, TN

2006

January 21	ISAP Board & Member Meeting Www.asphalt.org	Washington D.C.
January 22-26	TRB 85th Annual Meeting www.trb.org	Washington D.C.
January 23-25	NAPA 51st Annual Convention hotmix.org	Hollywood, FL
March 14-16	World of Asphalt www.worldofasphalt.org	Orlando, FL
March 27-29	AAPT Annual Meeting and Technical Sessions www.asphalttechnology.org	Savannah, GA
Apr 30-May 3	Airfield & Highway Pavements www.asce.org/conferences/pavements2006	Atlanta, GA
August 12-17	10th ISAP International Conference on Asphalt Pavements www.icap2006.fsg.ulaval.ca	Quebec, Canada

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