



MICHIGAN TECHNOLOGICAL UNIVERSITY

# RAIL TRANSPORTATION PROGRAM

## 2010 ANNUAL REPORT



## DIRECTOR'S MESSAGE



As we are getting close to wrapping up 2010, it's time to look back and ahead. Unlike the economy, the third year of Michigan Tech's Rail Transportation Program (RTP) didn't show any signs of downturn, quite the opposite. To our great delight, the rail industry maintained their high level of commitment to our program and our students. February 16th, 2010 was the greatest day of our short history, as the CN Rail Transportation Education Center (CN RTEC) opened its doors. It has been a real joy to see the immediate success of the Center, as the students involved in rail transportation activities quickly found their way to the space and resources.

There were several reasons for a busy third year. Students from multiple disciplines completed our first senior design/enterprise project for the Lake Superior & Ishpeming Railroad, our visiting scholar from Shijianzhuang Railway institute in China arrived in January, our first Ph.D student started in May, and we organized a Summer Youth Program in Rail and Intermodal Transportation for high school students in collaboration with the University of Wisconsin – Superior. We also completed our first research project "Multi-Modal Optimization of Timber Shipments in the North Central United States." All these activities and more are reviewed in this report, so I hope you have time to enjoy it with a cup of coffee and witness the accomplishments of our students, faculty, and staff that form the backbone of the Program.

In our Summer 2010 newsletter, I initiated a discussion on the future of rail transportation in the U.S. All the evidence suggests that the freight railroad system has navigated its way through the recession extremely well and high-speed passenger rail has made significant strides. However, amid the success, there has also been growing pressure for tighter regulations on freight rail, and some political candidates ran on "I'll stop high-speed rail" tickets. While everyone has the right to their own opinion when it comes to the alternatives and related investments, one would hope that decisions on the future of the U.S. transportation system will be made based on data, instead of political agendas. At the time when almost all issues and decisions tend to become polarized in politics, a certain level of objective investigations and research would be most welcome to highlight the longer term impacts of transportation system decisions. I believe that this would be a fitting role for universities, as our goal should be to provide objective research and education to our students and general public on transportation alternatives and how they affect the nation.

Speaking of universities and education, there is no doubt that last year was great for railway education and research beyond Michigan Tech. I was fortunate to participate in a group of raising industry leaders in the Railway Management Certificate Program organized by Michigan State University. The 2010 Joint Rail Conference broke all expectations with over 400 participants and in June we had another group of 50 university professors and industry professionals participating in the second Railway Engineering Education Symposium. I've been also delighted to see that Federal Rail Association has started a workforce development initiative and the topic has been increasingly covered in the industry magazines and articles. It is truly an exciting time to be in the railway education field and I believe that just like railroads in general, we are facing a growing demand.....so it's time to get back to work.

*Pasi*

# RAIL INDUSTRY PARTNERS

## Students Benefit from Rail Industry Sponsorship

Industry partnerships have been vital to the development and continuation of the Rail Transportation Program since its inception. Strong support has been consistently received from partnerships with CSX Transportation and Union Pacific Railroad, and each has renewed their pledges as Corporate Friends to the program.

Previous contributions by CSX and Union Pacific (UP) have generated scholarships awarded to students of the rail program as well as provided funding for student field experiences. Future plans include potential research projects in collaboration with our partners, Senior Design and Enterprise projects, and continued scholarly support of the RTP students.

The development of the CN Rail Transportation Education Center (CN RTEC) was successfully completed on campus with a \$250,000 donation from CN. The center opened in February 2010 and was established to provide education, research, and resource facilities for the Rail Transportation Program. The center consists of a media room and a student center and rail library. The dedication of a space for the RTP has been beneficial in providing the program and students with an identity on campus.

The media room is equipped with a new large plasma TV and numerous computer work stations, as well as conference tables and web-conferencing and telecommunications equipment. Webinars and remote conferences are held there to benefit the RTP and the Railroad Engineering and Activities Club (REAC). The space is also shared with the Center for Technology & Training (CTT) for use in their nationwide webinars and is available for use to other entities on campus.

The second room of the CN RTEC now belongs to the students involved in the RTP and the REAC club. The center houses a library of rail books, magazines, and videos, as well as four computer work stations equipped with rail engineering software, a reference library, and online learning technologies. Two of the computers were generously donated by IBM. The room also highlights our industry partners and career opportunities. Rail students use the room for class study and student researchers provide support on funded projects. REAC holds monthly meetings and conducts club activities from both areas of the center.

Support by our program partners is instrumental in determining the future direction of the Rail Transportation Program and the success of the rail program students at Michigan Tech. We look forward to continued collaborations with our current supporters as well as developing new industry partnerships.



Railroad engineering course students working on a train simulator assignment in the CN RTEC.



## RTP FACULTY AND STAFF



Dr. Pasi Lautala

### **Dr. Pasi Lautala, P.E.**

Pasi Lautala is a Research Assistant Professor and Director of the Rail Transportation Program. He has several years of rail industry experience both in Finland and the U.S. He teaches courses in Railroad Engineering, International Railroad Engineering and Railroad Track Engineering and Design. Dr. Lautala is also the advisor to the Railroad Engineering and Activities Club (REAC) on campus. In his role as director of the RTP, he is responsible for developing the rail education program and is currently the Primary Investigator on several rail related research projects. He is also the Secretary of ASCE Rail Transportation Committee and Chair of University Relations Subcommittee of AREMA's Education and Training Committee.



Bill Leder

### **William (Bill) Leder, P.E.**

Bill Leder is an Adjunct Professor and Distinguished Practitioner in Residence in the Civil and Environmental Engineering Department at Michigan Technological University. He teaches courses in Public Transit Planning and Engineering, Introduction to Consulting Engineering and Senior Design. Mr. Leder also possesses a distinguished 34 year career in the planning and design of airports and public transit systems. He concentrated on airport Automated People Mover (APM) systems and urban public transportation projects and has recently expanded his expertise in high speed rail topics. Mr. Leder is a recognized practitioner in airport passenger mobility planning and APM conceptual design, engineering, procurement and implementation.



Dr. Bill Sproule

### **Dr. William (Bill) Sproule, P.E.**

Bill Sproule has over 35 years experience in government, consulting, and university teaching and research in Canada and the United States. He is a Professor in the Department of Civil and Environmental Engineering. Over the years he has taught a variety of courses in traffic engineering, transportation planning, airport planning, highway design, public transit, and consulting engineering, and assisted in the development of the Rail Transportation Program at Michigan Tech, including teaching passenger train and public transit topics. Bill is also avid ice-hockey historian. Bill has been active in several professional associations and has received several awards including a Michigan Tech Distinguished Teaching Award and the ASCE Horonjeff Award.



Pam Hannon

### **Pam Hannon**

Pam Hannon is the Coordinator of the Michigan Tech Transportation Institute and provides support for the Rail Transportation Program in administration, development, and special event organization.

In addition, several other faculty and individuals are actively involved in rail related research activities at Michigan Tech including Adam Johnson, Dr. Devin Harris, Dr. Tess Ahlborn, Dr. Bernie Alkire, Dr. Ralph Hodek and Dr. John Hill. Undergraduate student researchers working under RTP projects in 2009-2010 included Stephen Chartier, Luke Gublo and Lars Leemkuil.



# DOCTORAL STUDENT AND VISITING SCHOLAR

## Hamed Pouryousef - Doctoral Student

The Rail Transportation Program was delighted to welcome the first doctoral student to the program during the spring of 2010. Hamed Pouryousef originates from Tehran, Iran where he graduated with a Bachelor of Science degree in Railroad Engineering and Operations from the Iran University of Science and Technology.

Hamed joined the Iranian firm, Metra, as a consultant engineer to the Iran Ministry of Transportation where he continued for eight years before applying to MIT-Portugal MS Program. The MIT-Portugal program is a cooperative agreement between the Massachusetts Institute of Technology (MIT) and the Technical University of Lisbon (IST) in Portugal. After completing his thesis *"Railway Track Maintenance Strategy and its Interactions with Operations (With Focus on Tehran-Qom-Isfahan, Iran High-Speed Rail (HSR) case study)"*, Hamed graduated with a Masters degree in Civil Engineering, Transportation.

In the spring of 2010, Hamed and his wife, Hosna, relocated to Houghton where he started pursuing his Ph.D. in the Civil and Environmental Engineering Department under the supervision of Dr. Lautala. Currently, Hamed's RTP research projects are focused on the Statewide Evaluation of Michigan Biomass Transportation Systems as well as Improving Log Transportation With GPS Based Data Monitoring and Analysis in Northern Wisconsin and the Upper Peninsula of Michigan. In the future, he is also hoping to adapt his MS research in railway maintenance strategies to the U.S. system.

## Chao Ma - Visiting Scholar

Arriving in December 2010, Chao Ma has transitioned to life at Michigan Tech and the Rail Transportation Program well. Taking a year's sabbatical from her Associate Professor position in the Civil Engineering School in the Road and Railway Engineering Department at the Shijiazhuang Railway Institute in China, Chao became the Rail Transportation Program's first visiting scholar.

Chao originally came in contact with the RTP program when she provided assistance for Dr. Pasi Lautala organizing research activities on cold climate rail research in China.

At Michigan Tech, Chao has conducted research comparing railway education between China and the U.S. as well as attended rail classes to learn more about the teaching structure in a U.S. university. She led preparations for the first Rail and Intermodal Transportation Summer Youth program in 2010 and has provided guest lectures highlighting the latest achievements of the Chinese rail system, including the high speed rail network under development. Additionally, Chao assisted in the development of a CN/CXT concrete tie sustainability project and co-authored a paper on "World Railway Education" with Dr. Lautala. As a member of the Railroad Engineering and Activities Club (REAC), Chao has actively participated in webinars, monthly meetings, and field trips with the REAC students.

Chao and her daughter Shiqi Yuan (Nancy) have enjoyed the small town atmosphere while living in Houghton. They've also had the opportunity to travel the U.S. to both the East and West coasts. Upon her return to China in December, Chao will resume her faculty position duties at the Shijiazhuang Railway Institute. She will also continue to strengthen the relationship between the Institute and Michigan Tech.

When asked about her experiences at Michigan Tech, Chao stated, "The Rail Transportation Program is a good program and provides a variety of opportunities for the students to learn more about the railway industry. It's been a great experience for me to work here for the past year, and it will benefit and help my teaching assignments when I go back China. All of the people here have been very nice and they have given me lots of support."



Hamed Pouryousef



Chao Ma and her daughter Nancy enjoying a Michigan Tech hockey game.

## STUDENT HIGHLIGHT - JUSTIN HICKS



Justin Hicks now works at HDR, Inc. in Charlotte, North Carolina in the Rail Freight Division.

Justin Hicks graduated from the Michigan Tech Rail Transportation Program (RTP) in December 2009 with a MS degree in Civil Engineering. In Justin's words "he got hooked on rail" after attending one informational meeting for the Summer in Finland Program during his freshman year.

As a result, Justin attended the Summer in Finland Program after his junior year. Finding a passion for rail transportation, he continued to take classes in Public Transit and in Railroad Track Engineering and Design. In addition, he took advantage of many of the opportunities the Rail Transportation Program offered outside of the classroom. These opportunities included a field trip to the LS&I railroad in Marquette, Michigan and attending AREMA meetings in Salt Lake, Utah and Chicago, Illinois. These experiences convinced Justin to pursue an internship in the rail field.

Justin found his first rail related co-op at Patrick Engineering after meeting company representatives at the annual Railroad Night event at Michigan Tech. While working for Patrick, he gained experience on intermodal yard and industrial siding projects in the Chicago area. His main tasks were related to intermodal yards and varied from developing concept drawings to on site construction monitoring.

Justin was one of the RTP's first graduate students to pursue his Master's degree in Civil Engineering. While working on his degree, Justin developed an analytical model to investigate multi-modal transportation of logs and the effects of changing fuel prices to modal choices. He presented his research and findings to the Committee on Local and Regional Rail Freight Transport (AR040) at the 2010 Transportation Research Board annual meeting. In addition, Justin assisted in the Railroad Track Engineering and Design class by taking a responsibility for the MicroStation and Geopak exercises and assignments.

*"The Rail Transportation Classes have proved to be invaluable for me in the engineering design world. Having a formal knowledge of track design and railroad operations gives me a framework to understand our projects and a faster learning curve to new topics and projects."*

Justin Hicks  
MS in Civil Engineering, Michigan Tech '09

Upon graduation, Justin moved to Charlotte, North Carolina to work with HDR, Inc. Justin notes that "internships were an important stepping stone into this full time position, along with the opportunity to attend professional conferences such as AREMA". It was at AREMA where Justin found his current position in the Rail Freight Division of HDR. Currently, his work includes development of design and proposals for the North Carolina Railroad double tracking and curve straightening projects between Charlotte and Raleigh. In addition, he has worked on High Speed Rail ARRA grant development and has contributed to rail transit projects, such as the New Orleans street car expansion, which is a 6.54-mile east-west line run from Union Passenger Terminal to French Quarter, and the Denver RTD east corridor project, a 22.8-mile new line from Union Station to Denver International Airport.

## STUDENT INTERNS/CO-OPS

Several Michigan Tech students were involved in rail industry internships or co-ops in 2009-2010. In total, more than ten students were able to gain real-life experience in the various industry positions over the past year.

### Lars Leemkuil, CN Railway

"This past summer during my internship at the CN Railroad, I was involved in many projects in the Chicago, Illinois and Duluth, Minnesota areas as part of the Technical Services group. I really enjoyed the experiences and knowledge gained during the internship and know that it will prove to be useful in my future career with any Class 1 railroad. I performed a lot of field surveying and other construction work. It was especially interesting to see how projects come together from the beginning steps to the final construction."

### Ryan Hoensheid, BNSF

"For my summer internship opportunity with BNSF, I was stationed in Belen, New Mexico, which is about 35 miles south of Albuquerque. This small town is considered a major locomotive crew switch point on the southwest division along the southern transcontinental railroad from Los Angeles, California to Chicago, Illinois. Currently, BNSF is expanding all of the remaining 48 miles of single track on the southern transcontinental railroad to either double or triple track to allow for increased capacity.

My internship focused on a five mile double track development through a narrow canyon pass called Abo canyon. I oversaw the construction of nine bridges, demolition of millions of cubic yards of mountain side and much, much more. Overall, the experience was a "once in a life time" opportunity and I would like to thank BNSF for giving me the chance to become part of their family!"

### Damian Wallner, Union Pacific Railroad

"I was on co-op with Union Pacific Railroad during the spring and summer semesters working in their structures design group. I was exposed to a wide variety of different structures and projects that were either designed or reviewed by the group. We worked on numerous structures, including overhead bridges, culverts, retaining walls, unloading pits, and underpasses. This experience allowed me to see the work in the field, as I observed various structural construction projects across the Union Pacific system. This put a reality to the drawings I was reviewing and designing.

I know from my experience working in the Railroad Industry that this is something I plan on returning to upon graduation. I'd highly recommend for students to seek opportunities in the Railroad Industry. I learned a lot and realized that countless opportunities are becoming available, as current managers retire from their positions. I've made up my mind that railroad industry is where my career will be."



Lars Leemkuil doing survey work during his internship with CN Railroad.



Ryan Hoensheid standing inside one of the reinforcement cages for an overpass bridge in Salt Lake City, Utah.



Damian Wallner during his co-op with Union Pacific enjoying the view from the top of a lift bridge.



# RAILROAD ENGINEERING AND ACTIVITIES CLUB

Since the inception of the Railroad Engineering and Activities Club (REAC) in 2005, REAC has served Michigan Technological University and the community by educating students about the rail industry and the opportunities it offers, along with networking opportunities with professionals throughout the rail industry.

REAC is a student chapter of the American Railway Engineering and Maintenance-of-Way Association (AREMA) and it has nearly 40 members from 10 different degree programs. REAC is very active on campus, hosting monthly general meetings and social events, as well as going on field visits and to conferences. REAC's aim is to educate/broaden the knowledge and perspectives of not only students, but also faculty and community, about today's rail industry.

REAC's monthly meeting presentations covered a variety of topics, ranging from Positive Train Control to commuter and high speed rail issues. We have worked hard to provide a versatile group of industry speakers that reinforce our vision as a multi-disciplinary organization with opportunities for students from various degree paths. Last year's industry speakers included: Steve Meyer (Utah Transit Authority), John Moore (Safetran Systems), David Thomson (S.T.V. Incorporated) and Mr. Philemon Lewis (Michigan Tech Alumni and former owner of Lewis Rail Services). We also had presentations from Michigan Tech rail industry student interns and graduates who are now employed within the industry.

Field visits and conferences are always a highlight of REAC's activities and provide students with a firsthand look into the rail industry. During our spring trip to CN's Escanaba, Michigan ore facility, students were able to tour their ore storage yard, along with the loading dock and unloading facility with rotary dumper. We were also given a tour of CN's yard and shop facilities in Gladstone, Michigan. These types of trips allow students to see what the industry is about and to stay informed of current issues and topics within the rail industry today. In September 2009, we had eleven REAC students attend the AREMA Conference in Chicago, Illinois, and five students attend the 2010 AREMA Conference in Orlando, Florida. For these students, it was an excellent look into the railroad industry and a great time to network and socialize with industry representatives. In addition, our 5th Annual Railroad Night had another successful year with our largest group of attendees to date, with a total of 130 participants. Mr. Tony Hatch (Senior Transportation Analysis on Wall Street) gave a dynamic speech on the "Rail Renaissance: return, capital and capacity."

As evident, this past year was very successful and busy for us. I believe that this will continue pressing forward through next year. With this upcoming year, we now have the CN Rail Transportation Education Center (CN RTEC) to help us continue our mission of informing students of the excellent opportunities and benefits within the rail industry. With CN RTEC, it has become easier to form bonds between club members and to meet and discuss rail issues, even outside "official" meetings. The rail industry is continuing to move forward and so are we. REAC is proud to be leading the way for rail education to students.

For more information, visit the REAC website at <[reac.students.mtu.edu](http://reac.students.mtu.edu)>.

*Stephen Chartier*  
*REAC President*



Stephen "Sven" Chartier



REAC members visiting the LS&I ore docks.



## STUDENT ACTIVITIES

### Student Project Highlight: Lake Superior & Ishpeming Railroad – Track Design to Improve Train Operations

In the Fall of 2009, a multidiscipline group of thirteen students completed a track improvement project for the Lake Superior and Ishpeming Railroad (LS&I) near Marquette, Michigan. The project consisted of three specific tasks:

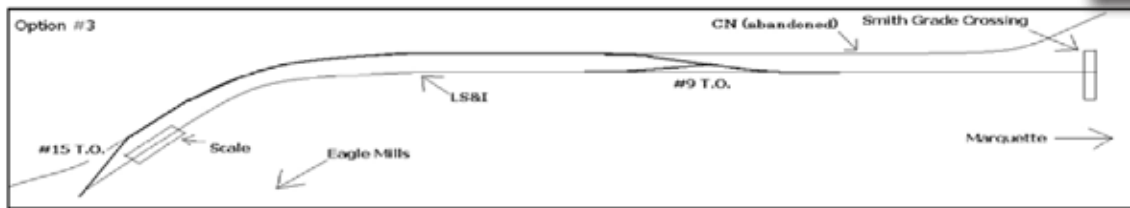
- To use an abandoned CN track to design a bypass track around a weigh-in-motion scale at the Pine Hill Location.
- To design an intermediate siding (by Midway Sales) to allow for passing of two iron ore trains to and from the dock.
- To develop cost estimates and construction phase plans and to analyze the effects of these two new sidings to the LS&I capacity and operations.

A civil engineering senior design group, along with the Efficiency through Engineering and Construction Enterprise (ETEC) and students from the surveying program, performed surveys and soil samples at the site and worked together to develop the final deliverables. The groups were led and advised by Dr. Pasi Lautala, Lynn Artman, and by industry advisors Lance Pepper from AECOM and Darryl Babbitt from LS&I.

The final outcome of the project included track design plans and complimentary report that provided background, scale research, and cost and operational analysis. The team recommended construction of a bypass track around the existing scale at a cost of ~\$850,000, so empty trains could pass the scale at regular track speed. The second phase was to install a new scale on the bypass track (at a cost of ~\$250,000) that would allow for greater weighing speeds and reliability. New scale and by-pass tracks would allow LS&I to operate at a larger capacity and reduce travel times to and from the dock.



LS&I project team (above). Team members getting directions from Darryl Babbitt (below).



Example project plan drawing showing the recommended scale bypass track.

### Scholarship Winners

The students of the Rail Transportation Program continue on their successful path in education. This year, 7 of 33 available scholarships by the AREMA Educational Foundation were awarded to Michigan Tech Rail Transportation Program students. Additionally, five students received internal scholarships sponsored by Union Pacific Railroad and CSX Transportation. The RTP wants to congratulate the following students on their accomplishments:

- AREMA Committee 27 – Maintenance-of-Way Work Equipment Scholarship: Stephen Chartier, Jr., Construction Management
- AREMA Committee 33 - Electrical Energy Utilization Scholarship: Luke J. Gublo, Civil Engineering
- Michigan Tech Alumni Scholarship: John Hatch, Mechanical Engineering
- AREMA Presidential Spouse Scholarship: Laura Hess, Civil Engineering
- Michigan Technological University REMSA Scholarship: Gregory L. Hunter, Civil Engineering
- AREMA Committee 24 – Education & Training Scholarship: Lars Leemkuil, Civil Engineering
- Robert & Sue Boileau Rail Engineering Scholarship: Damian Wallner, Civil Engineering
- Union Pacific Railroad Scholarships: Stephen Chartier Jr., Lars Leemkuil, Damian Wallner
- CSX Transportation Scholarships: Laura Hess, Greg Hunter
- AARS Scholarship: Lars Leemkuil, Civil Engineering

## STUDENT ACTIVITIES

### Rail and Intermodal Transportation Summer Youth Program

The first Rail and Intermodal Transportation Summer Youth Program was held this past July with ten enthusiastic high school students attending. The program was a collaborative effort between the Rail Transportation Program at Michigan Tech and the Transportation Logistics Management Program at the University of Wisconsin-Superior. The collaborators provided partial scholarships for students and organized a full week of rail and intermodal transportation education and field experiences to the youth.

The hands-on activities included a train simulator and modules on magnetic levitation, safety, international railways, track structure, and urban transit. In addition, several guest lecturers provided their insights. In the classroom, students learned about several topics including freight and passenger rail transportation, track train dynamics, intermodal transportation in supply chains, and rail operations.

The week long exploration course, mainly directed by Sven Chartier and Chao Ma, also included field visits to Lake Superior & Ishpeming Railroad near Marquette, Michigan, as well as an overnight trip to Superior, Wisconsin, where the students viewed the twin ports, visited the Lake Superior Marine Museum, and took a train ride and tour at the Lake Superior Railroad Museum. Both museums are located in Duluth, Minnesota.

With the success of the first Rail and Intermodal Summer Youth program, we look forward to offering the exploration course again in the summer of 2011.

### Michigan Tech Hosts National Summer Transportation Institute

For the second consecutive year, the Federal Highway Administration awarded Michigan Tech with the National Summer Transportation Institute (NSTI) program, hosted by the University Transportation Center for Materials in Sustainable Transportation Infrastructure (UTC-MiSTI) and the Michigan Tech Summer Youth Programs. The competitive scholarship program, held on campus July 19-30, attracted students interested in various forms of transportation.

Sven Chartier, REAC president and a student of the RTP, gave an overview of railroad engineering and the rail transportation program at Michigan Tech. Dr. Bill Sproule also provided presentations to the students in the areas of Public Transit and Airports.

This summer, twenty-seven youth participated in the two week residential program. One interested student attended both the NSTI and the Rail and Intermodal Transportation program.

The photo from the National Summer Transportation Institute 2010 can be found at < <http://www.misti.mtu.edu/index.php?p=nsti10>>.

### Fifth Annual Railroad Night

Five years after its inception, the annual RTP Railroad Night continues to be a success. Hosted by the Rail Transportation Program and the Railroad Engineering & Activities Club (REAC), this year's event was held February 16 at the North Shore Grill in Houghton and was attended by 130 rail enthusiasts.

Keynote speaker for the evening was Tony Hatch, senior transportation analyst on Wall Street with ABH Consulting who has over 20 years experience in the rail industry. Tony provided his insight on Rail Renaissance: Returns, Capital and Capacity.

In addition, check presentations were made by CSX and Union Pacific Railroad, who both renewed their commitment to the Rail Transportation Program for the third consecutive year. A special recognition was made to CN for their generous donation of \$250,000 for the implementation of the CN Rail Transportation Education Center (CN RTEC).

Luke Gublo, president of REAC, provided an update on REAC's activities and Director Dr. Pasi Lautala ended the evening by giving accolades to all who participated.



Students participating in the first Rail and Intermodal Transportation Summer Youth Program.

# CONFERENCES & PROFESSIONAL DEVELOPMENT

Michigan Tech's Rail Transportation Program is heavily involved in participating and organizing conferences and other professional development activities in the railroad field. In addition, RTP published several papers in 2009-2010.

## **Michigan State University Certificate Course in Railway Management**

Dr. Pasi Lautala was invited by Michigan State University's (MSU) Railway Management Program to participate in Session IV of the MSU Certificate Course in Railway Management. During the four week program, the participants gained a comprehensive knowledge base of all activities associated with railroad operations and management, including a thorough working familiarity of internal operations, financial considerations, and customer service requirements that will enable fact based decision making resulting in overall efficiency and profitability. According to Dr. Lautala "the MSU program greatly strengthened my understanding of challenges and complexities of railway operations and management. I am looking forward to continuing collaboration between RTP and MSU programs."



Pasi Lautala with MSU Professors Steven Ditmeyer (left) and Robert Gallamore (right).

## **Joint Rail Conference 2010**

Dr. Pasi Lautala functioned as the Chair of the Publicity Committee for the Joint Rail Conference, 2010, held in Urbana, Illinois. The theme of the conference was "High Speed and Intercity Passenger Rail" and it was a great success with over 400 participants. Dr. Lautala also presented a paper "Developing Railway Higher Education in the European Union and the United States", and was one of the panelists in the Railroad Education Panel Discussions.

## **Railroad Engineering Education Symposium 2010**

Dr. Pasi Lautala and Dr. Bill Sproule were both on the academic advisory committee for the Second Railroad Engineering Education Symposium (REES) that was held June 14-16, 2010 on the Johnson County Community College campus in Kansas City, Missouri. The symposium brought together total of 50 faculty and rail industry colleagues. The program included discussion on the career opportunities in the rail industry, current and future rail research, and introductory lectures by senior faculty on a variety of rail topics. Dr. Sproule presented a lecture on Transit, Commuter and Intercity Passenger Rail Transportation and Dr. Lautala presented on Railway Alignment Design and Geometry.



REES participants discussing rail topics at Johnson County Community College.



## CONFERENCES & PROFESSIONAL DEVELOPMENT

### American Railway Engineering and Maintenance of Way Association (AREMA) Annual Meetings

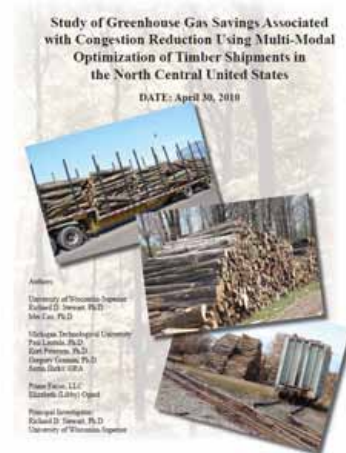
Eleven students from Michigan Tech had an opportunity to participate in the 2009 AREMA Annual Conference in Chicago, Illinois. Despite the fact that 2010 AREMA conference took place during the first week of fall semester in Orlando, Florida, five current students were able to participate in this year's conference. It was also rewarding to see that several of our recent graduates were present through their current positions in the industry. Among other activities, a recent RTP graduate student Shane Ferrell and RTP Program Director, Dr. Pasi Lautala, presented a paper "Rail Embankment Stabilization on Permafrost- Global Experiences".



RTP representatives at the 2010 AREMA conference in Orlando, Florida.

### RTP Publications

- Stewart, R., Lautala, P.T., Ogard, L, et al., Study of Greenhouse Gas Savings Associated with Congestion Reduction Using Multi-Modal Optimization of Timber Shipments in the North Central United States, University of Wisconsin-Superior, US Department of Transportation, June, 2010.
- Lautala, P.T. and Sproule, W.J., Rebuilding Railroad Engineering Education in the United States with Industry-University Partnerships, Transportation Research Record 2109, Transportation Research Board, 2009.
- Lutch, R. H., Capacity Optimization of a Prestressed Concrete Railroad Tie, MS Thesis, December, 2009.
- Hicks, J.W., Modeling the Multi-Modal Transport of Logs and Effects of Changing Fuel Prices, MS Report, December, 2009.



RTP representatives at the 2009 AREMA conference in Chicago, Illinois.

### RTP Conference Papers

- Lautala, P.T., Handler, R, Hicks, J., *Spatially-Based Model to Determine Price-Optimal Log Transportation by Trucks and Rail in the Upper Mid-West – Development and Outcomes*, paper accepted by the Transportation Research Board Annual Meeting of the National Academies, 2011.
- Puryousef, H., Lautala, P.T., *High Speed Rail (HSR) Access to Existing Stations In Downtown*, paper accepted by the Transportation Research Board Annual Meeting of the National Academies, 2011.
- Lautala, P.T., and Ferrell, S., "Rail Embankment Stabilization on Permafrost – Global Experiences", paper and presentation at American Railway Engineering and Maintenance of Way Association (AREMA) 2010 Annual Conference, Orlando, FL, August 29 – September 1, 2010.
- Lautala, P.T., Edwards, R., Máciório, R., Pachl, J, Sproule, W., "Developing Railway Higher Education in the European Union and United States", paper and presentation at the Joint Rail Conference 2010, Urbana, IL, April 27-29, 2010.

# RTP RESEARCH PROJECT HIGHLIGHTS

## **“Study of Greenhouse Gas Savings Associated with Congestion Reduction Using Multi-Modal Optimization of Timber Shipments in the North Central United States”**

The RTP participated in a study led by the Transportation Logistics Management Program at the University of Wisconsin, Superior (UW-S), to investigate a multi-modal rail/truck surface transportation solution set to improve the timber shipments in the North Central United States. The final report was released in June, 2010, and the pdf file can be downloaded from the UW-S web site at <<http://tinyurl.com/uws-rtp-greenhouse>>. As part of the project, Justin Hicks and the Michigan Tech research team developed a comprehensive map of all rail facilities capable of handling logs in the study area and a computer model for comparing the transportation costs between truck and “bimodal” (truck and rail) transportation, based on the distance traveled and cost of fuel. The outcomes are presented in the MS report *“Modeling the Multi-Modal Transport of Logs and the Effects of Changing Fuel Prices”* by Hicks. The report suggests that over 20% of transit ton-miles analyzed could have been moved more cost-effectively through combined truck and rail (bimodal) transportation, leading to roughly 3.75% reduction in transportation costs (using fuel rates during the time of transportation). In addition, sensitivity analysis conducted to analyze the effects of changing fuel prices for the optimal modal split suggested that every one dollar increase in fuel price would warrant additional seven percent shift of ton-miles to bimodal transportation. The respective percentage of savings would increase almost linearly with fuel prices (Figure 1).

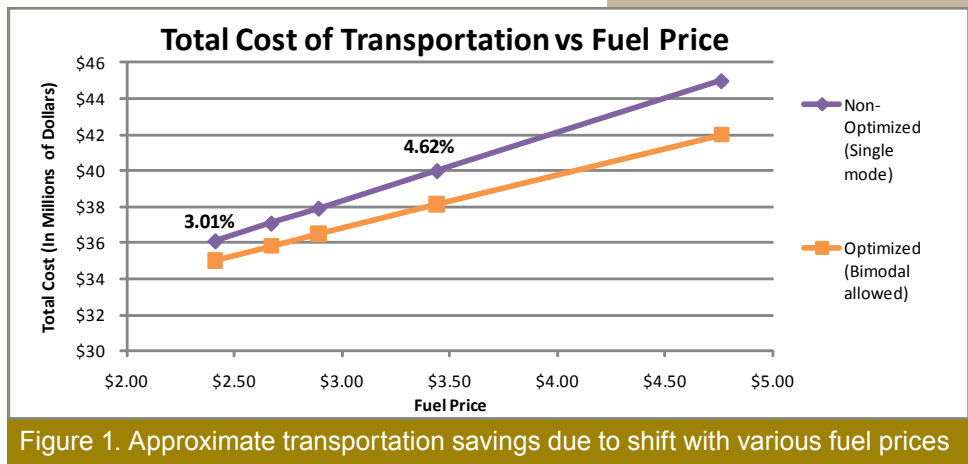


Figure 1. Approximate transportation savings due to shift with various fuel prices

## **The Synthesis of Railroad Engineering Best Practices in Areas of Deep Seasonal Frost and Permafrost**

The Synthesis of Railroad Engineering Best Practices in Areas of Deep Seasonal Frost and Permafrost study began in May, 2008 with assistance and guidance from Dr. Paul Metz and Mr. Mark Taylor of the University of Alaska – Fairbanks (UAF). The project is part of a planned Alaska Canada Rail Link (ACRL) that would connect the current Alaskan and Canadian rail networks.

The study is in its final stages and the final report is currently being prepared. The objective was to advance the understanding of the special requirements caused by deep seasonal frost and permafrost for the design, construction, maintenance, and operation of rail infrastructure in the arctic environment. Without a proper understanding of these challenges, successful design and construction of the proposed rail link could be compromised.

The research has revealed that the most challenging aspects in cold climate railroads are related to geotechnical and substructure issues, such as construction methods and stabilization of subgrades under the track structure. The most complicated situations often situate at locations, where track structure is constructed on top of warm or ice-rich permafrost, and at transition areas between soils, or between permafrost and deep seasonal frost areas. Literature review and industry interviews collected during scan tours suggest that significant portions of rail infrastructure in such conditions have historically relied on passive solutions to maintain track stability and most lines have witnessed major deterioration over their lifetime. The latest cold climate railroad, constructed in China within the last decade, has taken another approach, by using proactive methods, such as crushed rock embankments, thermosyphons, dry bridges, or combination of methods to reduce the thaw and related settlement.

For more information, visit <[www.mtti.mtu.edu/alaskarail](http://www.mtti.mtu.edu/alaskarail)>.

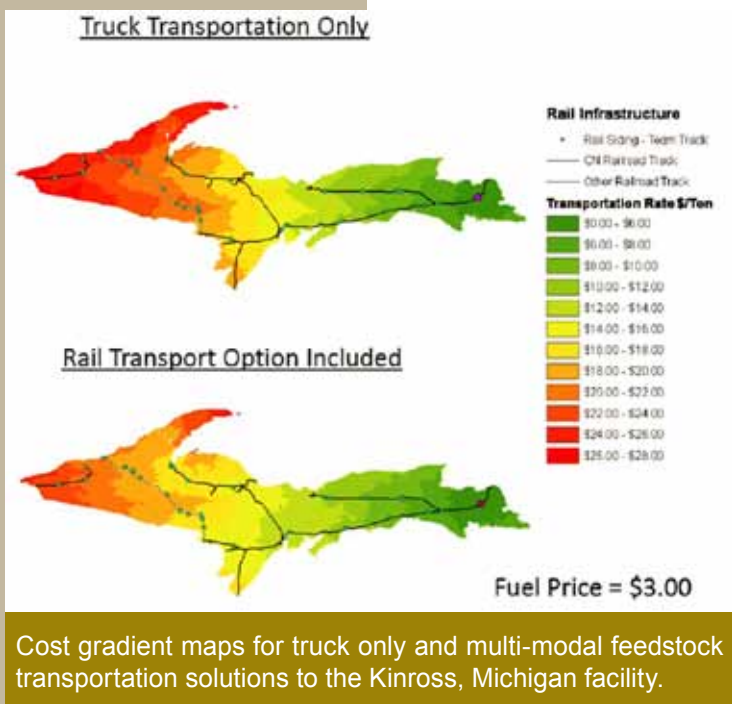


A dry bridge at the Qinghai-Tibet railway.

## RESEARCH PROJECTS

### Research Projects In Progress

**“Project 3 of Frontier Renewable Resources Center of Energy Excellence (COEE): Improving Forest Feedstock Harvesting, Processing and Hauling Efficiencies” and “Forestry Biofuel Statewide Collaboration Center (FBSCC)”**



There are two on-going projects related to multi-modal transportation of woody biomass. The primary objective of the COEE study is to develop recommendations for an efficient, sustainable, and cost effective forest feedstock harvesting, processing, and hauling system for the Kinross, Michigan cellulosic ethanol facility developed by the Frontier Renewable Resources (FRR). The two-year project is being conducted in collaboration with Michigan State University (MSU) as part of the Center of Energy Excellence. The RTP leads the efforts to investigate and evaluate the alternatives for the multi-modal biomass and transportation infrastructure systems. The RTP is also leading the effort to identify and evaluate the capabilities of the state of Michigan transportation system to deliver biomass feedstock to a factory gate. The evaluation includes an assessment of current road, rail and marine transportation infrastructure in forest regions of Michigan. In addition to mapping the physical location of transportation infrastructure, other relevant information affecting the productivity of the system, such as seasonal highway weight restrictions, location, capacity and condition of truck/rail landings and yards, and condition of docks and access roads will be evaluated. Finally, the project will also investigate the availability of appropriate road vehicles, rail cars, and marine vessels and identify potential synergies between modes for efficient use of a multi-modal transportation network.

### **“Policy Project on Tuning Transatlantic Cooperation in Rail Higher Education (TUNRail)”**

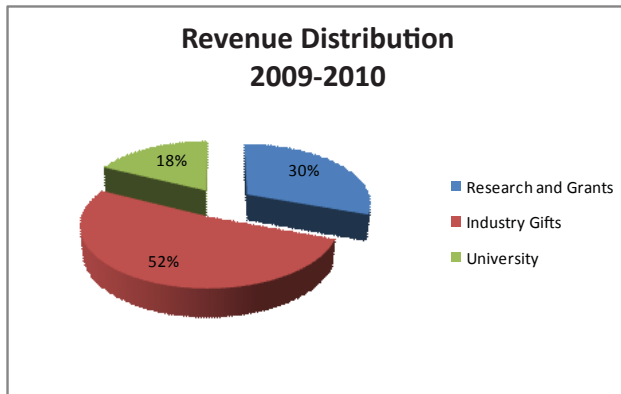
TUNRail is a policy-oriented research grant to “tune” and “intensify the railway higher education knowledge exchange and collaboration between the European Union and the United States” that has entered its second and final year. In addition to Michigan Tech, other participating institutions include the University of Illinois at Urbana-Champaign in the United States, and Instituto Superior Técnico, Universidade Técnica de Lisboa, Portugal and Technische Universität Braunschweig, Germany in the European Union. Funding for this two-year federal grant comes from the Fund for the Improvement of Postsecondary Education (FIPSE) in the U.S. Department of Education and some of the tasks completed to date include comparison of rail systems in the EU and US, a comprehensive university railway education survey, and on-line industry survey to identify demand and critical skills of future railway graduates in the EU and US. For more information, visit <<http://www.tunrail.info/>>.



## FINANCES

### RTP Funding

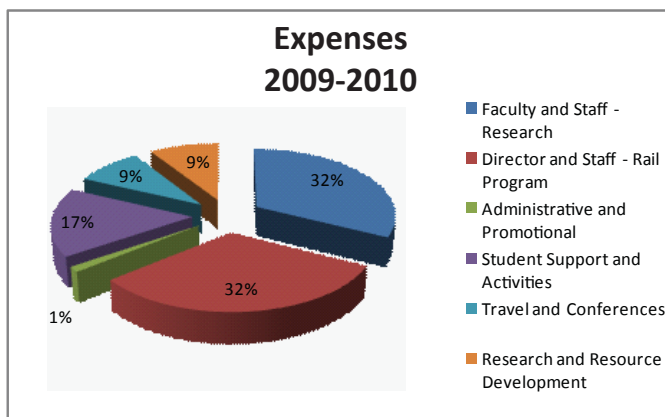
Michigan Tech's financial support for the Rail Transportation Program is received from the Office of Vice President for Research (VPR), the Michigan Tech Transportation Institute (MTTI) and the Department of Civil and Environmental Engineering (CEE). External funding consists of industry partner contributions, gifts from private individuals and sponsored research or grant funding.



### RTP Expenditures

Expenditures to support the rail transportation activities have been divided into the several categories.

- **Faculty and Staff** – Research expenses are faculty and staff salaries and includes overhead charges specific to sponsored research projects.
- **Director and Staff** – Rail program includes Director and staff salaries used to support and continuing development of the Rail Transportation Program.
- **Administrative and Promotional** expenditures are expenses incurred in the operation of the rail program, such as phones, printers and maintenance fees, and promotional and outreach materials.
- **Student Support and Activities** includes expenses which benefit students directly such as tuition and stipends, expenses for conference fees and field visits, travel, and sponsorship for student projects, events, and REAC activities.
- **Travel and Conferences** includes all non-student support for travel and participation in rail and educational conferences, and meetings to facilitate the development of the rail transportation program. This includes travel expenses incurred in sponsored research projects.
- **Research and Resource Development** expenses are related to the development of the CN Rail Transportation Education Center (CN RTEC). They also include investments to new resources such as books, software, and other accessories deemed important for the program.



## Michigan Tech Rail Transportation Program Vision

The vision of 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 21<sup>st</sup> Century.

For more information, visit the Rail Transportation website at <<http://www.rail.mtu.edu>>.

## 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.

For more information, visit the Michigan Tech Transportation Institute website at <<http://www.mtti.mtu.edu>>.

## 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.



[www.mtu.edu](http://www.mtu.edu)