



Rail Transportation Program

Michigan Tech Transportation Institute • Michigan Technological University

Celebrating **5** years 2012 Annual Report





DIRECTOR'S MESSAGE



Another beautiful summer is turning into fall in the Upper Peninsula of Michigan and it's time to greet the next academic year. One could call this report a "special edition", as it's been five years in October since the Rail Transportation Program (RTP) was officially established as part of the Michigan Tech Transportation Institute. Overall, our objective has been to have an upward trend in our key measures, which include the number of students involved in rail related curricula activities and in the Railroad Engineering and Activities Club (REAC), as well as in the number of placements in industry internships and full time positions. It has been rewarding to experience progress in all these measures. We are especially excited about the growing number of internships this past summer, as industry consistently ranks them as the most important collaborative method with universities.

Besides quantitative measures, we are attentive to qualitative measures taken through observations as well as by noting comments and interactions with our past and current students, the university, and industry stakeholders. In this annual report, we continue to highlight some of our alumni in industry, recent graduates and more seasoned professionals. It's easy to recognize the success and respect they have gained through their contributions. There's nothing better for an educator than when a student, or his parents / grandparents, come to thank you for helping them to find their path and goals. It's just as rewarding watching from the sidelines as they turn into leaders and represent their companies in industry conferences and other stakeholder events. Some of our first students have rapidly advanced in their careers. We are proud to see how many Michigan Tech graduates are part of the rail industry.

I'd like to dedicate this report to all those who have decided to come along for a ride with us. However, I also want you to remember that we've barely scratched the surface yet and that we're no longer alone. Other universities are starting to recognize the opportunities in rail transportation and engineering as witnessed in the Railroad Engineering Education Symposium (REES). That means competition for us, but even more so – I believe – collaboration. The United States needs more rail transportation and there is plenty of room for other universities to get involved. It's exciting to be one of the "pioneers" in the field, but it's even better when there are more academic stakeholders to share the success with. Rail transportation has been on the sidelines for a long time, but if we get all the stakeholders aligned on the same path we may see a well-coordinated effort toward the development of a new, modern rail academia. I don't know about you, but that's where I'd like to place my bets. It's been great to see the first steps in that direction through the creation of the National University Transportation Center (NURail) funded by the U.S. Department of Transportation Research and Innovative Technology Administration (RITA).

Enjoy the report and don't forget to check out our website at www.rail.mtu.edu and our new [Facebook Page](#) for updates on our latest activities.

Pasi



Find Us on
Facebook

Rail Transportation
Program at Michigan

Rail Transportation Program Vision

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.

RAIL INDUSTRY PARTNERS AND RECRUITMENT

Industry partners and supporter contributions form the foundation of the Rail Transportation Program (RTP). Our success can be attributed to the significant and generous contributions that provide growth and sustainability, both financially and in the workforce development of our students.

Support comes in the form of operational programming as well as in substantial scholarship awards through donations by our partners: CN and Union Pacific. Additionally, in 2012, the Strategic Internship in Rail Program (SIR) was introduced to create continuous and consistent internship opportunities that introduce RTP students to the rail industry environment while promoting the value of RTP students to rail industry companies. Industry partnership is a crucial component and priority of the RTP expansion and development. We thank you for continuing to further the education of our students and the advancement of the RTP.

Other Organizations with 2011-2012 Financial Support:



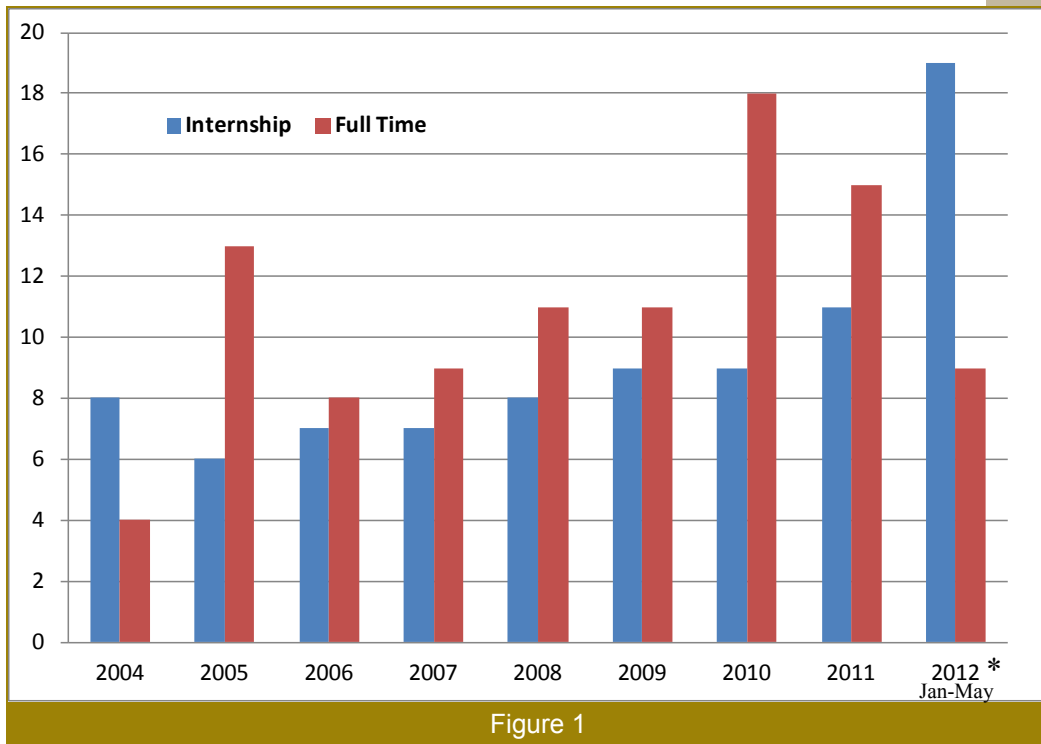
Program Partners



BUILDING AMERICA®

Full Time and Internship Recruitment Trends

Each year, numerous Michigan Tech students and graduates join the rail industry for internships, co-ops, or to start their full time career. Both internships and full time positions have witnessed an upward trend as seen in Figure 1.





RTP FACULTY AND STAFF



Dr. Pasi Lautala

Dr. Pasi Lautala, P.E.

While still a Ph.D. student in Civil and Environmental Engineering, Pasi Lautala and then advisor Bill Sproule, started the Rail Transportation Program at Michigan Tech with the Summer in Finland International Engineering course. Now director of the Rail Transportation Program and an Assistant Professor in the Civil and Environmental Engineering Department, Dr. Lautala is an actively involved leader in re-establishing rail transportation education in North American universities. He has created and teaches several courses in railroad engineering and is currently the principal investigator for several funded research projects related to railroads, multimodal transportation and railway engineering education. He has several years of railroad and railroad consulting experience in planning, design, and operations in the United States and Finland, and is a member of various professional associations including AREMA, ASCE, ASEE and TRB.



Bill Leder

Bill Leder, P.E.

Bill Leder is the Roland A. Mariucci Distinguished Practitioner in Practice and Adjunct Professor of the Civil and Environmental Engineering Department at Michigan Tech. His interests include public transportation planning, engineering, airport planning and design, railroad engineering, design build contracting for large transportation projects, and project management. Professor Leder teaches courses in Public Transit Planning and Engineering and Introduction to Consulting Engineering. In addition, he applies his expertise from 34 years of service in the public sector to leading Senior Design Projects on campus.



Dr. Bill Sproule

Dr. Bill Sproule, P.E.

Bill Sproule is a Professor in the Department of Civil and Environmental Engineering with over 35 years of service in government, consulting, and university research and teaching in Canada and the U.S. He assisted in the development of the current Rail Transportation Program at Michigan Tech and teaches various transportation courses. Dr. Sproule's interests include transportation planning, traffic engineering, airport planning and design, public transit, automated people movers, and consulting engineering. Canadian born and a true ice hockey fan, Bill also teaches a class titled "Hockey History and Culture". Dr. Sproule has been recognized with 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 supports the Rail Transportation Program through project management, program development, and educational events coordination.

Additional faculty and staff actively involved in rail related activities at Michigan Tech include Dr. Bernie Alkire (retired), Dr. John Hill, Dr. Stan Vitton, Dr. Paul Sanders, and Adam Johnson.

Ph.D. student Hamed Pouryousef and undergraduate student researchers Kyle Pepin, Mike Farrell, Han Cheng, and Matt Purves have provided invaluable assistance to the RTP on research projects and program development.

ALUMNI HIGHLIGHT

Chad Hewitt

Chad Hewitt graduated from Michigan Tech with a Bachelor's degree in Civil Engineering in 1997 and a Master's degree in Civil Engineering in 1999. Chad is currently the Director of Engineering at Remprex Engineering Services (RES), which is headquartered in the Chicago area.

While at Michigan Tech, Chad followed the typical civil engineering tract, unfortunately there were no specific rail related course offerings available at the time. Luckily, his family had a history of working in the railroad industry, so he grew up with exposure to railroads and knew that it was a potential career path. When looking for a topic for his graduate work, the rich history of the rails in the Keweenaw was appealing. With the help of Bill Sproule's shared interest in rail and inter-urban transit, an idea was born to provide for a study to reintroduce rail service for the benefit of the Keweenaw National Park. "I was definitely the only CE taking graduate level Keweenaw history courses with Larry Lankton, but it was a natural fit for my subject matter."

Chad left Michigan Tech to enter the consulting workforce in Chicago, the center of all things rail. During his early career, he had great exposure to all facets of railroading, working on a wide variety of mainline and industry projects. "Early in my career, I was always the junior person in the room by what seemed like 30 plus years". This presented an impending challenge as many of those experienced professionals were nearing retirement, a fact that seemed daunting. "There was a sense of urgency to learn all you could before existing experienced staff retired". When his friend and co-worker Pasi Lautala left the Chicago area to pursue his PhD, and later started the RTP at Michigan Tech, that was a sign of hope that both the industry and others out there who also saw the pending storm and were going to do something about it. "These days, now I feel somewhat like the seasoned veteran" states Chad, as an influx of new hires has entered the rail industry. Chad has always been a champion for Michigan Tech grads and has hired more than a few. Three of the ten on staff at RES are Michigan Tech grads (including himself) with two coming directly from the RTP. Chad believes that Michigan Tech grads have something special obtained by four plus years studying and living in Houghton. Tech students are able to translate their skills to the lifestyle of a railroader which demands individuals whom are accustomed to technical challenges as well as sometimes harsh conditions in the field.

Chad enjoys the variety and challenges offered by the rail industry. "It's fast paced and always challenging, you learn to act as a true engineer and work based upon skill and instinct." In his current position at RES, Chad's job is to find new and better solutions across a variety of rail and intermodal projects. His current focus is in providing a full range of design and construction services for intermodal facilities, with a specific emphasis on Automated Gate Systems (AGS), which is the core focus of Remprex as a company. The diversity of work opportunities has provided Chad with hands-on experience in architecture, site electrical, fiber optics, computer networking, and wireless technology. These experiences move beyond rails, ties, ballast, and earthwork that one naturally expects of a railroad designer. Chad has been able to split his time between both design and construction within his career and insists that all young engineers have exposure to both sides of the fence to insure well-rounded development of their skills. "The railroads are always open to letting people do what they show an aptitude for, there's no pre-conceived notion that a CE, ME, or EE should only work on specific projects that are within a specific domain. It's very liberating to explore new facets of engineering and know that your engineering skills to solve problems and deliver projects are truly valued to get the job done."



Chad Hewitt, Director of Engineering at Remprex Engineering Services



GRADUATE HIGHLIGHTS



Victoria Demers at work on a UP Locomotive

Victoria Demers, Union Pacific Railroad

Victoria is a 2012 graduate with a BS in Mechanical Engineering. In June of 2012 she began work for Union Pacific Railroad as an Operations Management Trainee (OMT). When her training is complete Victoria will become a Manager of Mechanical Maintenance.

"I had not thought about working for the railroad until visiting the Career Fair at Michigan Tech. After talking to the representative from Union Pacific and looking into their program, my interest grew. The OMT program is very comprehensive, with a lot of travel and training. The schedule for training includes both conductor and locomotive engineer duties, effective communication, and time with both the transportation and engineering departments. It is imperative to understand how different aspects of the company work together to give our customers the best experience possible.

Having a background in Lean Manufacturing, I was excited to discover that the mechanical side has begun implementing many of the practices of Lean, including 5S, visual management, and eliminating waste in their processes.

The opportunities here are endless. One is not bound to stay in the field you start in. One week you could be designing a new car and the next managing a maintenance shop, or running train operations in a yard. It is hard not to find your niche!"



Beau Ihnken at Loram

Beau Ihnken, Loram

Beau is a 2011 graduate with a BS in Mechanical Engineering. In 2010 he worked for a summer with Loram and decided to pursue a full time position after graduation. In 2011 he was hired at Loram and currently holds a position as a Computerized Maintenance Management System (CMMS) Coordinator for the domestic fleet.

"I started at Loram originally as a general laborer for a summer on a ballast cleaner; there is where my official interest in rail began in 2010. I needed a summer job and ended up enjoying my work so much that I began working for Loram full time in July of 2011. At Loram we build some of the best track maintenance equipment made. This includes rail-grinders, ballast cleaners, ditchers, switch grinders, undercutters, track lifters, and much more. I am a CMMS Coordinator for the domestic fleet. Any inventory and maintenance on the machines that use CMMS (currently 26 of the 72 machines) go through me. This system is also used for tracking the life of assets on the machine to make sure that they are performing to specification. Work is very fast paced here and constantly changing; in fact I just got back from Texas off a new ballast cleaner."



Dave Sutton at Joint Rail Conference, currently working for EMH&T

Dave Sutton, EMH&T

Dave graduated in May, 2012 with a BS in Civil Engineering and has since been working with EMH&T (Evans, Mechwart, Hambleton & Tilton, Inc.).

"My great grandfather worked as a conductor and I have always enjoyed travel by train. One of the highlights of my youth is traveling via Amtrak from Chicago to San Francisco, so I have always had somewhat of a sleeping interest in the industry. The unique program at Michigan Tech helped renew that interest, and with the exposure and education I received it became apparent that the rail industry was for me.

EMH&T provides planning, design and management of rail infrastructure and has extensive experience in designing rail facilities for the transport and transfer of commodities. My work experience thus far has been mostly drafting plans with AutoCAD Civil 3D for a proposed intermodal terminal and mainline relocation in Salaberry-de-Valleyfield, QC, Canada. I have enjoyed the challenge and complexity of the project and look forward to the many more to come in this growing industry."

STUDENT INTERN/CO-OP HIGHLIGHTS

Ryan Blessing (Civil Engineering)

Railworks- Member of Strategic Internship in Rail Program*

"This past summer, I took an internship with RailWorks Track Systems out of St. Paul, MN. The project I'm working on is called the Central Corridor Light Rail Transit Project (CCLRT). It begins in Minneapolis where it ties in to the Hiawatha Light Rail, crosses the Mississippi River, meanders around the University of Minnesota, and then continues on to St. Paul. Because this is such a large project, I have had the opportunity to meet a lot of great people and experience really amazing rail related topics. I have also learned a great deal about what it takes to accomplish such an amazing feat when contractors have to coordinate their schedules with each other and with the Twin Cities.

On a typical day, I may travel between the Twin Cities checking on the active project sites, develop an AutoCad drawing, make material inspections, do site walks to check for defects, and order materials. Because such a high percentage of this project is embedded track that requires a large amount of concrete, I also had the opportunity to visit the concrete facility to see how this material is made. As the summer comes to a close, I will be staying on with RailWorks for a co-op through the fall semester and see the project to its completion.



Ryan Blessing, 2012 Railworks Intern

Emmalee Bauer (Civil Engineering)

CN Railroad- Member of Strategic Internship in Rail Program*

"This past summer, I had an internship with CN Railroad working under the supervision of Mark Bauer. I am going into my 3rd year at Michigan Tech in the Civil Engineering department, expecting to graduate in 2014. I specifically worked on the track side of the engineering department. My job for the summer was hy-railing on the rail (a vehicle which travels on the rail) while making corrections to the rail track charts. I was specifically looking at crossings, switches, bridges, culverts, and rail weight (136 lb vs. 115 lb). After making the corrections in the book, I went to the CN headquarters based in Homewood, IL to make the corrections to their AutoCad files.

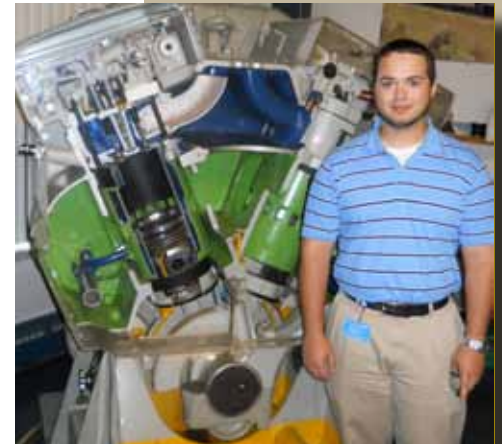
I went into this internship knowing nothing about the railroad and have come out with first-hand experience and an abundance of information. The biggest thing I learned through this internship is that working on the railroad is a way of life. Every employee of CN is on call 24/7 and is also expected to move around a lot. The opportunity of having an internship was fabulous. I was able to learn more about how I want to focus my education at Michigan Tech and I am excited to see how I can apply what I learned this summer."



Emmalee Bauer, 2012 CN Intern

Nathan Wilder (Mechanical Engineering), Electro-Motive Diesel

"This summer I worked for Electro-Motive Diesel in LaGrange, Illinois. Electro-Motive is a major producer of diesel electric locomotives and diesel engines. During the summer, I worked on a variety of projects in the engine assembly plant. Working in a manufacturing environment is much different than being in an office, and there are always many different things going on at once. I liked being able to get hands on experience with machining parts and setting up tooling and machines, experiences that I would not be able to do in a classroom at school. One of the big projects I worked on was the implementation of new machining cells on the factory floor. Another fun event was a two day course I took called "Locomotive Familiarization". In the class we went over all the components of the locomotive and on the last day we actually went out and got to get on a locomotive. The knowledge and experience gained during the summer will greatly benefit me at school and in the future."



Nathan Wilder, 2012 Electro-Motive Intern

*Visit our website to learn more about our Strategic Internships in Railroads partner program at http://www.rail.mtu.edu/strategic_internships.htm



RAILROAD ENGINEERING AND ACTIVITIES CLUB



Dylan Anderson at CN railway

What began in 2005 as an exploration of student interest in rail, has become an engaging means for educating students, faculty, and community members about the rail industry and all that it offers. Since its beginning, the Railroad Engineering and Activities Club (REAC) at Michigan Tech has been actively serving both the student body and community at large.

When REAC became the first student chapter of the American Railway Engineering and Maintenance-of-Way Association (AREMA) in 2006, it expanded its vision beyond simply informing people about the rail industry and has since sought to connect individuals to networking opportunities. REAC's spirited social presence has increased the multidisciplinary membership of the organization to over 80. Monthly meetings, social events, site visits and field trips, as well as volunteer events and participation in/hosting multi-organizational events have resulted in a robust core of active individuals who are excited by the possibilities that rail offers.

In this past year, monthly meetings have covered an array of topics from a host of knowledgeable speakers. Wherever member interests lie, whether it be in railroad facility design, passenger rail systems in urban environments, designing bridges or even locomotive engines, REAC monthly meetings supply speakers and topics that accommodate everyone.

Two of the features that continue to separate REAC from other student clubs are the sponsored visits to field sites and conferences. These excursions provide students with a firsthand look into the rail industry. In spring of 2012 our trip brought us to Chicago, IL (page 9). Other trips throughout the year included a visit to the largest North American railroad conference, Railway Interchange, in Minneapolis, MN, and a visit to Lake Superior & Ishpeming Railroad where REAC members were able to observe daily operations of the yard and shop as well as the loading and unloading facilities. These experiences provide exposure and keep students informed about current issues and topics within the rail industry.

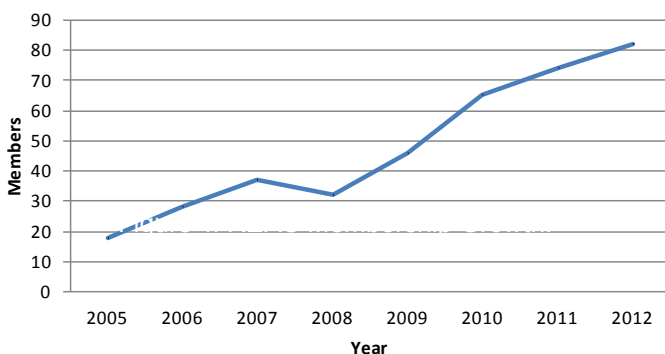
This past year saw the continued success of a REAC tradition, Railroad Night. The seventh Annual Railroad Night had an even larger attendance than the previous year, pulling in students, faculty, community members, and rail industry representatives. More than 150 attendees enjoyed a presentation by Kevin Kesler of the Federal Railroad Administration (FRA). In addition, 14 companies from the rail industry had representatives in attendance.

As we head into a new academic year the future for REAC looks bright. REAC is an ever expanding organization and for this coming year we have a few objectives in particular we'd like to accomplish. One of these objectives is to expand existing inter-organization involvement beyond social exchanges and move towards forming working collaborative bonds. With this cooperation, hosting recruitment events and sponsoring projects will both be more readily facilitated as well as able to target a more diverse spectrum of students.

REAC is always looking to welcome more students into our organization to spread the word about opportunities that exist within the rail industry. We also will continue our involvement in the local community through outreach and volunteer events. With strong industry support and a dynamic group of students, REAC will continue to expand and thrive in the coming years.

Dylan Anderson
REAC President

REAC Membership



REAC Membership Growth

STUDENT ACTIVITIES AND SCHOLARSHIPS

REAC Spring Trip- Union Pacific Proviso Locomotive Shop and Yard; BNSF Intermodal Yard; & EMD's Engine Manufacturing and Office Facilities- Chicago, Illinois

The annual spring trips funded by the RTP are an important piece of the continual effort to provide meaningful opportunities for students interested in rail careers. This past spring, the RTP and the Railroad Engineering and Activities Club (REAC) hosted a three day venture to the Chicago area. While there, attendees toured Electro-Motive Diesel (EMD), Union Pacific (UP), and BNSF intermodal facilities.

The trip began with a tour of EMD's engine design facilities guided by Technical Proposal Manager Jim Spiegel. Students were able to explore EMD's Engine Plant and Experimental Test Facility along with the AC Traction Motor Test Cell and Control Room. In addition to demonstrating the creation process from concept to product, EMD also prepared several short presentations on current/past projects that EMD had handled. The projects were presented in formats already familiar to Michigan Tech students, which both enhanced the experience and sparked interest from students who had never before seen industry applications of the same software they use in classes.

With the time left after the EMD tour, the group took the Metra into downtown Chicago and explored attractions such as the Willis Tower and Millennium Park.

The beginning of the second day in Chicago was highlighted by a UP rail yard tour, organized by Mike Iden. At UP's diesel locomotive shop students were able to oversee the installation of a positive train control as well as the locomotive repair facility. They also visited the cab of the new Genset locomotive.

Following the UP visit, the weekend concluded with a tour given by Michigan Tech Alum Nick Norman at BNSF's Willow Springs intermodal facility. Michigan Tech students received an overview of traffic control operations and typical maintenance work encountered at intermodal facilities. Employees related their own personal experiences with their jobs, which served as invaluable insight for many of the Tech students looking to find their niche in the rail industry.



Group photo at UP's Diesel Facility (above).
Students touring the UP facilities (below).

Rail Transportation Program Congratulates its Scholarship Winners

The Michigan Tech Rail Transportation Program (RTP) students received many of the scholarships offered by the American Railway Engineering and Maintenance-of-Way Association (AREMA) Educational Foundation this year. Additionally, six Tech students were internally awarded Union Pacific and CN scholarships.

Dylan Anderson (Civil and Environmental Engineering) - UP, AREMA Wayne E. Russell Memorial Scholarship
Chris Blessing (Civil and Environmental Engineering) - CN & UP
Ryan K. Blessing (Civil and Environmental Engineering) - AREMA Committee 27 - Hougen Manufacturing Scholarship
Luke J. Gublo (Civil and Environmental Engineering) - CN, AREMA Committee 37 - Signal Systems Scholarship
Tyler J. Kuzee (Civil and Environmental Engineering) - CN, AREMA Norfolk Southern Foundation Scholarship
Michael Larson (Mechanical Engineering-Engineering Mechanics) - CN
Hamed Pouryousef (Civil and Environmental Engineering) - Michigan Tech Alumni AREMA Scholarship
Troy Sabo (Civil and Environmental Engineering) - UP, AREMA Committee 27 - John Deere Scholarship
Dave B. Sutton (Civil and Environmental Engineering) - Michigan Tech Alumni AREMA Scholarship



YOUTH ACTIVITIES

Rail and Intermodal Transportation Summer Youth Program



Summer Youth Program participants at LS & I

Third time's a charm, or so it would seem for the Rail and Intermodal Transportation Summer Youth Program. What began as a joint venture between the Rail Transportation Program at Michigan Tech and the Transportation and Logistics Program at the University of Wisconsin-Superior has continued to improve the ways in which it provides youth with a unique and immersive rail experience. Likewise, the students continue to provide both excitement and their own views on rail from all around the nation.

"My favorite part of the week was seeing a woman dispatcher and increasing my confidence that I can be one in the future. ." -SYP student

For the weeklong duration of this scholarship program, students are being constantly shuttled from classroom learning modules and activities to field visits at rail sites and industry venues. Topics such as operations, international railways, urban transit, track structure, magnetic levitation, signals, and safety are all touched upon and supplemented with industry visits.

One field trip included a visit to the Lake Superior & Ishpeming Railroad in Marquette, MI where students were able to explore the maintenance yard, inspect track structure, and much more. Other visits included a trip to the Lake Linden Museum and several visits in Duluth to a BNSF rail yard, a truck simulator at Halvor Lines Trucking, the Duluth Railroad Museum, and a train ride to Lester River.

Looking forward, we're excited to start planning for next year's summer events. Applications and information about joining us for 2013 can be found on the SYP website starting in November at <http://youthprograms.mtu.edu/students-prospective-syp.php>.

RTP Partners with Mind Trekkers

This past year, the RTP joined forces with Michigan Tech's Center for Pre-College Outreach in contracting a magnetic levitation rail exhibit for their Mind Trekkers program (<http://mindtrekkers.mtu.edu/index.php>). Mind Trekkers is a group that travels extensively throughout the U.S., delivering a road show complete with scientific activities and displays to encourage an interest in science, technology, engineering and mathematics (STEM) for students K-12.

Numerous engaging hands-on STEM (Science, Technology, Engineering, Mathematics) based activities are conducted by undergrad/grad students and faculty from Michigan Tech with the goal of exciting students and informing the community about early STEM learning. Additionally, the program also offers students and parents the opportunity to speak with STEM professionals so that they may explore their post-high school options.

Based on an educational module currently utilized by the RTP in their annual Rail and Intermodal Summer Youth Program, an elevated Mag Lev track structure was designed and constructed by engineer Chris Gilbertson (Center for Technology & Training). The demo allows students to build and design their own unique Lego levitating trains which they then race against each other on a set of elevated magnetic tracks. Rather than using traditional mechanical methods, such as engines, wheels and axles, the Mind Trekkers Mag Lev uses the same principles found on high speed magnetic levitation rail systems currently in development around the world.



Summer Youth Program participants tour the BNSF control tower



SYP Mind Trekkers participants test levitating trains on the Mag Lev

RAILROAD EDUCATION AT MICHIGAN TECH

Educational Collaboration with Industry

Industry collaboration has always been a significant part of rail education at Michigan Tech and 2011-2012 was no exception. Guest speakers serve an important role in exposing students to the rail industry and providing their experiences, in person or via web conference. The 2011-2012 guest speakers included:

- **Dave Mason**; Railworks - *Opportunities in Rail Construction*
- **Dan Soler**; Metro Transit - *Central Corridor Construction Project, Expanding Light-rail Service in the Twin Cities, MN*
- **Bill Sawin**; NS - *Design and Construction of Railroad Bulk Transloading Facility*
- **Chad Hewitt**; Rempres Engineering Services - *Rail Intermodal Yard Terminal Development: From Design to Operation*
- **Nigel Peters**; Chief Engineer of Structures for CN - *Canadian National Bridge Projects*
- **Michael Iden**; General Director Car & Locomotive Engineering for UP – *Engines of Change: Locomotives and Fuels for the Future*
- **Phil Pasterak**; Parsons Brinckerhoff - *High Speed Rail Development in the US and Midwest*
- **Miroslav Haltuf**; H-Comp Consulting/Otis Group/Czech Republic - *Railway Research in Europe*

Another collaborative effort is panel discussions with industry professionals during railroad classes. RTP hosts industry panel discussions during the fall and winter career days either as part of (CE 4404) Railroad Engineering, or (CE 4490) Rail Transportation Seminar courses.



Chad Hewitt, Rempres Engineering Services (above). Phil Pasterak, Parsons Brinckerhoff (below).

Student projects



Students work at LS & I to assess a portion of track and the existing rail lubrication infrastructure

Over this past year students have worked with Lake Superior and Ishpeming Railroad (LS&I) and Quincy Mine to provide experiential learning to students.

A project team from the Transportation Enterprise (TE) worked for two semesters with LS&I to assess their existing rail lubrication infrastructure and provide recommendations for updating the system. Students familiarized themselves with not only rail lubrication practices but also rail related terminology and knowledge. During the field visit the student team identified potential problems in the track geometry and added investigation of ideal superelevations to the project.

This past year also saw the efforts of nearly twenty students working on a rehabilitation project for the Quincy Mine Hoist Association (QMHA). This multidisciplinary group was tasked with restoring the historical track alignments of the mine so that it may serve as a

tourist attraction as well as a functional passenger railroad. The team conducted comprehensive topographic surveys, a redesign of the existing track and yard layout around the engine house, crossings between historic and present rail lines, a locomotive run around for maneuvering around passenger cars, and the design of several trestle bridges as part of the final deliverable.



CONFERENCES & PROFESSIONAL DEVELOPMENT



Alum Dave Thomson (HR Green), Pasi Lautala, Dave Sutton, and Hamed Pouryousef at the Joint Rail Conference



Pasi Lautala and Bill Sproule with the group from the Rail Engineering Education Symposium (REES)

Conferences, Workshops and Conference Papers

- **Joint Rail Conference (JRC), Philadelphia, PA, April 2012.** Dr. Pasi Lautala, graduate student Hamed Pouryousef (CEE), and undergraduate student David Sutton (CEE) presented at the 2012 Joint Rail Conference, "Technology to Advance the Future of Rail Transport," in Philadelphia, April 17-19.

Lautala presented "Tuning Transatlantic Collaboration in Rail Higher Education (TUNRail)--Final Outcomes," based on his project that was supported by the Fund for Improvement of Postsecondary Education (FIPSE), US Department of Education. Lautala also chaired two sessions in the conference.

Pouryousef presented a paper, "The Role of Railroad in Multimodal Woody Biomass Transportation in Michigan," and Sutton presented a paper, "Industry-Student Collaboration to Develop Sustainability Metric for Concrete Tie Production."

- **Council of University Transportation Centers (CUTC) National Transportation Workforce Summit, Washington D.C., April 2012.** Dr. Pasi Lautala presented his paper "Meeting the Needs – What Does the Railroad Industry Need and Expect from Higher Education?" Dr. Lautala also participated in the panel discussion on workforce development needs for rail and transit industries.

- **CWR and Thermal Forces Workshop, May 21, Chicago, IL.** Dr. Pasi Lautala participated in the Continuously Welded Rail and Thermal Forces Workshop and passed an exam to qualify for FRA Track Safety Standards requirement Part 213.7(c).

- **Railroad Engineering Education Symposium (REES), Overland Park, KS, June 2012.** Pasi Lautala and Professor Bill Sproule (CEE) were invited speakers. The event brought together engineering faculty from universities across North America to learn about the railroad industry and research opportunities--and to take away materials that can be incorporated into their courses and curriculum. Lautala was also the coordinator of the academic program and a member of panels on railroad courses and program development.

- Lautala, P.T., Pouryousef, H., Handler, R., Chartier, S., The Role of Railroads in Multimodal Woody Biomass Transportation in Michigan, proceedings of ASME/ASCE/IEEE 2012 Joint Rail Conference, Philadelphia, PA, April 17-19, 2012.

- Lautala, P.T., Sutton, D., Dewey, G., Duong, P., University-Industry Student Collaboration to Develop Sustainability Metric for Concrete Tie Production, proceedings of ASME/ASCE/IEEE 2012 Joint Rail Conference, Philadelphia, PA, April 17-19, 2012.

Research Reports

- Lautala, P.T., Global Railroads, invited article in the Encyclopedia of Global Studies. Sage Publications, March 2012.

- Lautala, P.T., Stewart, R., Handler, R., Pouryousef, H., Chartier, S., Michigan Economic Development Corporation Forestry Biofuel Statewide Collaboration Center, Task B1 Evaluation of Michigan Biomass Transportation Systems, Final Report, January 2012.

- Lautala, P.T., Stewart, R., Handler, R., Chartier, S., Michigan Center of Energy Excellence Frontier Renewable Resources, Kinross Michigan Facility Biomass Transportation Systems Evaluation, Final Report, January 2012.

- Lautala, P.T. et al., Tuning Transatlantic Cooperation in Rail Higher Education – Handbook for Rail Higher Education, November 2011.

RTP ON-GOING RESEARCH HIGHLIGHTS

Evaluating Export Container Pooling Options in Minnesota, Wisconsin and Michigan's Upper Peninsula

Sponsored by National Center for Freight and Infrastructure Research and Education (CFIRE). Principal Investigator, Dr. Richard Stewart, Univ. of Wisconsin-Superior, Co-PI, Dr. Pasi Lautala, CEE/MTTI.

Containerized intermodal exports can accomplish several important objectives, such as reducing highway congestion issues. Implementing the strategic use of intermodal rail transport along corridors where highway freight shipments have become overburdened can alleviate pressure on the highway system and reduce the cost from greater economies of scale for intermodal rail shipments. Additionally, environmental benefits can accrue by diminishing the need to expand the highway system through better utilization of existing transportation infrastructure.

The traditional business model for rail intermodal terminals has favored longer distances between adjacent terminals and concentrated on serving the major metropolitan regions. This creates a challenging environment for less developed regions with an interest in using containers for exports because rerouting to facilities increases cost. Without available containers for exports in the vicinity, the cargo must often be trucked to a transfer station to be loaded into an export container. This cargo will incur the expense of double handling and possible damage.

This research effort identifies barriers for communication and collaboration which preclude ISO containers from markets in mid-West where export shippers need them to participate in the new economy. The research focuses on issues that limit export container availability in northern Minnesota and northern Wisconsin by conducting literature reviews and cataloging existing best practices in comparable regions. Additionally, the potential adoption and corresponding gain to exporters in the Twin Cities, Fox River Valley, and Warsaw metropolitan area and the Twin ports (Duluth-Superior) will be assessed. Case studies of efficient equipment assignment and pooling strategies may be used to investigate how competitive disadvantage can be reduced in areas unable to obtain containers at a reasonable cost for their export.



CN Grain Transfer Facility at Homewood, IL

High Speed Rail (HSR) Workforce Development through Education and Training

Sponsored by the Federal Railroad Administration (FRA). Principal Investigator, Dr. Pasi Lautala, CEE/MTTI.

With the US making strides towards the development of a High Speed Rail (HSR) system, industry and government have recognized the need to collaborate for a safe and successful implementation system. The current workforce has limited experience and institutional knowledge for the planning, design, construction, operations, and maintenance of HSR and educational opportunities are equally inadequate.

In order to address the lack of education and training that a HSR workforce requires, the RTP research team is developing a framework for a web based High Speed Rail Learning System (HSRLS) in collaboration with the Mineta Transportation Institute (MTI) that includes implementation of a proof-of-concept web portal with test modules. This technology based approach secures maximum reach within (and outside) the nation and provides 24/7 access to materials for audiences from unlimited physical locations. The long term objective is to turn the HSRLS into an open infrastructure portal where educational and training materials can be shared and accessed by a consortium of university, government and industry stakeholders. Modules are eventually expected to encompass multiple levels of education from university topics to skill based training and technology transfer for an operational workforce. This effort will improve the understanding of workforce development educational needs while enhancing academic and industry educational materials and offerings. Such developments provide for greater stakeholder involvement and ultimately a more focused and resilient learning system.



Eurostar High Speed Train at London, Station, UK



ON-GOING RESEARCH PROJECTS

Influences of Driver Attention on Rail Crossing Safety

Sponsored by the US Department of Transportation Research and Innovative Technology Administration (USDOT RITA). Principal Investigator, Dr. John Hill, MEEM.

This research provides an understanding of what keeps drivers safest at rail intersections. With an increase in rail use as public transportation, the ability to make informed decisions by drivers is essential. Through better understanding of how drivers handle the visual demands of the roadway, it is possible to design safer railroad crossings.

The main objective of this research is to develop an understanding of how visual field and visual attention on the part of the driver influence safety at rail crossings. Using an NADS Minsim driving simulator equipped with a suite of rail crossing simulations and Facelab eye tracking hardware, visual scanning patterns will be assessed. Driver response is measured both physiologically through heart rate measurements as well as by measuring vehicle characteristics such as breaking distances and deceleration profiles. After benchmark values for driver reaction have been established a variety of crossing types, warning system types, and scenarios for drivers engaged in distracting tasks at crossings will be utilized.

The next steps in the project include three primary studies. The first study will evaluate visual field use for a variety of crossing types ranging from rural crossings with rail crossing bucks to crossings with gates and lights. The second study will assess the effect of driver distraction on crossing safety. Distractions will be based on driver, vehicle, and environment. The third study will relate to crossing geometries. This will include evaluation of oblique crossings, evaluation of high speed passenger train interactions and replications of crossings with a documented history of vehicle-train collisions.



NADS Minsim driving simulator tests driver response at rail crossings.

National University Transportation Center in Rail (NURail)



In January, 2012, a seven university consortium, including Michigan Tech, was awarded the first National University Transportation Center in Rail (NURail) by the USDOT Research and Innovative Technology Administration (RITA). The primary objective of the NURail Center is to improve and expand rail education, research, workforce development, and technology transfer in the U.S.

The following activities are in progress at Michigan Tech:

- Dr. John Hill's (MEEM) research focus is on the Influences of Driver Attention on Rail Crossing Safety. Current work involves visual scanning patterns and distracted driving at railroad crossings. Further research will assess human performance with regard to specific crossing geometries.

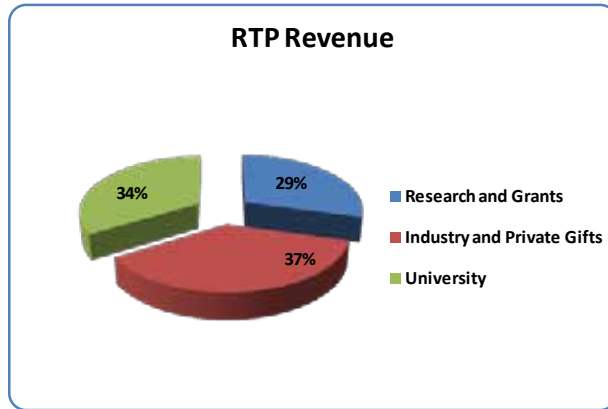
- Improved Materials for the Rail Industry are being cast and tested in the MTU metal casting facility by Dr. Paul Sanders (MSE) and his team. The purpose of this project is to investigate the use of Austempered Ductile Iron (ADI) in railroad wheels. Phase I includes the assessment of rail wheel thermal history and thermal degradation of ADI grades. In year 2, alloys will be designed and modeled to evaluate their performance under rail service conditions.

- Michigan Tech's educational and workforce development activities are led by Dr. Pasi Lautala, who also functions as the Director of Education for the NURail consortium. The activities to date have included the 2012 Railroad Engineering Education Symposium (REES), where almost 30 university professors spent three days in Overland Park, Kansas, to receive basic and advanced material for railroad engineering and transportation education. NURail funding also allowed increased support for the Rail and Intermodal Transportation Summer Youth Program for high school students. Michigan Tech is also developing new Senior Design and Enterprise projects in various rail topics that will include students from Mechanical, Electrical, Materials Science and Civil Engineering departments. Finally, Michigan Tech is working on a proposal to establish an undergraduate certificate in Rail Transportation/Engineering.

- Future NURail projects include research in rural freight and intermodal transportation improvements, collaboration with the Michigan Department of Transportation (MDOT) to organize a Michigan Rail Transportation Conference, and initiation of online railroad course development.

RTP Funding

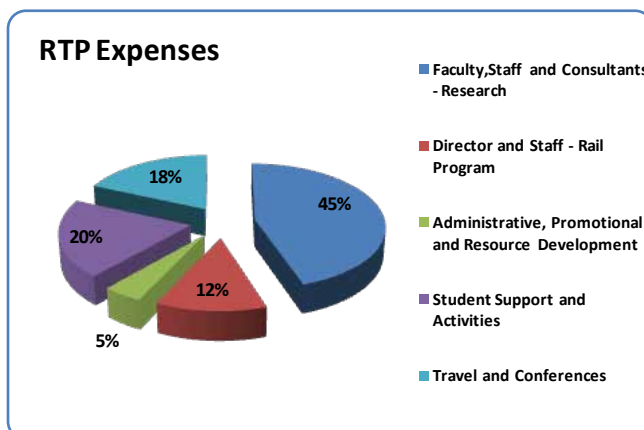
Financial support for the Rail Transportation Program is received internally at Michigan Tech from the Department of Civil and Environmental Engineering (CEE). External funding consists of sponsored program research projects, industry contributions and gifts from private individuals.



RTP Expenditures

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

- **Faculty, Staff and Consultants (Research)**- Research expenses are wages, salaries, and subcontracts plus overhead charges specific to sponsored research projects.
- **Director and Staff (RTP)**- Rail program expenditures include director and staff salaries and other direct expenses used to support and continue development of the Rail Transportation Program.
- **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 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.
- **Administrative, Promotional, and Resource Development** expenditures are expenses incurred in the operation and development of the rail program, such as marketing, material development, and purchase of program resources (software, books, manuals, etc).



About the Michigan Tech Transportation Institute

The Michigan Tech Transportation Institute serves as an umbrella organization bringing together the cross-disciplinary centers, programs and researchers from across campus conducting transportation related research and education initiatives that address national and global needs. A collaborative effort in providing education, outreach, technology transfer, workforce development and multi-disciplinary research, MTTI is comprised of:

Center for Technology and Training (CTT), www.ctt.mtu.edu

The Center for Technology & Training provides transportation outreach and education; software development; and research services to support agencies that manage public infrastructure.

Rail Transportation Program (RTP), www.rail.mtu.edu

The multi-disciplinary Rail Transportation Program uses three integrated activity groups to increase rail exposure and to engage students, faculty and industry partners in rail transportation—Projects and Research, Education, and Events and Extracurricular Activities.

University Transportation Center for Materials in Sustainable Transportation Infrastructure (UTC-MiSTI), www.misti.mtu.edu

The UTC-MiSTI is one of sixty US Department of Transportation funded University Transportation Centers conducting research, education, technology transfer, and workforce development to assist state and national transportation agencies in achieving their respective missions.

Tribal Technical Assistance Program (TTAP), www.ttap.mtu.edu

The Tribal Technical Assistance Program is one of seven regional programs which make up a nationwide effort jointly financed by the Federal Highway Administration (FHWA) and the Bureau of Indian Affairs (BIA) to provide the latest technology, training, and information resources to tribal transportation and planning personnel.

Center for Structural Durability (CSD), www.mtti.mtu.edu

The mission of the Center for Structural Durability is to promote new opportunities for research, education and technology in the area of durable structural highway systems that will directly assist MDOT in achieving its performance goals of safety, mobility and productivity of the Michigan Transportation System.

Transportation Materials Research Center (TMRC), www.tmrc.mtu.edu

The Transportation Materials Research Center is a Michigan Department of Transportation (MDOT) funded research center established to provide expertise and facilities in support of MDOT's material research and investigations.

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.

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