Spring 4-1-2013

Rail Transportation News Spring 2013

Rail Transportation Program

Rail Transportation News

The Michigan Tech Rail Transportation Program Newsletter

Spring, 2013

In This Issue

CN Endowed Fellowship in Rail Transportation

CN's $500,000 donation to establish the CN Endowed Fellowship in Rail Transportation marks one of the largest corporate gifts to Michigan Tech during its Generations of Discovery capital campaign and will support the endeavors and increasing growth of the Rail Transportation Program (RTP) at Michigan Tech. Building on the CN Rail Transportation Education Center (CN RTEC) that opened in 2010, the endowment will support rail transportation-related projects and research, as well as hardware and software resources for students, and provide student scholarships.

CN Presents Donation to the RTP

"We are proud that our support of Michigan Technological University Rail Transportation Program helps today's students become tomorrow's railroaders," said Jim Vena, CN Senior Vice President, Southern Region. "The University provides its engineering students with a strong knowledge of railroading, and the talented graduates and interns we have hired from this program in recent years have proven to be valuable assets to our Company."

"CN continues to lead the way in recognizing the importance of academia in the development of the modern rail system and its future leaders," said RTP Director Lautala. "Our staff and students have worked hard over the past years to develop and improve our program, but all the work would have limited meaning without CN's leadership and support. The program has witnessed tremendous growth since we received our initial support from CN, and this endowment will allow us to take the RTP to the next level. I feel grateful that CN sees the value of our efforts and is willing to guide us as we continue our path to develop one of the premier rail programs in North America."

Strategic Internships in Railroads Program

Industry collaboration has been the backbone of the success of the Rail Transportation Program (RTP) since its inception. CN and RailWorks have joined the RTP's Strategic Internship in Railroads Program (SIR).

The mission of the SIR partnership is to create continuous and consistent internship opportunities that introduce RTP students to the rail industry environment and promote the value of RTP students to rail industry companies. Companies commit to hiring at least one student from Michigan Tech annually in an intern or co-op position.

The program is multidisciplinary and open to all students with an interest in rail. This past summer, RTP sponsor CN contracted with three students for summer internships and has been actively seeking a work force for summer 2013.

RailWorks has taken greatest advantage of the partnership by hiring six students from our program across a multidisciplinary background last summer with hopes of securing ten additional students for 2013. According to Harry Glantz, Vice President of Human Resources at RailWorks after his recent visit to the Michigan Tech campus, "We came away with 12-15 good candidates for our internship program this year. The quality, maturity and demeanor of the candidates we spoke to made the experience a pleasure, my thanks and congratulations! We had good traction starting out from our success in 2012."

To date, almost 100 students have been hired as interns or for co-ops and a similar amount for full time positions in rail industry. The SIR is an opportunity for partnering companies and students to actively work toward company objectives and goals while providing a learning platform for our students. To join us in the SIR program, see http://www.rail.mtu.edu/strategic_internships.htm or contact Pasi at ptlautal@mtu.edu.

Michigan Tech Rail Transportation Program Supporters

We want to acknowledge the following industry partners for their support of the RTP.

CN

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Michigan Tech Transportation Institute

Director's Message

February 19th, 2013 demonstrated how nothing stops rail transportation. Despite the fact that Houghton was being pummeled by one of the strongest blizzards in years that closed stores and schools, over 100 students, faculty, community members and industry representatives fought their way through the snow to participate in the 8th Annual Railroad Night. It is these moments when I remind myself how unique the rail industry is and how well our students have captured the nature of it from early on.

There is no doubt that this past year has topped all previous years for the Rail Transportation Program at Michigan Tech. As you'll see in this newsletter, the activity level has accelerated rapidly through student and research projects and a more versatile group of students and faculty is getting involved, helping us grow closer to our goal of becoming a truly interdisciplinary program. As usual, we dedicate the majority of this newsletter to our students and their accomplishments. We're delighted to see that the industry places high value on their contributions through increased level of sponsored projects, and internship and full time recruitment. I've always been an advocate of learning by doing and we've made great strides in getting our students from Mechanical, Electrical, Materials Science, Civil Engineering, Construction Management and Humanities Departments to work on sponsored projects. At the same time, we shouldn't forget to recognize our Railroad Engineering and Activities Club (REAC) and its student leaders, who continue their drive toward increased visibility of rail transportation and engineering among our student body and community.

It is known that one of the great challenges for rail industry today is to manage growth and our Rail Transportation Program isn't any different. The continuing success has led to a situation where our limited resources are insufficient to meet all the needs. We've been stretching the hours on the clock, but the increase in external support in the form of a generous CN endowment and NURail Center funds, has finally allowed us to start recruiting additional resources to the program. I feel quite confident that as the annual report rolls around in late summer, I'll be able to introduce our latest additions to the team, another crucial step to keep us ahead of the "growth curve". Until then, enjoy the newsletter and let us know if you have any comments…..or any ideas for new projects or activities for our program.

Pasi

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Michigan Tech Transportation Institute

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Rail Transportation Program at Michigan Tech

Rail Engineering Activities Club (REAC) Update

As the 2012-2013 school year begins to wind down, the members of REAC can reflect upon a solid year. The club has continued to partner closely with industry to provide speakers, field trips, and scholarships. This relationship is crucial to REAC's success and will continue to be essential in the coming years.

REAC currently has over 80 members from 10 different degree programs that maintain an interest in the rail industry. During our monthly meetings, we have had the privilege of hearing from Jonathan Warlof (PTC effects on BNSF), Brent Marsh and Steven Sams (Rail in Wisconsin), Dr. Pasi Lautala (Rail Transportation Program Update), Chris Durden and Richard Hisrich (CSX Intermodal Terminal), and summer rail interns from Michigan Tech.

Four years ago I came to Michigan Tech with virtually no knowledge about the rail industry and no direction when it came to a career path. During my first year I discovered REAC and was able to determine what I wanted to focus my studies on. Over the past three years I have held the Graphics, Vice President, and President positions within REAC and have greatly expanded my leadership abilities. Through the monthly meetings, biannual field trips, and the AREMA conference this last fall in Chicago, I have significantly increased my knowledge of the rail industry. My involvement with REAC and RTP has led to many opportunities including interning with CN two summers ago and HDR in their Rail Department this past summer. These experiences further solidified my choice to be involved within the rail industry. As I pursue a masters degree in Transportation Engineering, I will carry the knowledge gained from REAC as I look to expand my knowledge in rail. In the coming months, I will pass REAC onto the next generation of young leaders and I am confident that the new officers will continue to spread awareness of the railroad industry across the campus of Michigan Tech and the surrounding area.

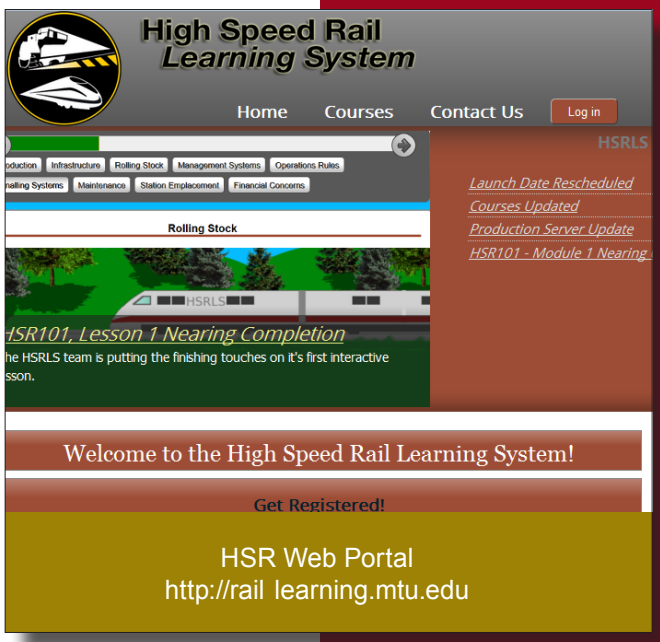
Dylan Anderson, Outgoing REAC President

High Speed Rail Learning System

More than midway through our project timeline, the High Speed Rail Learning System (HSRLS) proof-of-concept portal will be ready for launch in April. The goal of the project is to use technology to improve the availability of HSR and rail education. The project team has been busy developing interactive materials in HSR that will be used to demonstrate the portal's capabilities.

These learning modules developed from university courses, rail experts and industry associations include content on:

- HSR Workforce Symposium and SCORT Workforce Development
- HSR 101 (including K-12 education)
- Dynamics of Railroad Track
- HSR Management



After the initial launch, the project team will start soliciting feedback from visitors to the site before a functional and validated proof-of-concept learning site is completed as a deliverable of the Federal Railroad Administration (FRA) sponsored project. Testing of the site and feedback on function and content is being sought (http://rail-learning.mtu.edu) and recommendations for long term sustainability, including limitations and challenges encountered, will be presented to the FRA in a final report.

An assessment of the overall portal and individual modules will be undertaken by our project partner, the Mineta Transportation Institute, via surveys, individual interviews, and discussion boards.

Collaborative NuRail and MDOT Projects

Improving Rural Freight Rail in the State of Michigan

Dr. Pasi Lautala is leading a project co-sponsored by the Michigan Department of Transportation (MDOT) and the U.S. DOT sponsored National University Rail Center (NURail) that concentrates on identifying challenges faced by rural rail service providers and shippers along light-density lines and on developing tools and methods that facilitate the use of rail and multimodal transportation alternatives in the Upper Peninsula of Michigan. Affordable transportation is a requirement for industry survival and this is especially true in rural America where the lower cost of labor and/or natural resources is offset by higher costs of transportation. On the other hand, industries located along light-density rail lines are extremely vulnerable to service levels and economic viability of the rail line. Specific project tasks include: development of a GIS-based rural rail infrastructure inventory map of Michigan, commodity flow analysis, development and implementation of online shipper survey, analysis of shipper / rail service provider concerns, and a comparative analysis of identified new opportunities for rail / multimodal shipping.

Assessment of Aggregate Sources in Michigan for High Speed Railroad Ballast

Dr. Stan Vitton is leading another collaborative project between NURail and MDOT that analyzes acceptable aggregates available in Michigan for railroad ballast on high speed rail lines. Railroad ballast is an important component in the safety and economics of railroads, but finding a high quality ballast source close to a rail line can be difficult. In Michigan, the entire Lower Peninsula and the eastern half of the Upper Peninsula are composed of sedimentary bedrock, which generally does not make for good high quality ballast, but the remaining portion of the Upper Peninsula consists of igneous and metamorphic rocks that have a high potential for use as a ballast material. In addition to analyzing the current MDOT aggregate inventory, this project will investigate existing waste rock stockpiles at the Cliffs Natural Resources (Cliffs) surface mines near Marquette, Michigan, as well as other aggregate producers in the Marquette area, for their suitability to ballast.

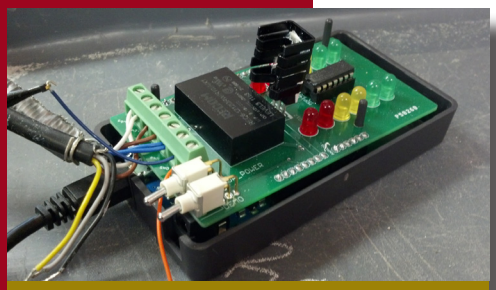
Undergraduate Student Projects

With support by NURail and industry partners, the RTP is sponsoring several multidisciplinary Senior Design and Enterprise projects. Enterprise is student-driven, multidisciplinary teams that work like companies on real-world client projects. Teams design, manufacture, and test their own prototypes—an end-to-end project development experience.

Deteriorating grade crossing surface

Performance of Grade Crossing Surface Materials

Grade-crossings are an integral part of both railway and highway networks and are the main location where the two modes converge with each other. The State of Michigan has a large number of crossings with different types of surface, but there is a limited understanding on how each type has performed over time. Understanding performance is important, so that the most economical decisions can be made when determining crossing rehabilitations, or selecting materials for new crossings. Safety for both train and roadway vehicle traffic is of utmost importance, as well as the longevity of the crossing materials. This project is conducted by the ETEC (Efficiency through Engineering and Construction) Enterprise. ETEC partners with MDOT and NURail Center to investigate different grade crossing surface materials used in the State of Michigan and to perform analysis related to the performance of various materials.



Locomotive Sand Sensor Prototype

Locomotive Sand Level Sensor Development

Locomotives currently have no system in place to safely and accurately measure the level of sand in the on-board sanding containers which are used for traction during acceleration. This Senior Design Group, sponsored by Union Pacific Railroad and the National University Research Center (NURail), has designed a sensor system that monitors the sand levels and displays the information to personnel in a safe, accurate and easy-to-read format. The prototype system saves man-hours, eliminates necessary risk of injury, and prevents downtime on the tracks from human error in estimating sand levels.

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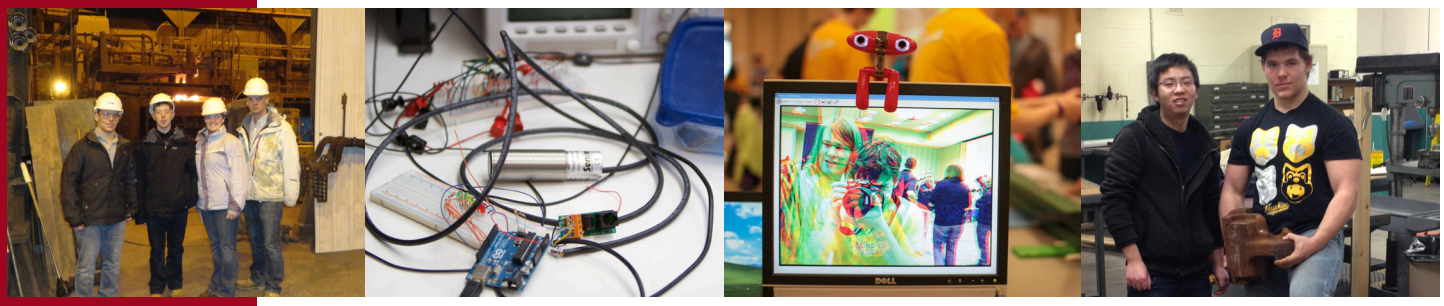


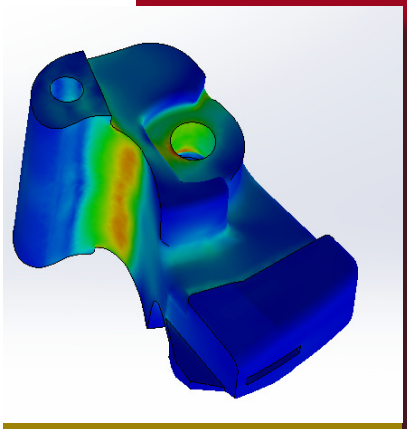
Students from multiple disciplines receive hands on experience and develop professional skills

Undergraduate Student Projects

"Students Discover, Learn, and Develop Real World Skills"

Rail Car Coupler Redesign

Couplers are an essential component of every train's operational success. When couplers fail in use their replacement causes major delays, costing rail companies and customer's time and money. Surprisingly, the current type E coupler in use today across North America has not been significantly modified since the original patent was filed in 1873. The Rail Car Coupler Redesign Group at Michigan Tech has undertaken the task of improving the current coupler design. The group has concentrated on increasing fatigue life and decreasing weight and cost of the knuckle. While the Senior Design team researched failure modes and proposed potential design modifications, industry restrictions on the external geometry also led to an exploration of alternative materials such as austempered ductile iron (ADI). In order to validate their design modifications, the team is working in collaboration with Amsted Rail to prototype and cast Type E redesigned knuckles for testing.

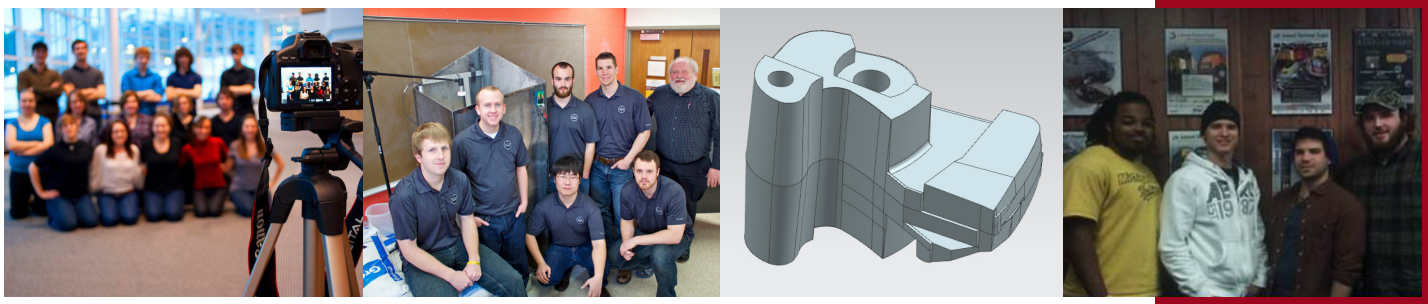


Finite Element Model of Type E Coupler

Cin/Optic Media

The Rail Transportation Program revolves around preparing students to create the future of the rail industry. Cin/Optic Media is a Michigan Tech Enterprise that focuses on media. Cin/Optic has partnered with the RTP and NuRail to create a promotional video that will highlight the opportunities that RTP offers to students as well as taking a closer look at the growing rail industry and how students in the RTP will be contributing to its future. With the help of Cin/Optic, the RTP can demonstrate the benefits of rail initiatives and why rail is a career worth considering for university graduates.

Cyn/Optic Team interviews industry representa tive for promotional video



Teams of students work with real world clients and industry

Conferences and Presentations

AREMA Conference, Chicago, IL - September 15th-18th 2012
Pasi Lautala; Darryl Babbitt, (CEE '09) Operations Supervisor of the Transportation Division at Cliffs Natural Resources; and Kyle Pepin, Undergraduate Research Assistant for RTP presented a paper "*Win-Win: Shortline Railroad and University Team Up for Education and Development*."

TRB Conference, Washington DC - January 13th-17th 2013
Pasi Lautala presented a paper"*Meeting the Needs- What does the Railroad Industry Need and Expect from Higher Education?*" Currently in publication for the Transportation Research Record.

Hamed Pouryousef Pasi Lautala, and Thomas White- Senior Operations Specialist, Transit Safety Management presented a paper "*Review of Capacity Measurement Methodologies; Similarities and Differences in the U.S. and European Railroads.*" Published in TRB Conference Proceedings.

PhD student Hamed Pouryousef presenting at the TRB Conference

Courses and Workshops Attended

UW Madison Continuing Education - October 24th- 26th 2012
Engineering Mass Transportation Systems: Light Rail-Rapid Transit-Commuter Rail
Jeff Lidicker, CEE Faculty

UW Madison Continuing Education - November 5th-6th 2012
Fundamentals of Railway Train Control and Signaling, Including PTC Systems
Hamed Pouryousef, PhD candidate

Rail Traffic Controller (RTC) Workshop, Fort Worth, TX - November 7th-8th 2012
Hosted by BNSF and Berkeley Simulation Inc.
Hamed Pouryousef, PhD Candidate

Natural Gas, Argonne- Argonne National Library - October 2nd-3rd 2012
Natural Gas Locomotive Technology Workshop sponsored by FRA
Jeffrey Lidicker, PhD and Jaclyn E. Johnson, PhD


Bill GeMeiner, Union Pacific Railroad

REAC Guest Presenters

REAC has been honored to host numerous rail industry guest lecturers over the years. Recent presentations on campus or web conference include:

Summer Interns - Troy Sabo, Chris Blessing, and Nick Lanoue - September, 2012
Presented and Reported on Past Summer Internship Experiences

Jonathan Warlof , Supervisor of Design Services for BNSF Railway (CEE '11) - October 9th, 2012
"*Positive Train Control – What it is and What it Means to BNSF*"

Steven Sams, CEE '09, WisDOT Railroad Specialist and Brent Marsh, CEE '09, WSOR Project Engineer - November 13th, 2012
"*Growing Rail Transportation in Wisconsin – WSOR Projects*"

Pasi Lautala, PhD, PE, RTP Director - December 4th, 2012
"Full Speed Ahead: A brief review of current rail activities at the Rail Transportation Program"

Richard Hisrich and Chris Durden, CSX Intermodal Terminals, Inc. - January 22nd, 2013
"*The Next Generation Terminal*"


Dave Ferryman, Vice Presi dent System Engineering, CN

RTP Guest Lecturers and Visitors

Bill GeMeiner, Senior Mgr, Methods & Research, Union Pacific Railroad - March 26th-27th, 2013
"*Wayside Detection/Monitoring Systems*"

Dave Ferryman ,Vice President System Engineering for CN - April 2nd, 2013
Presentation and discussion "*CN Engineering Challenges*" was held on campus. Mr. Ferryman visited Michigan Tech to review the facilities and to discuss future collaboration and activities with students and faculty.

Railroad Day and 8th Annual Railroad Night

Mother Nature paid a visit to the Michigan Tech campus in a big way to welcome participants to the Rail Day and 8th Annual Railroad Night activities sponsored by the Rail Transportation Program (RTP), its industry partners, and the Railroad Engineering and Activities Club (REAC). Despite the blizzard and the fact that Michigan Tech closed the campus in a rare occurrence, more than 100 Michigan Tech students, faculty, administration, community members and rail industry representatives took part in activities, with only one of the thirteen registered companies unable to attend.

To begin the day, a poster session combined with an industry breakfast provided RTP students a platform for presentation of their current research projects and an opportunity to interact with industry personnel.

Continued activities included a brainstorming session for the establishment of an Industry Advisory Board to the RTP, luncheon meetings with Michigan Tech faculty engaged in rail research, campus lab tours, and an industry panel discussion during the CE4490 Rail Seminar class.

Keynote Speaker, Robert VanderClute at the 8th Annual Railroad Night

The day ended on a high note with the 8th Annual Railroad Night. After an opening welcome, CN officially presented a $500,000 check for the CN Endowed Fellowship in Rail Transportation, followed by keynote speaker Robert VanderClute, Senior Vice President, Safety and Operations, Association of American Railroads (AAR). Closing comments and a raffle drawing ended a successful day of rail activities.

REAC students with keynote speaker

REAC Field Visit to Duluth, Minnesota

Rail Engineering and Activities Club (REAC) takes trips each semester in order to gain hands on experience and insights while touring rail facilities and meeting with people that work in the industry in a variety of capacities. In November 2012, students travelled to Duluth to visit CN's Proctor Yard, CN's ore dock facilities, and to visit a consulting company, Krech Ojard. The first morning started with a visit to CN's proctor yard. The group had a brief tour of the yardmaster's office and then headed to the locomotive shop. After observing locomotives in various phases of repair, the group moved on to the car repair shop with a demonstration of various techniques.

During the trip, the group was able to meet with a former Michigan Tech student currently working for Krech Ojard, Brandon Maurisak. Brandon provided an office tour and explained the rail project he was currently working on. He also discussed the role of railroad engineering consultants in projects.

The final stop was the CN ore dock facilities in Duluth Harbor. After a brief safety meeting, the tour began in the operations building and concluded on one of the docks. Many questions were answered as the group walked along the dock and saw the hoppers being loaded.

CN ore dock facilities in Duluth, MN

Overall, the trip to Duluth was very informative and a great way to spend a weekend enjoying the fall weather and learning about rail transportation and engineering.

Full Scholarships Available for Summer Youth Program

4th Annual Rail and Intermodal Transportation - July 7th-13th, 2013

This program is a weeklong investigation designed to create awareness and stimulate interest in the area of rail and intermodal transportation. It is a collaborative effort by Michigan Tech's Rail Transportation Program and the Transportation and Logistics Management Program at University of Wisconsin—Superior and full scholarships are available to cover the Program fee. Highlights of the activities include:

- Learn about and ride trains—the "green transportation alternative"—and see locomotives in action.
- Ride a train and enjoy technical tours to rail and intermodal facilities in Marquette, MI and Duluth, MN.
- Find out why trucks, ships, and trains are so important to today's economy.
- Work in teams to complete group projects.
- Experience college life on two college campuses—stay in a residence hall, explore campus, and meet others
- Enjoy outdoor activities in Michigan's beautiful Keweenaw Peninsula.

Upon request, arrangements can be made to talk with faculty from disciplines or areas in which you have special interests, as well as admissions and financial aid staff.

This exploration will travel to various locations throughout the week including Duluth, MN, with a night's stay in Superior, WI.

http://www.syp.mtu.edu/ or www.rail.mtu.edu ; or contact Pam Hannon at prhannon@mtu.edu for more information.

Rail Transportation Program Vision

The vision of the Rail Transportation Program is to expand its service to the rail industry by offering an interdisciplinary program in railroad engineering and urban rail transit that will provide opportunities for our students and faculty to participate in the development and operation of rail transportation for the 21st Century.

About Michigan Technological University

Michigan Technological University is a leading public research university, conducting research, developing new technologies, and preparing students to create the future for a prosperous and sustainable world. Michigan Tech offers more than 120 undergraduate and graduate degree programs in engineering, forestry and environmental sciences, computer sciences, technology, business and economics, natural and physical sciences, arts, humanities and social sciences.

MichiganTech
Create the Future

About the Michigan Tech Transportation Institute

Transportation related activities at Michigan Technological University (Michigan Tech) including research, education and training, outreach, product development or technology transfer, are organized under the umbrella of the Michigan Tech Transportation Institute (MTTI). MTTI brings together principle investigators across all disciplines at Michigan Tech for collaborative research in six areas of transportation to address national and global needs:

- **Structures** research focuses on the built environment including bridges, pavements, geotechnical applications, construction and nanotechnology related to sensors. Research is also conducted on monitoring strategies to extend the service life of aging transportation infrastructure.
- **Materials** used in transportation infrastructure including concrete, asphalt, steel, wood and aggregates are being investigated as well as the use of industrial byproducts and recycled materials including fly ash, slag and cement kiln dust.
- **Systems** groups focus on the planning, design, construction, operations and management of transportation infrastructure and systems including highway networks, railroads, airports, public transit, and waterways.
- **Environmental** studies include the transportation issues of energy, carbon dioxide and other pollutants, flora, fauna and wildlife, and the impact of the environment.
- **Societal** research explores historical developments in transportation, archeological studies of transportation features, human factors, and the interaction of transportation and society through policy, planning, and regulation.
- **Technology transfer** "bridges the gap between research and practice" by providing outreach, management systems, and workforce development programs as well as develops management tools for the transportation industry including GIS, asset management, and project estimating software.