



**UIUC students organize an annual event called "Engineering Open House" to interest and educate young people in all aspects of engineering. For the past several years, Norfolk Southern has visited with its locomotive simulator and allowed students to try their hand at the throttle.**

## **Railroads once enjoyed strong relationships with the academic community. It's time to rebuild them.**

**By Christopher P.L. Barkan, Professor and Director, Railroad Engineering Program and George Krambles Faculty Fellow, University of Illinois at Urbana-Champaign, for *Railway Age***

**A**t a recent railroad job fair at the University of Illinois, there was good news and ominous news. The good news was that, despite the recession and current low traffic levels, 13 companies, including major freight and passenger railroads and a number of railroad engineering firms, participated. All were hiring, perhaps not at previous levels, but hiring nevertheless. More than 50 students attended and there was so much interest among them that most of the companies stayed past the end of the event to discuss internship and employment opportunities.

The ominous news was one railroad's top-priority hiring goal. In addition to its ongoing need for new civil and mechanical engineers, it hopes to hire more than 30 signal engineers to assist with PTC implementation. This number of jobs is

exciting; however, the idea that there might be 30 graduates nationwide with the appropriate education enabling them to quickly play an effective role without extensive additional training is stunning—and this was just one railroad's need! Some might correctly argue this is an extraordinary situation, brought on by the PTC mandate. But for a number of years we have been hearing from the industry about its need for railroad engineering and transportation professionals, and its difficulty finding interested, qualified individuals. This demand will substantially increase in the future.

It is instructive to consider the situation in the highway sector. Recruiters seeking individuals knowledgeable in highway signaling and even ITS (Intelligent Transportation Systems, the highway equivalent of PTC) would have little difficulty finding hundreds of qualified

candidates familiar with highway traffic control system theory, design, and technology. Why is there such a disparity between rail and highway?

The answer is simple: Highway transportation engineering is a well-established element of the curriculum in many of the nation's university programs. Nearly all major engineering programs teach introductory transportation engineering, but despite the word "transportation" in the title, the content of these classes is almost exclusively highways. In addition, many offer advanced highway engineering and transportation classes. It is not unusual for there to be up to half a dozen faculty whose expertise and research is focused on some aspect of highway transport.

By contrast, only a handful of U.S. colleges and universities have even one class focused on rail or employ faculty specializing in rail.

The implications are profound, for society as well as for the rail industry. Besides the difficulty finding graduates

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interested in railroad jobs, transportation professionals at the local, state, and federal levels also have little understanding of rail. When rail projects arise, there is often poor understanding of the exigencies of railroad infrastructure and operations. Our nation's over-dependence on highway transport and public resistance to many new rail projects is rooted in widespread ignorance about where, when, and how rail contributes to the nation's transportation needs. Given the scarcity of rail content in current educational programs, this is not surprising.

It wasn't always this way. Railroads once enjoyed strong relationships with the nation's academic community. Classes were taught and research was conducted on campuses nationwide. Following World War II, these relationships began to fade. The rail industry's declining fortunes in the latter decades of the regulated era was one reason. Railroads also began outsourcing many functions, reducing their need for new personnel. New technologies further diminished railroads' hiring needs.

Although these changes were essential to the industry's financial survival and recent resurgence, a casualty was the nearly complete loss of a relationship with the academic community. Railroads curtailed much of their campus-based research programs and substantially reduced hiring. This neglect led faculty and college administrators to perceive railroads as an obsolete, possibly dying industry with little relevance to society.

Meanwhile, development of air and highway systems offered exciting new challenges and opportunities to academia. State and federal DOTs soon grew to rely on universities to conduct research and educate students to meet the burgeoning need for new talent in these fields. As aging faculty expert in rail transport retired, young faculty with air and highway transportation expertise replaced them. A key ingredient of success for faculty and administrators is a strong, vibrant program of sponsored research. So while railroads were exiting college campuses, public- and private-sector highway transportation interests were filling the void. Large amounts of funding were invested in educational programs and research on air and highway transportation topics. These funding policies continue to this day.

The result is a close relationship between the organizations sponsoring highway research—FHWA, state DOTs, etc.—and the academic transportation community. Transportation faculty have become thoroughly invested in academic careers centered on highway-oriented research. This has affected course content, so generations of students have been immersed in highways to the near-total exclusion of rail. The loss of rail-oriented research had a more insidious effect. Besides losing the benefit of innovations that might have developed, it also fostered the impression that railroads were not interested in technology advances—reinforcing the perception of railroad obsolescence.

Recent positive changes in the U.S. rail situation suggest



**Several of Chris Barkan's past and present students were shown the latest in concrete tie designs by representatives of Vossloh at the FAST track at TTCL as part of this year's AAR Annual Research Review.**

that a new course of action is needed. The freight rail renaissance will renew as the economy recovers, and expansion of passenger rail will continue, increasing the need for expanded infrastructure and well-educated personnel to plan, design, build, operate, maintain, and manage all of these new activities. Rail infrastructure, rolling stock, and train control technology is at a dynamic stage. Accommodating new demands for safety, speed, service, capacity, sustainability, and energy efficiency will require the best that industry, government, and academia have to offer. Innovative solutions are required. New talent is needed to apply new ideas and technologies. Yet, industry and government is largely neglecting the potential role of academia in helping rail transportation fulfill its potential in the 21st century.

At the University of Illinois at Urbana-Champaign, we are fortunate to be one of three AAR-sponsored Affiliated Labs, and we also receive support from other industry sponsors. A handful of other schools have funding from FRA and other sources, but the nation's rail system needs much more. There is roughly a 100:1 ratio of highway to rail academic funding in the U.S. The rail industry is accustomed to competing with the highway sector for traffic, but it must also compete for faculty and students interested in transportation education and careers.

The rail community will benefit from a dynamic "infrastructure" of college faculty and students working in close partnership with industry and government. Such a relationship will enable railroads to take full advantage of all that the academic community can offer in developing solutions to today's challenges and creating opportunities. It will foster development of a new generation of faculty and help them motivate and educate students in the principles of rail transportation and prepare them to meet the exciting challenges of the new railway age.

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**William C. Vantuono**

## High speed rail: A huge opportunity?

**R**ussia. China. Japan. France. Britain. Belgium. Germany. Spain. Italy. Taiwan. South Korea. The first two countries are the newest additions to the high speed rail club, which many in the U.S. have been wanting to join. Yes, we've got our own version of a high speed train, Amtrak's *Acela Express*. But compared to the 200-mph-plus trains that rocket across other corners of the globe, our present service is, well, a beginning.

"The United States is a developing country in terms of rail," Siemens Transportation Systems senior official Ansgar Brockmeyer told *The New York Times* last month, while riding Russia's first true high speed train, the Sapsan. Developing country? Us, the United States of America, the nation that went, in the space of about a decade, from catapulting one astronaut into a 15-minute suborbital flight on top of a modified ballistic missile to landing 12 of them on the moon using purpose-built spacecraft during seven missions and returning them safely to the earth.

I well remember the days, in the 1990s, when the major suppliers of high speed technology—Siemens, Alstom, Bombardier, and a few other companies that have since been absorbed by the "Big Three"—began declaring that high speed rail was dead here. With the exception of *Acela*, there was nothing to show for their time, efforts, and money except a trail of canceled projects, political opposition (or worse, apathy), and broken dreams. Opportunity lay elsewhere, they said, and they were right (see first paragraph).

But opportunity knocks once again in our third-world-of-passenger-rail nation. (Remember, *we* have the world's finest freight rail system.) I'm sure the Big Three, and a few other potential players, haven't forgotten the good old days of high hopes and nothing else, but I get the impression that this time, it's serious business. The President of the United States is dangling an \$8 billion high speed carrot, and while it won't buy much more than a handful of upgraded freight rail corridors handling passenger trains not much faster than 110 mph, it's a start.

High speed rail in the U.S.? I used to say, with a touch of sarcasm, "Not in my lifetime." Perhaps I was wrong. I'd love to be wrong.

## Look to the colleges

"Over the past decade, the rail industry has increasingly recognized the need to expand its recruiting activities on college campuses and support development of academic programs in railroad engineering and transportation," says Chris Barkan, Director of the Railroad Engineering Program at the



University of Illinois, Urbana-Champaign. "Although hiring is down due to the traffic downturn, there is encouraging news regarding the industry's ongoing interest in developing these relationships, and the impact they are having." More needs to be

done (see Barkan's story on p. 25). Meanwhile, here are some recent developments. Says Barkan:

"Michigan Tech received \$250,000 from CN to establish the CN Rail Transportation Education Center (CN RTEC). Michigan Tech has been working with its other industry partners, CSX and Union Pacific, to develop its rail program, and the CN contribution is a big help. The CN RTEC just opened. It functions as a central location for student, faculty, and industry collaboration. It also provides education and research facilities, including computer workstations with rail applications, a reference library, and on-line learning technologies.

"Meanwhile, over the past several years, the University of Illinois at Urbana-Champaign has received support for its rail program from CN, Hanson Professional Services, the George Krambles Transportation Scholarship Fund, and CSX that enabled it to hire a second faculty member specializing in rail. It also received support for other aspects of its rail program from BNSF and NS. This has enabled it to expand its curriculum to a total of five rail classes, with a sixth one in high speed rail to be taught in Spring 2010. Interest in rail and enrollment in the U of I rail classes has increased dramatically this year, and UIUC has a new effort underway to develop a railroad teaching classroom named in honor of former professor of railway engineering, William W. Hay.

"To encourage other schools to develop rail classes, AREMA Committee 24 worked with the ASCE Rail Transportation Committee to organize the Railroad Engineering Educational Symposium (REES) last year. The purpose was to provide teaching materials on rail engineering to college faculty interested in adding this to their curriculum. The AREMA effort bore fruit; this year rail content was added to a number of classes taught by REES attendees, and new rail classes were developed and taught at the University of North Florida, University of Kansas, and a jointly-taught class at Vanderbilt University and the University of Memphis. AREMA already has plans under way for REES 2010 to be held in Overland Park, Kan., next June.

"REES also provided information that was helpful to faculty at Penn State Altoona who are developing a new rail transit and engineering program there. The proposal for the new program is undergoing internal review. The response from the administration has been favorable and classes should begin next year. These efforts were recently bolstered by a \$100,000 gift from NS to assist in the development of the new program.

"The University of Kentucky (pictured, with a CSX executive teaching), North Dakota State, South Dakota State, and University of Maryland, all of which have been teaching rail and rail transit-related classes for a number of years, report steady or increased enrollment this year. Although the industry will need more programs and classes to educate college students in the fundamental principles of railroad transportation and engineering, the efforts and results to date are encouraging and the enrollments demonstrate that there is interest from students when rail courses are offered."