AGGREGATE update

INTERNATIONAL

ICAR

CENTER FOR AGGREGATES RESEARCH

VOLUME 9 NUMBER 1 SUMMER 2005

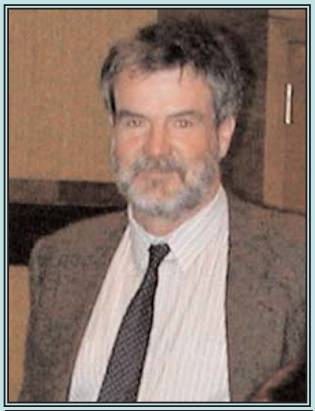
ICAR's13th Symposium offered new sales/marketing courses & introduced new task forces

triskaidekaphobia-(*n.*) fear of the number thirteen

Pushing aside their triskaidekaphobia, attendees of the International Center for Aggregates Research (ICAR)'s 13th Annual Symposium gathered in Austin, Texas, to hear the latest in aggregates research. The meeting took place April 10-13, 2005, at the Omni Hotel Downtown. Each year representatives of industry, academia, and government share their concerns and experiences at the "most important annual meeting on aggregates research," according to a recent survey of Departments of Transportation. The symposium affords attendees the chance to help to shape the research program of ICAR.

continued

Distinguished Researcher Award



Chris Rogers

This year's Distinguished Researcher, Chris Rogers, hails from the Ontario Ministry of Transportation. In his acceptance speech, the geologist contrasted research in academia with that in highway departments. He used AAR (alkali-aggregate reaction) research as an example.

After a failed attempt in the early 1980s to measure aggregate reactivity in a Canadian study, Rogers's group tried a different approach. They bought 300 tons of alkali-reactive aggregates then gave them away. Yes, gave them away.

In return, they asked the users to pay shipping costs and publish their results. This effort yielded about 50 papers published all over the world. The conclusions found their way into both Canadian and American standards. They influenced specifications in Europe, Australia, New Zealand, and China. Rogers emphasized the project's success in both leveraging research and encouraging cooperation. He showed how highway agencies can use their resources to promote research.

He also illustrated how highway agencies can use their unique position to foster and promote research in the construction of test sections. Ontario encourages installation of test sections for normal construction projects. These sections serve many purposes.

Rogers recently discovered some forgotten pavement test sections that had been constructed in the early 1970s. At 21 years, his group re-established the section limits and measured friction. They obtained stunning results regarding proportions and blending of aggregates as they correlated to friction. At 23 years, they got the same results. This data enabled them to establish limits.

Rogers then asked the audience if they, too, might have some forgotten test sections. He emphasized departments of transportation's unique position to conduct long-term studies.

He then encouraged DOTs to establish outdoor-exposure sites. As an example he described ICAR researcher Kevin Folliard's excellent one to predict AAR. A similar site in the much colder location of Ottowa, Canada, helps to reveal climate's impact on AAR.

"We need more of this kind of work," Rogers recommended. He encouraged aggregate producers and contractors to approach highway departments with proposals for test sections.

He concluded his acceptance speech with suggestions for future research.

"First, we need people who are 'curious'-they don't have to be PhDs, they have to want to know why!" Rogers rallied.

Finally, he underscored the need to develop proper performance tests. He also pointed out the need for better cooperation between producers and users in establishing field performance.

Better cooperation like Rogers encourages results from a healthy exchange of ideas. ICAR meetings provide opportunities for those with aggregates issues to voice their concerns and share experiences.

For more information about ICAR's next symposium, please see the back page or go to www.icar.utexas.edu.

The newly established task forces also met.

Task Force 1
Asphalt Durability Issues
chaired by Michael A. Taylor, Granite Rock Co.

Task Force 2,
Characterizing Aggregates for Asphalt
Mixture Proportioning
chaired by Randy L. Weingart, Luck Stone Corp.

Task Force 3
Concrete Durability Issues
chaired by J. Donald Powell, Vulcan Materials Co.

Task Force 4
Characterizing Aggregates for Concrete Mixture Proportioning

Task Force 5
Aggregates in Base Courses
chaired by Charles A. Sanders, Vulcan Materials Co.

ICAR's Aggregates Research Plan

ICAR invited representatives of industry, government, and academia in late summer 2004 to help develop its research plan. Its contents address the aggregates industry's requirements. Also, the plan considers topics previously identified by ICAR's task forces and Technical Advisory Committee.

Top Ten Future Research Needs

ASPHALT

- Use of surface energy as a tool to investigate remedial techniques for aggregates' surface properties
- Predict the frictional properties of aggregates used in surface courses of asphalt and concrete pavements (note: This topic also includes concrete objectives.)
- Define bond strength between mastic and aggregate - - some fillers are inert, others are interactive with bitumen - - the need is to identify and characterize the process

Portland Cement Concrete

- Develop new and modified tests for alkali-silica and alkali-carbonate reactions.
- Fixing the mica problem and mitigating soft, deleterious, and organic materials
- Validate the proposed aggregates grading modification to ASTM C33
- Correlate the new workability devices to field applications - - new ICAR device and FHWA device

BASES

- Demonstrate, compare, and contrast the performance of thick unbound and stabilized base courses
- Identify the causes of variations in aggregates' properties and quantify their effects on the economics and performance of finished products (note: this topic also includes asphalt and concrete objectives)
- Develop a virtual design system for bases which can utilize models developed previously for anisotropy and imaging analysis for particle shape, size, and texture

The plan is organized by three major applications of aggregates: asphalt, concrete, and bases. For each application, the plan describes three major research areas: design, performance, and characterization. The plan strives to support advances in product knowledge that will facilitate superior performance of aggregates and improve the quality and durability of the application. Other goals include the encouragement of the widespread use of greater amounts of -#200 fines, placement of thicker base courses, a significant increase in the use of local materials, and the use of more aggregates in various applications.

ASPHALT

1 Several design-related projects have been completed. In ICAR 201, Evaluation of Superpave Aggregate Specifications, researchers found that the Restricted Zone is unnecessary and the Fine Aggregate Angularity (FAA) does not predict mixture performance. Another project, ICAR 202, Evaluation of Superpave Flat and Elongated Aggregate Specifications, was jointly sponsored by the FHWA.

2 Two completed and one ongoing project have yielded interesting findings related to performance. ICAR 201used a Superpave shear tester, an asphalt pavement analyzer, and others. Also, ICAR 203, Evaluation of Aggregates Characteristics Affecting HMA Performance, found that image analysis can be used in a mechanistic model to predict damage. The ongoing project, ICAR 505, Surface-Energy Measurements as Performance Indicators of Hot-Mix Asphalt (HMA), found that aggregates surface-energy properties vary widely. Some other projects studied fracture.

3 In another research area, characterization, one project developed an aggregate imaging system called AIMS. Another ongoing project, ICAR 505, will measure surface energy's potential to predict stripping, rutting, etc.

CONCRETE

1 In the research area of design, ICAR 102, Increased Used of Fines in Portland Cement Concrete, found that higher amounts of fines can be used in concrete to fill voids and to produce workable mixtures. Also, ICAR 104, Effects of Aggregate Characteristics on the Performance of Portland Cement Concrete, found that concrete durability profits from the optimization of aggregate gradation. A third project, ICAR 107, Characterizing Minus No. 200 Fine Aggregate for Performance in Concrete, is underway.

2 Another area of research in portland cement concrete investigates performance, including constructability, hardened concrete properties, green concrete, and special concretes such as self-consolidating concrete. Projects investigating hardened concrete properties include ICAR 101, Framework for Development of a Classification Procedure for the Use of Aggregates Fines in Concrete. Another project, ICAR 102, found that good concrete can contain up to 17% microfines. Another project, ICAR 301, proposed a modification to ASTM 1293 to reduce test time from twelve months to three months. It also recommended mitigation methods so that the reactive aggregates could be used successfully.

3 In addition, many of the above-named projects' findings relate to characterization of aggregates. Classification procedures, tests such as methylene blue, image analysis, mineralogical properties and the affects of aggregates properties such as shape and texture all play impor-

BASES

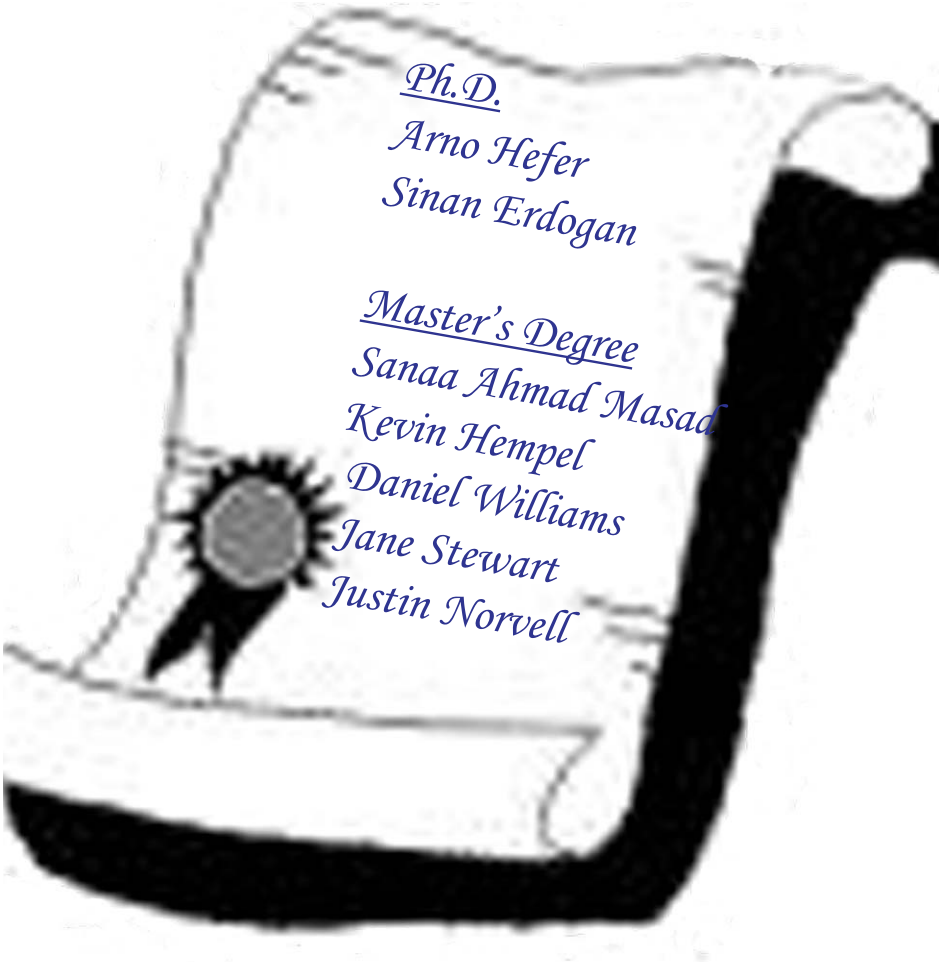
1 For design, ICAR 502, Structural Considerations of Unbound Aggregate Layers, developed a new structural model for unbound aggregates layers which accounts for directional properties and stress dependency. Also, the ICAR Design Guide incorporated the structural model from ICAR 502, field measurements from the Georgia Haul Road, and modified transfer functions from the AASHO Road Test into a new mechanistic pavement design process.

2 For performance of bases, ICAR 501, Increased Single Lift Thicknesses for Unbound Aggregate Base Courses, demonstrated the construction of unbound bases in single lift thicknesses of up to 14 inches. Also, ICAR's Field Evaluation of a Georgia Haul Road demonstrated the capability to achieve enhanced levels of compaction in unbound bases constructed atop stabilized sublayers and to measure directional stiffness in unbound material layers using seismic techniques.

3 For characterization of bases, ICAR 506, Utilization of High-Fines Content Unbound Aggregate Pavement Layers, currently underway, evaluates the effects of increasing the fines content of unbound bases on stiffness and rutting. Also, ICAR 503, Rapid Test to Establish Grading of Unbound Aggregates (Completed) developed a prototype LASS (Laser-based Aggregate Scanning System) that obtains true three-dimensional aggregates data by laser profiling. Lastly, ICAR 507, Application and Significance of the Micro-Deval Test, currently underway, seeks to link the micro-Deval test to field performance.

Congratulations to
2005 Graduates

who worked on ICAR Projects
thanks to the generous support of
the Aggregates Foundation for Technology, Research, and Education (AFTRE)



ICAR'S 14TH ANNUAL SYMPOSIUM

WHO SHOULD ATTEND?

Industry producers, researchers, sales personnel, & engineers

Construction contractors

DOT employees involved in research, design, & construction

University researchers & professors

AGGREGATES: ASPHALT CONCRETE, PORTLAND CEMENT CONCRETE, BASES & FINES

HOSTED BY

International Center for Aggregates Research

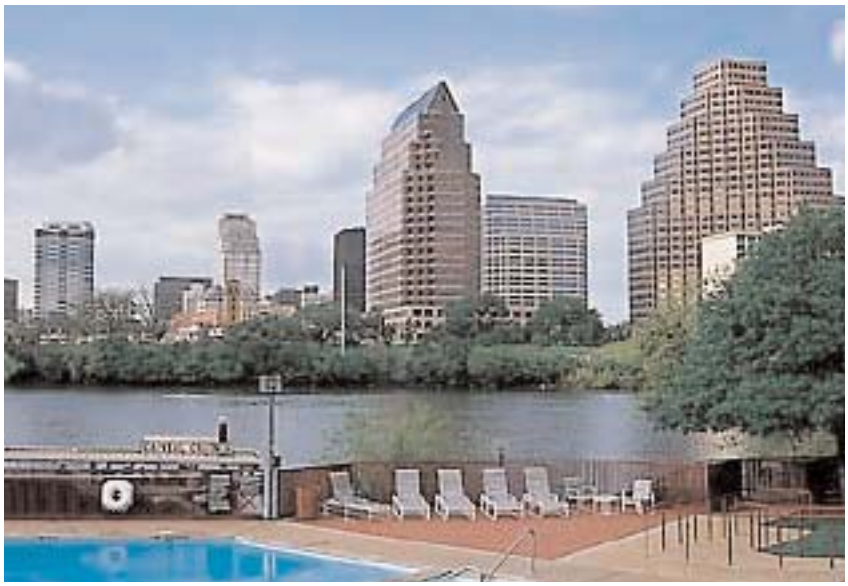
The University of Texas/ Texas A& M

Aggregates Foundation for Technology, Research, & Education

National Stone, Sand, & Gravel Association

APRIL 23-26, 2006 · AUSTIN, TEXAS

ICAR'S 14TH SYMPOSIUM will feature presentations on current aggregates issues in concrete, asphalt, and unbound pavement layers. In addition to these topical areas, we will have papers on new testing procedures, characterization of materials for various uses, and the application of new techniques to field practice.



View from Hyatt Regency Austin

PLAN NOW TO JOIN US IN AUSTIN for the only national forum bringing together state and federal officials, producers, and contractors to discuss aggregates issues, to speed the transition from research to field use, and to point the way for meaningful future research.

New! Earn PDH's

Ideal Exhibit Space

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