



Rail Transportation Program

Michigan Tech Transportation Institute • Michigan Technological University



Annual Report

Sept 2018 - August 2020



Michigan
Technological
University

Michigan Tech Transportation Institute



Rail Transportation Program Vision:

“Develop leaders and technologies for 21st century rail transportation.”

Mission:

“To participate in the development of rail transportation and related engineering skills for the 21st century through an interdisciplinary and collaborative program that aligns Michigan Tech faculty and students with the demands of the industry.”



Director's Message

For the first time since our inception, we've combined two years of activity into a single annual (or you could say biannual) report. When we made the decision to combine the two years, mainly due to my sabbatical leave, we had no idea how the world would change by the time we complete this report.

COVID has literally turned the world upside down and has certainly had an effect on our Program as well. Last spring, we had to switch overnight to remote teaching and our student club's (REAC) great plans for field visits were immediately squashed. Just like everyone else, we've done our best to adapt over the last nine months. REAC has been organizing more guest speakers than ever before, albeit virtually and RTP has started looking into 360 degree camera technologies to replace our traditional field visits with virtual ones. As they say, unfortunate events may put you down, but not out. It's just a matter of figuring out how we need to change.



If this year has been unprecedented due to COVID, the previous one was unforgettable for me and my family. After over 20 years in the United States, we spent my sabbatical year next to my childhood home in Finland. We returned to Houghton with two sons speaking fluent Finnish and with whole galore of experiences with rail transportation in Europe. I have to say that as much as the US freight rail network is the envy of the world, we certainly took full advantage of the benefits offered by the smooth and timely passenger trains throughout Europe.

Despite the challenging times of 2020, especially for students, the RTP has made exciting progress in multiple fronts. Specifically, we hosted our virtual rail conference (Midwest Rail Conference). It has also been exciting to see our graduates getting recognized by the rail industry, either through advancements of awards. Finally, we have continued our research expansion in grade crossings and trespassing topics and are hoping to diversify our research even further through four other proposals currently under review.

As usual, I want to finish my brief statement by thanking those supporters who make our possible. In addition to the continuous support by our key industry partner, CN Railway and our Rail Transportation Advisory Board (RTAB) members, I want to recognize The National Railroad Construction and Maintenance Association (NRC) for their educational grant to support our activities. The generosity of our partners, alum and industry in general, is an absolute necessity for the Program success. We're privileged to receive such support and we try to be the best servants for the industry trust on us.

Enjoy the rest of the report and if you crave more...visit our web site or get a hold of me directly.

~Pasi



Rail Transportation Advisory Board

After half a decade of operations, the Rail Transportation Advisory Board (RTAB) has been witnessing both membership and organizational changes in 2019-2020. On membership front, Bob Pokorski (our local industry “retiree”) has taken the helm as the Chair for the Board. We want to say Thank You to our past members who have stepped down, namely Tim McKay, Martita Mullen, and Beau Ihnken. We have also added four new members to the Board (all Michigan Tech graduates); Adam Sohasky (CE, 2009), Jon Warlof (EE, 2009), Brandon Maurisak (CE, 2010) and Aaron Dean (ME, 2018). You can learn more on Brandon and Adam on page 8.

Finally, we have reorganized the operations of RTAB by creating four committees that concentrate on specific topic areas; Membership and Scholarships, Finances, Academic Content, and Railroad Day/Night. We look forward to continue our development work under the leadership of our RTAB committees.



Bob Pokorski
Chair
Retired
Trinity Rail



Tim Hoeffner (CE, '80)
Vice-Chair
Director, Office of Rail, MDOT



Brent Marsh (CE, '09)
Secretary/Treasurer
Watco Companies



Pasi Lautala
(CE, '97 & '07)
Associate Prof., Director, Rail
Trans. Program, MTU



Brandon Maurisak
Senior Transit Engineer -
Transportation, Aecom



Matt Glynn (CE, '81)
Chief Engineer, Signals &
Communications, CN



Aaron Dean
Design Engineer
Pettibone/Traverse Lift



Jon Cool
President, Michigan Railroads
Association



Adam Sohasky (CEE, '09)
Manager, Rail & Testing
CN



Daniel Rust
Asst. Professor, Trans. &
Logistics Management
UW Superior



David Thomson (CE, '83)
Senior Vice President,
Hanson, Inc.



Rob Bingham (BA, '06)
Marketing Manager, Midwest
Region, Genesee and
Wyoming, Inc.



Niiko Rautiola (ME, '08)
Manager, Int'l Aftermarket
Sales, Progress Rail



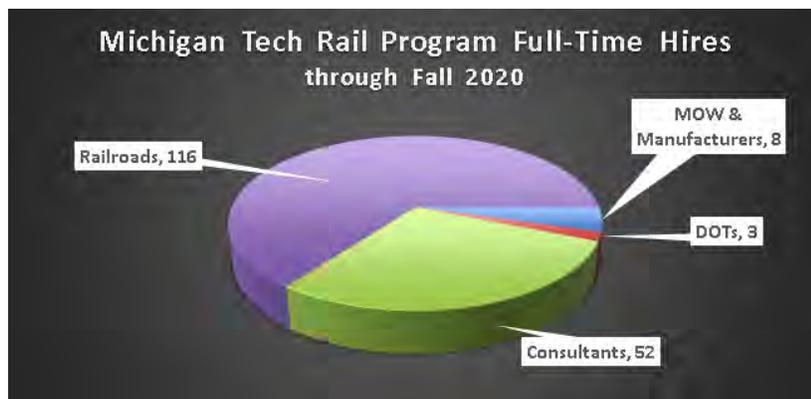
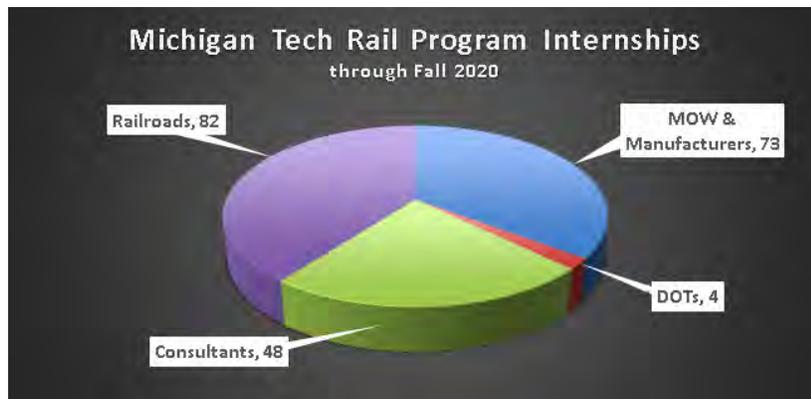
Walter Friesel
REAC President, MTU



**Thank you for your
generous support in
2018-2020!**

Rail Industry Partners and Supporters

The RTP receives strong support from wide range of agencies and industry companies. As usual, we want to give a special Thank You to our long-term partner, CN. We also want to thank all other supporters, many of which are mentioned in the Annual Report, as well as in our web site. We are especially grateful for the NRCMA on the support through their education grant (see Page 11.) Thank You!!



While the last two years have continued to be challenging from recruitment perspective, they also gave us an opportunity to rewind and analyze the impact of the RTP for the rail industry. In bit over a decade, we have guided over 200 students to railroad internships across the industry and an almost equal number to full time positions. No wonder Michigan Tech graduates are well represented at AREMA Conferences and beyond these days.

Two RTAB Members Receive Civil and Environmental Engineering Awards

During the ceremony held October 3, 2019, RTAB member Tim Hoeffner was inducted to the Michigan Tech CEE Hall of Fame for his contributions to the profession.

In the same event, Dave Thomson received the inaugural CEE Alumni Service Award. This award was established to recognize the contributions of alumni to the educational and research mission of the CEE Department at Michigan Tech. The day before, Dave was also given an Honorary REAC Membership as part of the 15th Annual Railroad Night Celebrations. Congratulations to Tim and Dave!



Pasi with Tim (left) and Dave (right)



RTP Faculty & Staff



Dr. Pasi Lautala,
P.E.

Dr. Lautala is the Director of the RTP and an Associate Professor in the Civil and Environmental Engineering Department. For past 10+ years, Dr. Lautala has been one of the leaders in re-establishing rail transportation education and related research in North American universities. He's an Associate Director of Education for the NURail Consortium, a member of the State of Michigan Commission for Logistics and Supply Chain Collaboration and Chair of TRB ARO40 Freight Rail Transportation Committee. From 2016-2018, Dr. Lautala also served as the Director of Michigan Tech Transportation Institute. Before his academic career, he spent several years in the rail industry in the United States and Finland.



Dave Nelson, P.E.

David Nelson is our Senior Research Engineer and supports activities across the program. Dave has a BS in Civil Engineering and an MS in Mechanical Engineering which will help as we continue to push for multidisciplinary collaboration across the university. He also has an MS in teaching, including seven years of experience in primary and secondary schools. Dave's 20+ years of engineering and management experience with the US Air Force, including a tour teaching at the US Air Force Academy, and his experience from the rail related projects with Maine Department of Transportation bring a unique set of skills and experiences to our program. Dave is actively involved in TRB's Highway-Rail Crossing Committee and AREMA's Committee 24, Education and Training.



Colin Brooks

Dr. Colin Brooks has over 25 years of experience in the application of remote sensing and GIS technologies to the modeling and understanding of environmental processes and transportation systems. He has been leading various transportation and environmental remote sensing application studies for the Michigan Tech Research Institute (MTRI), a research center of Michigan Technological University. In 2019, he started working for MTRI Inc. as well, which focuses on commercializing promising remote sensing research. The first project, the Crossing-i system, has received two rounds of SBIR funding to develop a UAS-enabled highway rail grade crossing automated inspection system.



Kuilin Zhang

Dr. Kuilin Zhang is an Associate Professor in the Department of Civil and Environmental Engineering (CEE) and an affiliated Associate Professor in the Department of Computer Science (CS). Dr. Zhang's research focuses on applying mathematical optimization, control theory, simulation analysis, game theory, machine learning, data science, and on-road vehicle testing to address safety, congestion, energy, environmental, and resilience issues of critical civil infrastructure systems in Smart Cities. Dr. Zhang is a member of the Transportation Research Board (TRB) standing committees of Transportation Network Modeling (AEP40) and Freight Transportation Planning and Logistics (AT015), and a voting member for the Society of Automotive Engineers (SAE) Cooperative Automation Driving System (CADS) Committee. He is also a member of IEEE, INFORMS, and ITE and a recipient of the NSF CAREER Award. Recently, his research has been supported by the Federal Rail Administration on the topics of cooperative driving automation at grade crossings via highway-rail connectivity, train platooning automation, and on-road testing of connected and automated vehicles.



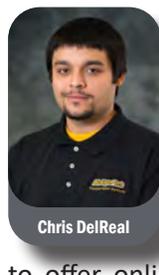
Pam Hannon

Pam Hannon is the Coordinator of the Michigan Tech Transportation Institute and supports the Rail Transportation Program through proposal development and coordination, and research project management.



Amanda Kerttu

Amanda (Kerttu) Codere has been working with RTP on a part-time basis since 2015. Her main responsibilities have included the logistics coordination and management for the Michigan/Midwest Rail Conference and development of RTP publications and promotional materials including the Annual Report, Newsletters and flyers.



Chris DelReal

Chris DelReal is a 2010 graduate of Michigan Technological University's Computer Networking and System Administration program. He now works with Michigan Tech's Center for Technology and Training as a web designer, technical advisor and code developer. Chris supports RTP's web services and developed the Rail Learning System to offer online railway engineering education resources.

Student Intern/Co-op Highlights

Kyle Dick (NS)



This summer I had my first internship in the railroad industry with Norfolk Southern Railroad in their Geographical Information Systems department. Our focus was on maintaining servers that kept track of NS's assets such as track, maintenance of way equipment, and locomotives, etc. Working at NS allowed me to gain vital coding experience that will benefit me in my future career. They were extremely flexible with me and allowed me to take one day classes to fill any holes in my existing knowledge base. From this experience, I feel confident that I can start a full-time career within the industry.



Alex Christmas (Union Pacific)



I returned to Union Pacific for the second consecutive summer, this time in the bridge construction group which gave me the opportunity to learn about bridge replacement and maintenance. I joined several teams throughout the Western US, visiting nine states in all, mainly as an observer. As a designated Form B subgroup Coordinator, I was able to keep up with both the rail traffic and the work going on. I took the safety culture to heart, having become an active participant during safety briefings, and always looking out for everybody. It is hugely important to me that production is safe - always!



Walter Freisel (RJ Corman)



This summer, I had my second internship with RJ Corman Railroad Group in Lexington, KY. I worked in the locomotive shop for the Central Kentucky Lines where I performed FRA mandated inspections and general maintenance on 1970's era EMD 645 series locomotives and modern Railpower genset locomotives. This being my second year, I was given more independence while working as well as the opportunity to work on a few larger projects including a locomotive rebuild.



Thomas Wall (Loram)



This summer I worked for LORAM Maintenance of Way on one of their shoulder ballast cleaners. Our machine was part of a larger surfacing gang on BNSF Railway. Working on the machine I became adept not only in operations, but in its maintenance related to the hydraulic and electrical systems. Working for LORAM gave me a great experience in the operations and maintenance of way side of the industry not often seen by students completing their first year of college. Working this summer gave me a great stepping stone into other internships I'll pursue in the future.



Zoe Wahr (Hanson Logistics)



Over the summer of 2019, I took part in Hanson's internship program in Kansas City, Missouri in the Railway group. With this group, I aided in the design and proposals for many projects; including a sound wall, crane installation, and various yard reconfigurations. I had many responsibilities throughout the summer ranging from quantity and cost estimation to MicroStation drafting. I was able to see all aspects of the design process because they had projects at varying stages that I was able to actively participate in.



Justin Micillo (Bergmann Associates)



During the summer of 2020 I was a railroad department intern for Bergmann Associates in NY. As a native of Rochester, NY, I found it to be beneficial to be close to home during the COVID-19 pandemic. I assisted with annual FRA bridge inspections on the New York, Susquehanna and Western's main line between Binghamton and Hancock, NY. My favorite part came when I spent a few days in Syracuse, NY observing two projects. One was an expansion of the CSX intermodal terminal in Syracuse and the other a sixteen-hour overnight project to replace a turnout leading to the Syracuse Amtrak station. I enjoyed my experience with Bergmann and am looking forward to interning with them again this coming summer.





Alumni Highlights



Brandon Maurisak, P.E. (BSCE, 2010)

Senior Transit Engineer - Transportation, AECOM

Originally from Merrill, WI, he graduated with a bachelor's degree in Civil Engineering in December 2010. Krech Ojard hired him as a project engineer in Duluth, MN through Rail Info Night upon graduation. While with Krech Ojard he was predominately tasked with track engineering for Class I railroads, shortline railroads, and industrial projects.

In May 2013 Brandon joined AECOM in Minneapolis, MN as a track project engineer. For most of his time in Minneapolis he was located at the project office for the MetroTransit Green Line Extension. Additionally, he was the track engineer for a miniature rideable train in Green Bay, WI and alignment lead for the Riverview Corridor Pre-project Development Study in St. Paul, MN. In August 2016 he transferred to AECOM's Portland office as a Senior Transit Engineer. Through 2017 and 2018 he was co-located in TriMet's Capital Projects group as

an office engineer and construction inspector for the renovation of three existing light rail stations. Recently he served as a line section manager for preliminary engineering of TriMet's Southwest Corridor Transit Project. In this role he led design coordination and plan production of 4.25 miles of light rail double track, five stations, six bridges, and associated roadwork.

Brandon was named to Mass Transit Magazine's Top 40 under 40 in 2019 and ENR Northwest's Top Young Professionals in 2020. He currently serves on the Michigan Tech RTAB, High Speed Rail Alliance's Young Professionals Board, and the board of directors for the Evergreen Curling Club. He is a 2015 graduate of the American Public Transportation Associations Emerging Leaders Program and has previously served on the boards of the Duluth Transit Authority and Duluth-Superior Metropolitan Interstate Council.



Adam Sohasky (BSCE, 2009)

Manager of Rail & Testing, Canadian National

In the summer of 2008, Adam was an intern for CN in the design and construction department based in Duluth, MN. Due to his experience in civil survey and construction, he was given full control of a siding construction project in Warroad, MN. Upon graduation from Michigan Tech with a Bachelor of Civil Engineering in the spring of 2009 he was offered a full-time position in Chicago, IL as a track design engineer. He received several promotions including Field Engineer in Jackson, MS, 2010; Track Supervisor in Stevens Point, WI, 2014; and in 2017, Adam was offered the position of Manager of Rail Grinding. Here, he was directly responsible for the operation and implementation of CN's rail life extension program across CN's 22,000 mile network. In 2018 Adam was given the additional duties of managing the daily operations of CN's Rail Flaw detection and Friction Management programs. In 2019

Adam was given the welding quality department as well as his previously listed responsibilities.

As the Manager of Rail & Testing, Adams primary job is to "extend the life of the rail as long as possible" Adam manages a team of 30 Rail Flaw Detection cars, 6 Rail Grinding Trains and network operations of all welding and friction management contractors across CN's network. Managing work across international boundaries, extreme geographic differences and four very different business units adds daily operational challenges. Adam notes "There is never a moment where you are looking for something to do as the business constantly reacts to new and exciting challenges. It is truly awesome to be able to witness the power of people across the network and how they rise to the occasion when properly supported. While this position seldom affords me the opportunity to preform "true civil engineering" the critical thinking and problem-solving process that I learned while at Michigan Tech has allowed me to succeed in this very demanding industry."



Recent Graduate Highlights



Aaron Dean (BSME, 2018)

Design Engineer, Pettibone/Traverse Lift, LLC

After graduating from Michigan Tech with a B.S. in Mechanical Engineering and a Minor in Rail Transportation, I obtained a position as a Design Engineer for Pettibone/Traverse Lift, LLC. I have been with the company on a part-time basis since 2017 and full-time since 2019. Based in Baraga, MI, Pettibone specializes in the design and manufacture of heavy material handling equipment for the oil & gas, construction, and railroad industries. In my current position, I am the lead design engineer for the Speed Swing product line, a multi-purpose railroad construction crane. Part of my responsibilities include working directly with Class 1 railroads, railroad construction contractors, and transit authorities; ensuring that they have the right equipment to keep their infrastructure maintained.

My time spent with the Rail Transportation Program at Michigan Tech has no doubt provided me with the necessary knowledge and skillset to excel in this industry.



Sangpil Ko (PhD CE, 2018)

Senior Researcher, KRRI

After completing with my PhD degree and post-doctorate research at Michigan Tech, I obtained a position in the Korea Railroad Research Institute (KRRI) located in South Korea. It is the national research laboratory for railroad transportation. I started in the division of future transportation policy where I'm pursuing new mobility systems connected with the existing rail infrastructure. My main responsibilities consist of performing research duties such as studying, consulting, and development of new research project as well as lecturing. I have learned a lot and gained a great deal of valuable experience in a short period time. My recent experiences include finding new opportunities with big data and artificial intelligence (AI) tools for the railroad industry.



Alex Christmas (CEE, 2020)

Engineering Assistant, Pathfinder Engineering

My final semester at Tech started off as any other, and it looked like smooth sailing to the finish line. Then Spring Break became permanent as school shifted to 100% virtual learning as the world faced the challenges of the COVID-19 Pandemic.

COVID-19 has made companies avoid hiring for logistical reasons as well as economics. Like many of my fellow graduates, my existing job offer, signed before the COVID menace emerged, vaporized before my eyes. I've had to adapt, get creative, leverage connections, and try to stick the landing. While I was destined for a Management Trainee position at a Class One Railroad, I have instead been working as an Engineering Assistant at Pathfinder Engineering, a local civil engineering firm which specializes, among other things, in railroad industry track design.

So far, I have been working on rail projects involving the addition of new or extended industry sidings. This has included field inspection and coordination with contractors and clients, as well as some design and project oversight work. While it is significantly different than what I thought I would be doing one year ago, it is still rewarding to be a part of the railroad industry! I should note that I was connected to Pathfinder via another MTU alum, and it would simply have not happened otherwise. While this pandemic has emphasized our family ties, let it also strengthen your ties to friends, coworkers and fellow college alumni as well!





RTP Students

2018-2020 Graduates

Three RTP supported graduate students completed their degrees in 2018-2020, as well as several Rail Transportation Minor graduates. Congratulations to all the students!!!



Sangpil Ko

PhD in Civil Engineering, 2018

Woody Biomass Transportation and Logistics - Modeling Studies for The Great Lakes Region

This dissertation concentrates on investigation of multimodal alternatives for woody biomass transportation and logistics. More specifically, the research developed and three MILP transportation optimization models that use region specific data in the Great Lakes States to evaluate alternative logistics systems for dedicated and co-firing bioenergy plants. *See page 15 for details.*



Anne Linja

MS in Cognitive and Learning Sciences, 2020

Effect of Short-Storage HRGCs on Driver Decision Behavior and Safety Concerns: Real-World Analysis and Experimental Evidence

Study investigated the effect of HRGC type (short-storage vs. non-short storage) on driver attention and decision-making. It systematically analyzed almost 1,000 incidents at crossings and found that there were more strikes in short-storage locations. In the lab experiment, drivers reported more safety concerns from photos in driving images from short-storage locations and rated those locations more important.

Rail Transportation Minor

The Rail Transportation minor is targeted to Michigan Tech students from various disciplines with interests in the rail transportation industry. The mix of discipline specific and multi-disciplinary class requirements provide students with the basic skills and background necessary to rapidly become effective specialists and leaders in the industry. In addition to the courses in rail transportation and engineering, students also learn logistics, management, leadership, and/or communications skills to meet the demands of rail industry careers. Along with civil engineering and business needs, the industry is increasingly looking for graduates with the technical expertise needed for their signal and communications systems (including IT systems), and the background to handle the latest developments in mechanical systems, including locomotive engines. The Minor was initially setup for students from Civil, Electrical and Mechanical Engineering departments, but future additions will be considered based on the level of student interest. Below are the names of students who have obtained or are working on their Rail Transportation Minor.

Rail Minor Graduates:

- Aaron Dean, ME, 2019
- Alex Christmas, CEE, 2020
- Alyssa Leach, CEE, 2018
- Amanda Bink, CEE, 2019

- Derek Owen, CEE, 2018
- Ed Nemec, CEE, 2018
- Jack Seilsopour, CEE, 2020
- Katie Tigges, CEE, 2018
- Otto Freiberg, CEE, 2017

Current Students:

- Austin Kerby
- Darian Reed
- Drew Heinonen
- Maddy Tata
- Walter Friesel

Grants

Michigan Tech RTP Awarded Education Grant by the National Railroad Construction and Maintenance Association (NRC)!

In late 2019, the Michigan Tech RTP was graciously awarded an Education Grant by the National Railroad Construction and Maintenance Association (NRC) toward development of various rail education efforts and outreach programs on campus. The Covid outbreak in early 2020 has forced us to adjust many of those plans, , we continue to find alternate ways in improving our programs under current environment. Instead of our original plan to support REAC field trips and attendance at the annual AREMA conference, we have started developing capabilities in creating virtual field trips (using 360-degree cameras). Similarly, instead of our initial plan of building a full-scale section of demonstration track on campus, we have concentrated on using 3D printers for making a variety of demonstration materials for our classroom and K-12 outreach programs. We expect to have a set of model track signals completed (Figure) and a preliminary set of bogies ready for production in the near future. We are looking forward to continuing our relationship with NRC and improving the railway education resources beyond the current pandemic.



Signal system model for classroom demonstrations

Scholarships

Each year the RTP offers internal scholarships funded by industry partners and students compete for AREMA scholarships including Michigan Tech Alum AREMA Scholarships.

2019 AREMA Scholarships

Kyle Dick	SCS	Michigan Tech Alumni Scholarship
Alex Christmas	CEE	Committee 27 – Maintenance-of-Way Work Equipment Scholarship

2019 CN Railroad Scholarships

Alex Christmas	CEE
Walter Friesel	TMET

2020 AREMA Scholarships

Kyle Dick	SCS	Committee 27 – Maintenance-of-Way Work Equipment Scholarship
Alex Christmas	CEE	Committee 15 – Steel Structures, Professor Wallace Sanders Scholarship
Zoe Wahr	CEE	Michigan Tech Alumni Scholarship

2020 CN Railroad Scholarships

Kyle Dick	SCS
Walter Friesel	TME
Zoe Wahr	CEE

**Congratulations to
all the winners!**



Student Activities

Railroad Engineering & Activities Club (REAC)



Every year, the Railroad Engineering & Activities Club (REAC) at Michigan Tech, the first of 25 AREMA Student Chapters around North America, strives to continue its mission of exposing students to all aspects of the railroad industry through professional presentations, field trips, conference visits, internship and scholarship opportunities, and community outreach programs. Now in its 14th year as an organization, REAC has been able to successfully achieve these goals. Here is a summary of what we have been up to over the past two years!

The 2018-19 school year started out with a bang as we attended the 2018 AREMA Conference in Chicago, IL. While at the conference, we partnered with the AREMA Student Chapter at the Illinois Institute of Technology (IIT) and visited the Chicago Transit Authority’s railroad maintenance facility, as well as a Union Pacific rail yard. Later that fall, we visited the Verso paper mill in Quinnesec, MI, and took a tour of their local rail operations and facility. In the spring of 2019, we partnered with the University of Wisconsin Superior to tour numerous rail facilities in the Duluth and Superior areas of Minnesota and Wisconsin. To fill in the gaps, REAC has continued to hold monthly meetings with presentations from Watco, WSP, Remprex, and BNSF just to name a few.

The fall of 2019 was just as busy. The 2019 Railway Interchange Conference and Expo in Minneapolis saw one of our members win first prize in the student poster competition, and FIVE members winning either AREMA or Railway Supply Institute scholarships! That conference trip also included visits to the Northstar Commuter Rail and Minneapolis METRO Light Rail maintenance facilities, again partnering with IIT. The 2019 fall field trip was to the Humboldt Mill and Mineral Range Railroad in Humboldt, MI, and Pettibone Traverse Lift in Baraga, MI.

We’ve also been very busy with community outreach events. One of the challenges of living in an area well distanced from any major railroad network is rail safety education, and these events help us educate local youth on railroad safety and operations. Over the past two years, REAC has taken part in several university and community run science fairs, and the 2018 and 19 Santa Train events at the Houghton County Historical Society in Lake Linden, MI.

While the COVID-19 Pandemic put a damper on our field trip goals for spring 2020 (which would have been to Progress Rail in Muncie, IN), other REAC activities did not falter! While maintaining a healthy mix of monthly professional presentations, REAC took advantage of unused field trip funds to design a new and improved model railroad, the first half of which is expected to be delivered in January 2021! This two-module N-scale model will simulate several railroading aspects including working CTC signals, active and passive grade crossings, track structures such as wyes and crossovers, and more, which will serve as a great improvement over our existing HO-scale layout by serving as both an entertaining and educational display!

Throughout the 2020-21 school year, REAC will remain flexible with these tumultuous times, collaborating with other AREMA student chapters to introduce even more students to the railroad industry. We look forward to working with new students, and preparing them to be the next generation of railroad professionals!

Walter Friesel, REAC President



MTU STEM Festival



Field Trip to Superior, WI



Student Activities Continued



14th Annual Rail Night - September 13, 2018

Railroad Night XIV marked another great year for Railroad Transportation at Michigan Tech, with dozens of students and plenty of industry representatives on hand to talk railroads and education. Michigan Tech's Rozsa Center provided the venue for all railroad night activities.

Meeting for the 14th consecutive year and sponsored by CN, Pettibone and Bergmann Associates, events kicked off with a "meet the industry" panel discussion. Ten representatives from our sponsors and other industry agencies answered questions from Tech students interested in the railroad industry. Questions ranged from those about daily duties to work/life balance, to career paths and skills worth pursuing.

Keynote Speaker:
Don Graab -
Norfolk Southern
(retired)

A social hour provided students and industry representatives a chance to mingle and talk about industry experiences. Students pursued more time with individual representatives, feeling them out for leads for possible career paths and gathering information about what it means to work in the rail industry.

The formal dinner event began with opening remarks from Dr. Bill Sproule, who regaled the crowd with history of the rail program at Michigan Tech and previous Railroad Nights. Alex Christmas followed with the REAC president's presentation. Finally it was time for dinner and the keynote speech. Mr Don Graab took the podium for an excellent keynote address about his career and lessons to be taken from it. The retired vice President of Mechanical for Norfolk Southern, Mr Graab shared his wealth of knowledge collected over several decades inside the industry.



15th Annual Rail Night - October 2nd, 2019

Continuing the tradition, Railroad Night XV (or Railroad Night 2019 if you prefer!) again brought together rail industry representatives and Michigan Tech students to explore opportunities in the industry. With the annual AREMA conference, Michigan Tech's fall career fair, and fall semester class start all occurring in the first three weeks of the semester, 2019 event was a more modest event and shifted back to give student a breather.

A group of 40+ students and industry representatives met in the Michigan Tech Memorial Union Ballroom, for the evening of festivities. Representatives from Alstom, Hanson Professional Services, Michigan DOT, Pettibone, OHM, and CSX provided the industry representation.

Keynote Speaker:
Dave Thomson
SR VP - Industry
Hanson
Professional Svcs

The evening kicked off with our typical Meet the Industry panel discussion, and continued with a social period in the main ballroom. After opening remarks by Pasi Lautala and REAC update by Walter Friesel, the REAC president for the year, the event was highlighted by keynote address by two industry leaders from Hanson Professional Services, Inc. Dave Thomson, Senior Vice President and Industry Market Principal (CEE, 83) and Gary Potts, Senior Vice President, Railway Market



Keynote Speaker:
Gary Potts
SR VP - Railway
Hanson
Professional Svcs

teamed up to provide our students with a cross-section of their experiences and career paths in the rail industry. Dave Thomson was also recognized for his support to the rail transportation activities at Tech through an Honorary Membership for REAC.

For the first time since starting the concept in 2006 we were forced to cancel Railroad Night 2020. Covid restrictions prohibited gatherings in the fall of 2020, and our Advisory Board suggested that a virtual event would not be well received by students facing virtual classes every day of the week. We are looking forward to continuing our Railroad Night tradition in the Fall of 2021.



Youth Activity Highlights

9th Annual Rail & Intermodal Transportation Summer Youth Program

July 8-14, 2019

2019 marked the 10th year for Michigan Tech’s Rail and Intermodal Transportation Summer Youth Program. A Collaboration between the Rail Transportation Program and University of Wisconsin-Superior hosted fourteen students interested in transportation, who arrived from all parts of the nation. The students spent a week on explorations both in the classroom and in the field.

The first day of explorations started with a lesson on safety and railway signals, before the first field visit to the LS&I shops and yard at Eagle Mills. Students were able to see how the LS&I keeps ore moving from the Tilden Mine to the port at Marquette, including an up close look at the facilities which maintain the rail equipment and track system.

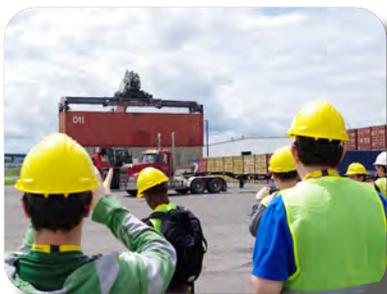


The second day continued with lessons and activities on track structure and operations, including some time working with a computer train simulator. At the end of the classrom activities, everybody packed up for the van ride to Superior, Wisconsin where we were hosted by the UW-Superior Transportation and Logistics Management Program.

Wednesday was marked by a series of tours throughout the important freight shipping hub of Duluth-Superior. The first stop was BNSF’s railyard, which included a safety briefing, look at the yardmaster’s office and a look at the car and locomotive repair shops. Next, Duluth Cargo Connect showcased intermodal transportation options, including a look at their rail-warehouse-truck transload operations, and their intermodal loading and unloading facilities. To wrap up the day, a representative from the Wisconsin DOT joined the group to do onsite grade crossing safety analysis - giving students a chance to evaluate grade crossing equipment and design.

We wrapped up the Twin Ports area tours on Thursday with a visit to Halvor Line’s trucking and logistics headquarters, including a tour of the back-office and truck maintenance bays. Students also got the chance to take the driver’s seat in a semi truck! Then the crew headed over to the Duluth Railroad Museum, for a look around their extensive railway history displays and complete with a train ride up the North Shore Scenic railroad in a private railcar! The day concluded with the drive back to Houghton.

The last day of the program began with classroom segments on urban transit, high speed rail, and a maglev demonstration activity. After lunch, the final field visit was held at the local history museum in Lake Linden, featuring the short Quincy and Torch Lake railroad, a demonstration of the old copper mine railroads which used to operate in the area. Everybody even got to operate the gas-powered engine for a few minutes! The final activity, back on campus, was a railroad documentary on the Tibet Railroad in China, which was hosted by RTP’s very own Pasi Lautala.



Left: SYP Students observe a container get loaded onto a truck



Right: SYP students work on a track structure model activity

2018 SYP Program Sponsors:



Student & Youth Other Events

September - 2018

12 SEP: Transportation Day event with career services

24 SEP: REAC general board meeting with summer interns

November - 2018

09 NOV: REAC Fall Field Trip to VERSO

March - 2019

19 MAR: REAC participated in the Western UP Science Fair & STEM Festival by doing a signal demo and track in a box

April - 2019

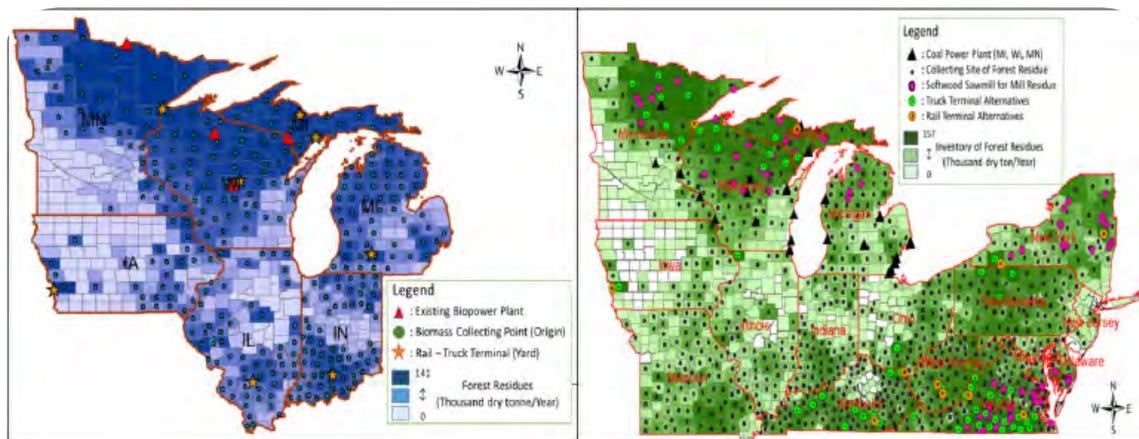
5-7 APR: REAC spring field trip to Duluth
08 APR: REAC provided after school program support at the Great Lakes Research Center

Student Research Highlights

Sangpil Ko - PhD research

Woody Biomass Transportation and Logistics - Modeling Studies for The Great Lakes Region

This dissertation concentrates on investigation of multimodal alternatives for woody biomass transportation and logistics. More specifically, the research developed and three MILP transportation optimization models that use region specific data in the Great Lakes States to evaluate alternative logistics systems for dedicated and co-firing bioenergy plants. The studies covered in this dissertation revealed that 1) multimodal transportation is essential when establishing larger biomass plants or increasing the scale of co-firing. On the other hand, the larger plants help to reduce the transportation and logistics costs, and as such support the increase in the use of biomass. 2) Local conditions have great impact on biomass transportation logistics, as the performance of woody biomass logistics system highly depends on accessibility of local transportation network, such as loading/unloading sites along rail lines. 3) When investigating logistics cost differences, plant capacity, biomass availability nearby, and average distance from biomass collecting sites are parameters with consistently high impact on the preferred solution, although the impact of a certain parameter may be opposite on a specific model or case study. 4) There would be potential benefits from woody biomass in the Great Lakes States, but inclusion of transportation and logistics system analysis that consider various types of supply networks and torrefaction process are essential to select the most suitable system.

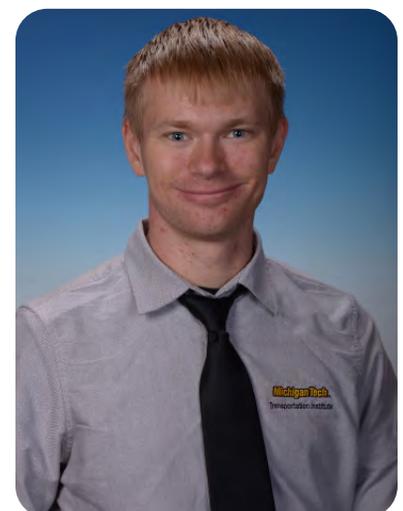


Various Biopower Plant and Biomass Origin Locations in the Great Lakes Area

Kyle Dick - Summer Undergraduate Research Fellowship

Correlation Between Grade Crossing Roughness and Driver Behavior

My research project was to investigate the impact of rough grade crossings/surfaces on drivers' approach speed at the grade crossing. This project used the existing Naturalistic Driving Study (NDS) data to determine an average roughness for each grade crossing, and to determine the average speed change of drivers approaching the crossing. Each crossing was ranked as either smooth, small bumps, causing moderate recoil, or rough. It was determined that rough crossings do result in drivers slowing down more before crossing the tracks, albeit only moderately. Two shortcomings impacted the project: lack of information on suspension systems and a low number of rough crossings in the database. This project would work better if there was information on the car's suspension system (to use the IRI) and if there were more rough crossings in the project.



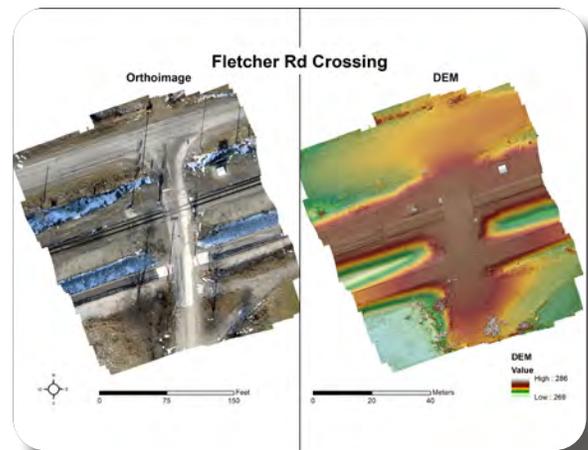


RTP Research Highlights

As usual, the Rail Transportation Program includes a wide array of topics. 2018-2020 witnessed completion of our National University Rail Center (NURail) projects, but also introduced new project leaders into rail transportation research. In addition to the new grade crossing and trespasser projects, led by MTRI, and MTRI, Inc., respectively, Dr. Kuilin Zhang received his first contract from the Federal Railroad Administration(FRA). In total, Michigan Tech had four on-going projects with the FRA at the time of this annual report. Below are highlights of some of the projects.

Michigan Tech Research Institute (MTRI) Trespasser and Grade Crossing Research

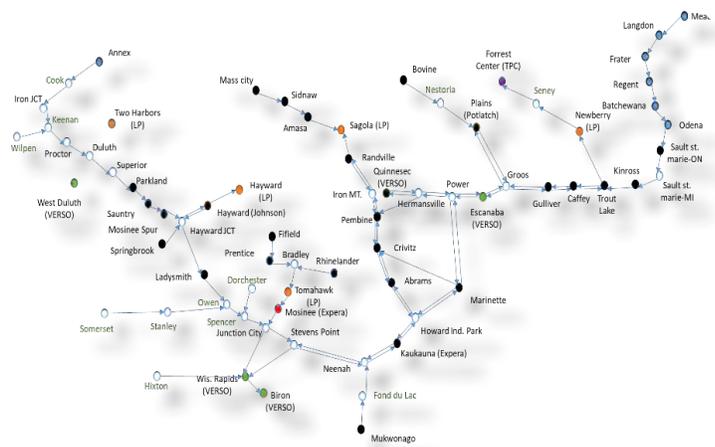
The Michigan Tech Research Institute has become the latest entity to get involved in the rail transportation research. In collaboration with the RTP, MTRI has been awarded two research projects by the Federal Railroad Administration (FRA). Erick Vega is leading a project titled Railroad Artificial Intelligence Intruder Learning System (RAIILS) that investigates the potential adaptation of technologies on mobile platforms for trespasser detection on railway right of ways. Another project funded under MTRI, Inc. and led by Colin Brooks is funded through the Small Business Innovation Research (SBIR) program which helps development of new products for commercialization. The “Crossing-i” is an automated, drone-based grade crossing inspection system capable of identifying crossings where low-clearance vehicles may get stuck due to rapid elevation changes. The system can also be used to rapidly evaluate the extent of visual sight triangles at the crossing, as well as to identify and locate signs and other warning devices. Both projects are currently in second phase, expected to be complete by the end of 2021.



Digital Elevation Model Built from Crossing-i UAV Data

Log Movement in the Superior Region - Rate and Capacity Based Analysis of Modal Shares

RTP completed the unique project in March, 2020. The project was co-funded by three State of Michigan Agencies (MEDC, MDOT and MDARD), as well as the National University Rail Center (NURail) and conducted in collaboration with the Lake State Shipper Association (LSSA), CN Railway, and Escanaba & Lake Superior Railroad. It conducted detailed modeling of almost ten million tons (one calendar year) of log transportation movements in the region, and investigated potential synergies and opportunities toward increased use of rail transportation. The model provided an accurate replication of actual movements, but found limited opportunities for modal shift to rail, mainly due to fairly short overall distance of the movements (more than 75% of the movements are less than 100 miles). Still, the project provided insight into the proper sizing of dedicated log car fleet in the region and on the potential benefits for truckers, if more traffic was concentrated to move through selected log sidings. It also recommended expansion of modeling to several years of data to reveal changes in shipment patterns from year to year.



Rail Transportation Network for Log Movements in the Study Region



Conferences and Events

AREMA 2018 & 2019

David Nelson and seven students attended the annual American Railway Engineering and Maintenance-of-way Association (AREMA) meeting in Chicago September 15-17, 2018. The REAC team, consisting of Alex Christmas (ECE), Maya Price (ECE), Kyle Dick (SCS), Smruti Dash (EEE) and Thomas Wall (ECE) placed 3rd in the student quiz bowl. Additionally, four Tech students were recognized for winning scholarships from the AREMA Educational Foundation.

Christmas was also successful in the undergraduate student poster competition, taking the 2nd place with a poster he and Dick developed about their project “North American Railroad Signal Aspects and Indications Demo.” The poster describes their project to 3-D print a set of railroad track signals covering all the possible signal combinations for North America, complete with colored LED lighting. Dick included a computer program with over 4000 lines of code to demonstrate more than 130 different light combinations.

The 2019 edition of the annual AREMA conference took place in Minneapolis, Sept 22-25, 2019. Eight students attended the conference, along with Pasi and David. The students were lead by our REAC president and vice president, Alex Christmas and Walter Friesel, and included Stanton Schmitz, Thomas Wall, Zoe Wahr, Kyle Dick, Nigel Soler, and Justin Micillo. Student activities dominated the first day of the event, with our students holding their own in the quiz bowl, and again taking home a first place in the student poster competition. Students also toured the Minneapolis Streetcar and Commuter Rail maintenance facilities with the Illinois Institute of Technology and University of Minnesota student chapters. Although Michigan Tech did not have any formal presentations during the conference both Dave and Pasi were very involved in committee meetings and attending the conference proceedings.



REAC at AREMA

98th & 99th Annual Meetings of the Transportation Research Board

January 2019/January 2020

The RTP continues to maintain strong presence in the TRB activities through presentations and committee activities. RTP had a combined four presentations/poster in the 98th and 99th TRB Annual Meetings (January 2019 and 2020). In 2019, we had poster presentations titled Human Behavior Analysis Of Highway-Railroad Grade Crossings Based On Environmental Conditions And Driver Demographics and on STEM K-12 Outreach as the Root of Transportation Education: Experiences from the Railway Engineering Field (in collaboration with Tyler Dick and Bryan Schlake). In 2020, Sangpil Ko, Pasi Lautala and Kuilin Zhang presented on Data-driven Study on the Log Movements for the Upper Midwest: Impact of Rail Car Fleet Size on Freight Storage and Car Idling. In addition to the presentations, Dave Nelson continues as a member of the Standing Committee on Highway/Rail Grade Crossings (AR080) and Pasi Lautala was appointed to another three year term as the Chair of the Standing Committee on Freight Rail Transportation (AR040).



**Sangpil presenting at the
99th Annual TRB Meeting**



Conferences and Events

Michigan Rail Conference 2019

August 7-9, 2019

The RTP, with support from planning committee and Michigan State University Railway Management Program co-organized the 7th Annual Michigan Rail Conference. The event was held at the Henry Center on the MSU campus and focused on “Think Global, Act Local.”

The program opened with a golf outing on the MSU Forest Akers West course. Beautiful weather and a great location lead to the largest turnout for the annual student scholarship outing to date. Twenty-seven players enjoyed an awesome day on the links!

Sixteen sponsors helped us keep the conference fees manageable for our Thursday technical sessions. Phil Tassin, CN’s General Manager for the Michigan Division opened the conference, followed by Charley Ballard with a presentation on the economic picture for rail in Michigan. The morning continued with a Michigan Update panel discussion. The rest of the day featured breakout sessions ranging from New Technology In Rail to International Connections, all focused on the conference theme, “Think Global, Act Local”. Honorable Ronald Batory, the Administrator of the Federal Railroad Administration provided the keynote address during the lunch break. Over 140 people from all aspects of the rail industry participated.

The conference wrapped up with a morning of field visits on Friday. Tour sites included the CN automobile loading facility, the RSDC steel distributor, and the Amtrak Lansing station. More detail about the conference is on the RTP web site, including a selection of conference photos.



**Honorable
Ronald Batory
FRA**

VIRTUAL Midwest Rail Conference 2020

August 11-12, 2020

The Midwest Rail Conference was one of many events disrupted by the Covid Pandemic in 2020. In spite of restrictions placed on activities in Michigan, RTP presented the first ever Virtual Midwest Rail Conference!. With a theme of “Sustaining Midwest Rail,” the virtual conference was quite a success with 18 sponsors and over 270 attendees. The virtual event allowed for a great lineup of speakers, including our two keynotes: Mike McClellan, VP Strategic Planning for Norfolk Southern and Joe McHugh, VP State-Supported Services—Business Development for AMTRAK. This year’s event was collaborative effort by the TRB Freight Rail Transp. Committee (AR040), the National University Rail Center (NURail) consortium and our Michigan based team supported by the Michigan State University Center for Railway Research and Education and the Michigan Tech Rail Transportation Program.



**Mike McClellan
Norfolk Southern**



**Joe McHugh
Amtrak**

Other Events/ Professional Development/ Workshops

September - 2018

12 SEP: Annual onsite RTAB meeting

October - 2018

01 OCT: Dave attended TRB Subcommittee skype meeting on Railroad ROW, Trespass and Suicide
31 OCT: Sangpil dissertation defense

November - 2018

09 NOV: Dave visited E&LS in Escanaba to discuss a potential Senior Design project

January - 2019

24-26 JAN: Dave attended AREMA Committee 24 meeting in Atlanta planning for REES 2020

March - 2019

21 MAR: Pasi attended the SAFER LC Conference in Paris

April - 2019

10 APR: Pasi attended a Shift2Rail Meeting in Pardubice, Czech

June - 2019

1-8 JUN: Dave visited USAF Acady and TTCI to collect information for Airports Class

06 JUN: Pasi attended the 2019 International Level Crossing Awareness Day Conference in Amersfoort, Netherlands

14 JUN: Pasi attended the Tampere Light Rail Tour

July - 2019

21-24 JUL: Dave and Nigel attended APTA P-REES in Chicago
23-25 JUL: Pasi presented in TRB Summerail Event in St. Louis

August - 2019

14-15 AUG: Pasi attend a Supply Chain Commission meeting in Muskegon

16 AUG: Pasi presented in a MEDA Meeting in Marquette

19-22 AUG: Pasi attended the National Rail Grade Crossing Conference in Pittsburgh

26 AUG: Pasi gave a testimony in Rail Hearings in Marquette

27 AUG: Dave, Alex & Kyle participated in Rail DSTR visits in Menominee County



Conferences and Events

RTP Presents in European Conferences and Universities

During his sabbatical leave in Finland, Pasi participated and presented in several conferences, meetings and university courses. He taught a special topics course Intro to North American Rail Transportation at his home university (Tampere University of Technology, or TTY), provided guest lectures at Jyvaskyla University of Applied Sciences, Aalto University (Helsinki) and Technical University of Denmark. He also presented Michigan Tech and US trespasser and crossing research in international conferences and workshops organized by the International Union of Railways (UIC) in Paris, France and in Amersfoot, Netherlands. Pasi also functioned as the opponent for a dissertation defense "Monitoring the Vertical Deformation Behavior of Road and Railway Structures" by Heikki Luomala at TTY.



International Level Crossing Awareness Day (ILCAD) Conference Participants, Amersfoot, Netherlands

SummeRail and National Grade Crossing Conference

After his return from Europe, Pasi Lautala presented in the TRB SummeRail Conference in St. Louis, MS (July, 2019) and in the National Grade Crossing Conference in Pittsburgh, PA (August, 2019). His presentation titles were titled *Upper Midwest Log/Forest Study* and *Survey of Railway Crossing Research at Michigan Tech*, respectively.



Summerail 2019 Field Visit

NRC Annual Meeting

In January, 2020, Dave Nelson attended the NRC Annual Conference in San Diego, CA and accepted the 2019 NRC Educational Grant. Dave gave a presentation in the Rail Education Programs and Work Force Development Session describing the RTP and outlining how we planned to use the grant funding to support student activities and rail industry outreach.



NRC Award winners (Including Dave Nelson from RTP)

Guest Speakers /Visitors

October - 2018

15 OCT: Brent Marsh from Watco's Wisconsin & Southern RR

November - 2018

12 NOV: Justin Hicks from Rempex Engineering Services

December - 2018

10 DEC: Dave Thomson from Hanson Professional Services

January - 2019

28 JAN: Phil Pasterak from WSP

March - 2019

25 MAR: John Lovenburg from BNSF

April - 2019

15 APR: Dr. Ananyo Banerjee from TTCI

October - 2019

10 OCT: Aaron Dean from Pettibone

November - 2019

11 NOV: Dr. William J Sproule from Michigan Tech

December - 2019

12 DEC: Michael Studer from WSP

January - 2020

27 JAN: Brad Diener & Dennis Maney from Lunda Construction

February - 2020

24 FEB: Kathleen Hepburn & Larry Golden from GATX Corp

March - 2020

26 MAR: Michael McLaren from Kiewit & Ryan Hoenshied from MDOT

April - 2020

20 APR: Bob Pokorski, Retired from TTX/RTAB Chair

About the Michigan Tech Transportation Institute

The Michigan Tech Transportation Institute will provide the operating structure, resources, recognition, and leadership, in a collaborative environment, that supports research, education, and outreach leading to sustainable solutions for transportation.

MTTI is an umbrella organization bringing together the cross-disciplinary centers and principle investigators conducting transportation related research and education initiatives that address national and global needs. Principal Investigators conduct transportation research under MTTI within six transportation focused areas:

- Transportation Structures including bridges and pavements. Other related areas include geotechnical, construction, and nanotechnology related to sensors.
- Transportation Materials including concrete, asphalt, steel, wood, and aggregates. Other related areas include construction, geotechnical, and nanotechnology related to sensors and materials.
- Transportation Systems including waterways, traffic/safety, construction, rail, air, public transportation, freight, intelligent transportation systems, vehicle infrastructure integration, nanotechnology related to sensors, and radio frequency identification devices.
- Environmental Aspects of Transportation includes environmental impacts, energy, carbon dioxide and other pollutants, fugitive dust, wildlife, flora and fauna, and carbon credits.
- Social Aspects of Transportation includes policy, planning, human factors, history, economics, and archeology.
- Transportation Technology Transfer includes all outreach, management systems, and workforce development programs.

Director, Pasi Lautala, MTTI

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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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