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Spring 2008

Mack Nuggets, Spring 2008

Mack-Blackwell National Rural Transportation Study Center (U.S.)

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Mack Nuggets

Summer Transportation Institute Visits Mack-Blackwell



Dr. Brady Cox shows a video of earthquakes to the Summer Transportation Institute students before demonstrating the “shaker truck”.

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Seventeen students from North Little Rock, Arkansas arrived at the Center for Training Transportation Professionals (CTTP) to learn more about transportation-related careers. They ranged in grades 8th to 10th and were asked why they decided to attend this year's Summer Transportation Institute (STI). Their answers ranged from their father being a graduate of the engineering program to “their mother made them”.

After a quick Q&A session as to what to expect on the tour, Ms. Frances Griffith, Administrator for Technician Training at CTTP, walked them through the labs. In one

lab she showed a sample of a cylinder of concrete. Ms. Griffith explained that with this sample, they could test the strength by inserting it into a machine and putting pressure on the cylinder until a crack appeared and this would give them information that would be used to make the correct strength of concrete for our roads and highways.

The next stop was with Dr. Brady Cox, Assistant Professor in Civil Engineering. He showed the students a video of earthquakes from all over the world and explained how they cause destruction to buildings and roads. Dr. Cox then took the students outside to show them the “shaker

truck” – a truck that simulates earthquakes. The information obtained by testing with the shaker truck helps engineers build better highways and structures.

The last stop was Bell Engineering Center where Mr. Bryan Hill, Associate Director for Recruitment, Retention, and Diversity, challenged them to a small-scale bridge building competition to determine whose design could withstand the greatest pressure— see winners of the contest on page 5.

MBTC greatly enjoyed hosting STI and looks forward to future visits. The STI is sponsored by the FHWA, AHTD and supported by MBTC.

Message from the Director



Dr. Heather Nachtmann

As I read this issue, the importance of education in operating a successful UTC came to mind. As a researcher, I appreciate the role that a rigorous and active research program plays in contributing to the nation's transportation systems. However, I am a true believer that research and education go hand and hand.

When we had the opportunity to host the Summer Transportation Institute staff and students, our first stop was a tour of our research

labs with demonstrations from our talented faculty.

Updates on our professional development efforts are given in the articles about our most recent distinguished lecturer and current efforts of CTPP.

Each year our *Outstanding Student of the Year* recipient is one of many students whose efforts are essential to the success of MBTC.

Lifelong learning has even crossed over into the administrative side of

MBTC. Dana Ledbetter and Sandy Hancock recently completed their first sessions of the Master of Science in Operations Management program here at the UA.

Education permeates every aspect of the MBTC, and we would not have it any other way.

Next week we are looking forward to finding our way to San Jose for the summer UTC and CUTC meetings.

Motor Carrier Effectiveness

"Financial incentives are rarely attached to driver performance, and indeed many internal performance measures are not given a great deal of weight."



Drs. Nina Gupta and John Delery,
PI's for MBTC 1043

Recruiting, retaining, and motivating good drivers has been of concern in the trucking industry in the past, and chances are that it will continue to be of concern. This study was designed to provide information-based insights about ways in which these concerns can be addressed fruitfully and realistically, and about avenues for ameliorating driver turnover problems. What does the information in this study say about these issues? It points to several areas that motor carriers might look to in their search for ways to enhance their overall success.

Driver rewards and compensation must continue to be addressed systematically. The

results are consistent across-the-board. One reason for high turnover among drivers is pay (and benefits), but many carriers pay drivers below market, and certainly when the whole compensation package is taken into account. Obviously, increasing driver pay is expensive. At the same time, these costs must be weighed against the high costs of turnover, against the accident rates for inexperienced drivers, against the loss in equipment, etc. One balance, giving drivers (and especially the better and more experienced drivers) more money and better benefits may more than offset the direct and indirect costs of high turnover and the resulting

inefficiencies and hazards.

On a related matter, financial incentives are rarely attached to driver performance, and indeed many internal performance measures are not given a great deal of weight. Thus, there is little reason for drivers to do their best, to drive efficiently and to maintain their rigs in good condition. It may be useful to explore ways in which financial incentives can be tied to desired driver behaviors. This does not necessitate additional expenditures. Rather, it entails shepherding financial resources to achieve maximum benefits.

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Distinguished Lecture Series

Mr. Ted C. Kennedy, founder of BE&K, Inc., a worldwide engineering, construction, and contract maintenance firm, spoke at the Mack-Blackwell Rural Transportation Center Distinguished Lecture on Thursday, February 21, 2008 in the Combs Auditorium, Room 282.

Mr. Kennedy is one of the most successful engineers/contractors in the U.S. today.

Mr. Kennedy's topic for the evening was on Leadership and his lecture detailed his rise in the construction field. He gave advice on courses to take in school as well as what to look for in a job

once they were out of college. He also talked about how it was important to show how to be leader in difficult times. It was a great honor for us to have him come and speak to faculty and students on his experiences.

Many students and faculty as well as other interested parties attended his



Mr. Ted C. Kennedy
Founder of BE&K, Inc.

MBTC Student of the Year

Jennifer A. Pazour was selected as the Mack-Blackwell Rural Transportation Center (MBTC) *Outstanding Student of the Year* based on the contributions she is making to MBTC.

Ms. Pazour is a doctoral student in Industrial Engineering at the University of Arkansas. She graduated from South Dakota School of Mines and Technology with a B.S. in Industrial Engineering in 2006. Her research interests are in transportation, material handling, and healthcare logistics. Ms. Pazour's master's thesis is entitled, "A National High-Speed Rail System for Freight Distribution." Her research for MBTC focuses on reducing the amount of freight traffic on the current highway

system through the deployment of a national high-speed rail system. She has developed a model that decides where to build high-speed rail arcs in the United States for freight distribution. Initial results indicate that a relatively small investment in a high-speed network leads to significant reductions in both freight transit times and the amount of freight traffic on the nation's highways. Ms. Pazour presented this research at the INFORMS National Conference in November 2007.

Ms. Pazour aspires to a future career in academia and was selected for this award because of her overall contribution to the academic community at the University of Arkansas. She has

exceptional research skills, demonstrated strong academic ability, and provides active service to her field.

Each US Department of Transportation (USDOT), University Transportation Center (UTC) has the opportunity to select an outstanding student from their center who is then put forth as a nominee for *Outstanding Student of the Year* of the entire University Transportation Center (UTC) program. Ms. Pazour was honored during a special ceremony at the Transportation Research Board (TRB) Annual Meeting in Washington D.C. In addition, she received \$1,000 plus the cost of attendance at TRB from MBTC, and a certificate from USDOT.



Ms. Jennifer A. Pazour

Jack Buffington, Associate Director for Mack-Blackwell was presented the "Distinguished Contribution to University Transportation Education and Research" award at the Transportation Research Board Meeting in Washington in January 2008. He was presented the award by the President of Council of University Transportation Centers (CUTC) Ron Diridon of San Jose State University.

Center for Training Transportation Professionals



Ms. Roselie Conley, Ms. Mary Fleck,
Ms. Frances Griffith, Dr. Stacy Williams,
Ms. Carrie Pennington

The Center for Training Transportation Professionals (CTTP) has had a busy year. First, they started the pilot program on concrete patching course with great success. They continue to offer American Concrete Institute (ACI) concrete strength testing certification classes and have started offering the ACI aggregate testing certification course.

CTTP plans to offer a half

day PDH course on evaluating concrete strength tests.

CTTP will host a National Highway Institute (NHI) course in the fall of 2008 on Bridge Scour. They are also planning on offering an erosion control and sediment course for construction sites. New to the curriculum is a construction surveying course. Plans are in the works to redevelop the website and offer online

refresher courses.

The CTTP staff is always looking for ways to keep all of our transportation professionals on the cutting edge.

For more information on CTTP or to see the listing of available courses, go to their website at www.cttp.org.

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“Designing and maintaining effective human resource systems is not easy. Each situation and each carrier is unique, with a unique combination of assets, liabilities, and constraints.”

To be effective, these systems must use rewards and incentives that are *important* to drivers -- money, benefits, more nights at home, etc. Indeed, non-monetary rewards were among the few incentives respondents reported using. A good incentive system attaches rewards that *employees* value, not rewards toward which employees are indifferent.

Staffing issues also offer a fertile area for improvement. To the extent driver shortages are apparent; the recruiting avenues must be expanded.

Another area of concern includes the amount and kinds of **training** that drivers *are* given versus *should be* given. Clearly, safe driving training and accident prevention are important. Our report

does not lend itself to offering prescriptions about exactly what kinds of training should be offered. What our report does do is highlight what is currently happening, and point to areas for exploration. The final decision about what makes sense must, of course, be made in the context of the relevant situational constraints and considerations.

Similarly, it is important to determine the **performance areas** that are critical for drivers, and the best sources of performance assessment information with respect to these performance areas. Again, this study cannot establish the areas of driver performance that must be assessed; what it does do is show the factors that are currently considered in assessing

driver performance, and point to potential improvements. In addition to identifying critical areas of performance assessment, it is also important to get performance information from the right source.

Performance information can be vital in designing effective incentive systems.

In short, designing and maintaining effective human resource systems is not easy. Each situation and each carrier is unique, with a unique combination of assets, liabilities, and constraints. What is important is to determine systematically and comprehensively what will work best, and what the costs and benefits are. This report provides information that should be useful in making such judgments.

MBTC's Recently Completed Projects

Listed below are projects completed since the start of fiscal year 2008. Full reports for these and all other completed MBTC projects are listed on our website at ww2.mackblackwell.org/web/research/all-projects.htm.

JULY 2007

MBTC - 7015
Assessment of Multimodal Transport of Baled Poultry Litter and Dewatered Biosolids from Northwest Arkansas
Principal Investigators: Harold L. Goodwin, Ph.D. and Kenneth B. Young, University of Arkansas

MBTC – 2080
Effects of Not Wearing Safety Belts on Injury Severity
Principal Investigator: Sunanda Dissanayake, Ph.D., Kansas State University

MBTC – 2064
Assisted Night Vision for Motorists in Highway Construction Zones: Phase II (Field Testing and Assessment)
Principal Investigator: Hiram C. Patangia, Ph.D., P.E., University of Arkansas at Little Rock

MBTC – 2072
Roundabout Feasibility Study for West Memphis, Arkansas as a Prototype for Intersection Improvements
Principal Investigators: John V. Crone, Otto Loewer, Ph.D., and Carolyne Garcia, University of Arkansas

AUGUST 2007

MBTC – 2093
Improved Traffic Signal Efficiency in Rural Areas Through the Use of Variable Maximum Green Time
Principal Investigator: Steven Click, Ph.D., P.E., Tennessee Tech University

SEPTEMBER 2007

MBTC – 2079
A Safety Analysis of Driver Reaction to Alternative Traffic Control Devices at Rail-Highway Grade Crossings
Principal Investigators: Eugene R. Russell, Ph.D., P.E. and Margaret Rys, Ph.D., Kansas State University

DECEMBER 2007

MBTC – 2100
Evaluation of the Role of Driver's Knowledge of Who has the Right-of-Way Contributes to Interstate On-Ramp Crashes
Principal Investigator: Deogratias Eustace, Ph.D., P.E., PTOE, University of Dayton

JANUARY 2008

MBTC – 2092
Yield Characteristics of Biodiesel Produced from Chicken Fat-Tall Oil Blended Feedstocks
Principal Investigator: Robert E. Babcock, Ph.D., P.E, Ed C. Clausen, Ph.D., Michael Popp, Ph.D., University of Arkansas

MBTC – 2078
Evaluation of Economic Impacts of NAFTA on the Transportation System/Sector of Selected Southern States
Principal Investigator: Gregory L. Hamilton, Ph.D., University of Arkansas at Little Rock

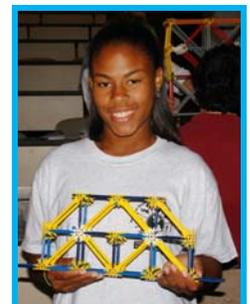
MAY 2008

MBTC – 2077
Networked Sensor System for Automated Data Collection and Analysis
Principal Investigator: Kelvin C.P. Wang, Ph.D., P.E., University of Arkansas

MBTC – 2097
Automated Inventory and Analysis of Highway Assets, Phase-II
Principal Investigator: Kelvin C.P. Wang, Ph.D., P.E., University of Arkansas



Digital Highway Data Vehicle



The bridge building design contest is a contest designed to challenge the student's structural and mechanical thinking ability. The students learned why the triangle is such a common shape in structures and what went into the design of the bridges that you see every day. The students used a creative toy construction system to "manufacture" their bridges for this contest.

Mack-Blackwell Rural Transportation Center

4190 Bell Engineering Center
University of Arkansas
Fayetteville, AR 72701

PHONE:
(479) 575-6026

FAX:
(479) 575-7168

E-MAIL:
mbtc@uark.edu

DOT invests in the future of transportation through its University Transportation Centers Program, which awards grants to universities across the United States to advance the state-of-the-art in transportation research and develop the next generation of transportation professionals.



The Research and Innovative Technology Administration (RITA) coordinates the U.S. Department of Transportation's (DOT) research programs and is charged with advancing the deployment of cross-cutting technologies to improve our Nation's transportation system and Mack-Blackwell is proud to be a participating university.

Kevin Hall, Ph.D., P.E.
Executive Director

Heather Nachtmann, Ph.D.
Director

Jack Buffington, P.E., RADM
(Ret.)
Associate Director

Dana Ledbetter
Communications Director

Sandy Hancock CPS
Accountant

We're on the Web!

See us at:

www.mackblackwell.org

About Mack-Blackwell...

Ever wonder how a company or organization started, who was involved, how it was named? I had these same questions when I started with MBTC in the summer of 2006. Most of the people in the organization had been here for years and knew everything about the center so I thought I would start at the beginning and go directly to the sources for their stories. I am not sure how many parts this story will become but the following is from the first director of MBTC, Dr. Walter LeFevre. We would all be lost without his wisdom.

"In the spring of 1982, I resigned my position as Civil Engineering (CVEG) Department Head. It was my desire to return to teaching and research on a full-time basis. Soon afterwards, the University was informed that they would be awarded a Transportation Center. This was not anticipated so several major decisions were made on how to form the Center. The University decided that the Center would be a joint effort of the College of Business and the Departments of Civil and Industrial Engineering with the administration to be in Civil Engineering. I was asked to administer the Center and to develop the center procedures.

Congressman John Paul Hammerschmidt knew of

my interest in the area of transportation research and the bill included many of the points we had discussed. For several years I had made it a point to visit in Washington with our congressional delegation about engineering related problems. The official name of the center in the legislation is "The National Rural Transportation Study Center". The terms in the name became the focus of the UAF work plan. Our studies had to include other institutions in order to be a "national center". Rural is how the federal government describes most of Arkansas. Transportation meant it had to be more than highways. But most important was that there had to be a teaching function to all our efforts. Student involvement was required on all center funded projects. We were to be more of a study center than a research center. Very few individuals have the opportunity to structure a center to fit their personal desires. As an example of the promotion of education effort, there would be no overhead charge on technology transfer.

I was informed by a colleague that Melissa Tooley was working for her father but desired to get additional education. I made a special trip to

Little Rock and found Melissa at work in her father's firm. When Melissa was a senior in high school, she and her father made a visit to our campus to investigate scholarship opportunities. I tried very hard to convince her to attend the U of A but her father's ties to his alma mater were too strong. Based on my assessment of her professional ability, I offered her an assistantship to assist in the new Center development. Melissa later received a doctorate and has been successful in directing transportation research at three different universities."

Mack-Blackwell Rural Transportation Center was created in the spring of 1992. The center is named in honor of State Senators Y.M. Mack of Moorefield, Arkansas and Lawrence Blackwell of Pine Bluff, Arkansas, who sponsored the 1952 legislation establishing the current structure of the Arkansas Highway and Transportation Department (AHTD). The AHTD is a major source of matching funds for the research conducted by MBTC.



Dr. Walter LeFevre