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Dear 2018 Symposium Attendee,

Welcome to Champaign-Urbana, Illinois and the Department of Civil and Environmental Engineering (CEE) at the University of Illinois at Urbana-Champaign (UIUC). UIUC is home to the Rail Transportation and Engineering Center (RailTEC), and we look forward to you meeting the students, staff, and faculty that work within RailTEC and CEE.

We are pleased that you have chosen to attend the 2018 International Crosstie and Fastening System Symposium and hope you will actively participate in discussions and engage your fellow attendees throughout the event. Our objective is to facilitate the transfer of technology and knowledge as well as to further domestic and international communication and collaboration on the design and performance challenges and solutions for crossties and fastening systems. Significant strides in research have been made since RailTEC first hosted this event six years ago in 2012, and the presentation lineup in 2018 is the strongest yet. We are hopeful that you will enjoy the technical presentations, research discussions, Rail Transit and Class I keynote addresses, and technical tour.

We would like to thank the Federal Railroad Administration (FRA) and Federal Transit Administration (FTA) for their ongoing sponsorship of crosstie and fastening system research in RailTEC at UIUC. Additionally, we sincerely appreciate the ongoing research support from Amtrak, Progress Rail Services, WSP / New York City Transit Authority (NYCTA), WMATA, GIC Technologies, Resource Fiber, Union Pacific Railroad, and the NURail Center. Without these organizations and the many other individuals and organizations that frequently provide input and guidance for our research we would not be able to conduct research and host an event such as this. If there is anything that our team can do to make your stay in Champaign more enjoyable, please do not hesitate to contact one of the faculty, staff, or students within RailTEC. Have a wonderful week!

Sincerely,

Bassem O. Andrawes  J. Riley Edwards  Conrad Ruppert, Jr.
Christopher P.L. Barkan  David A. Lange  Erol Tutumluer
Marcus S. Dersch  Arthur de Oliveira Lima

RailTEC Infrastructure Research Sponsors
2018 Symposium Overview and Featured Events

**Tuesday 15 May**
- Registration (Yeh Center Atrium, 1st Floor) 7:00am - 5:30pm
- Light Breakfast 7:00am - 8:00am
- Opening Remarks 8:00am - 8:10am
- Technical Session 1 8:10am - 9:20am
- Break 9:20am - 9:45am
- Technical Session 2 9:45am - 12:00pm
- Lunch (ECE Building, Room 3002) 12:00am - 1:30pm

*Rail Transit Keynote: Jim Harper (Chicago Transit Authority (CTA))*
- Technical Session 3 1:30pm - 3:15pm
- Break 3:15pm - 3:45pm
- Technical Session 4 3:45pm - 5:30pm
- Dinner 5:45pm - 7:00pm

**Wednesday 16 May**
- Registration (Yeh Center Atrium, 1st Floor) 7:00am - 12:30pm
- Light Breakfast 7:00am - 8:00am
- Technical Session 5 & 6 8:00am - 9:45am
- Break 9:45am - 10:15am
- Technical Session 7 10:15am - 12:00pm
- Lunch (Yeh Center Atrium, 1st Floor) 12:00pm - 12:30pm
- Technical Tour (see page 9) 12:30pm - 5:15pm
- Keynote Dinner (Memorial Stadium) 6:00pm - 9:00pm

*Class I Railroad Keynote: Chad Anderson (CN Railway)*

**Thursday 17 May**
- Registration (Yeh Center Atrium, 1st Floor) 7:00am - 12:15pm
- Light Breakfast 7:00am - 8:00am
- Technical Session 8 & 9 8:00am - 10:15am
- Break 10:15am - 10:45am
- Technical Session 10 10:45am - 12:15pm
- Start of AREMA Committee 30 Meeting 1:00pm
- Informal Dinner 6:00pm

**Registration**

Register online at:

**Registration Fee:** $495

**Parking:** $25 per day (Parking pass is not needed if staying at Hampton Inn)

**Cancellations:** Cancellations received in writing by 17 April 2018 will receive a 100% refund. After that, cancellations received in writing by 1 May 2018 will be processed for a 50% refund. No refunds will be issued after 1 May 2018.
Mr. Jim Harper
Chief Infrastructure Engineer
Chicago Transit Authority (CTA)

In his role as Chief Engineer, Mr. Harper is responsible for managing a staff of approximately 50 engineers and professionals at CTA. His department is responsible for maintaining infrastructure design and construction standards, performing in-house design, coordination of outside design consultants, design support during construction, oversight of system commissioning, participation in asset management development and implementation, and support of ongoing maintenance. Mr. Harper has a BSME from the University of Michigan and a Masters in Urban Systems and Policy Planning from Northwestern University. He began his career working as a Systems Engineer on a people mover project at O'Hare Airport. He later worked on a variety of projects, alternately working for both transit agencies and consultants in a variety of roles, including a design/build light rail project in Minneapolis. Since 2005 Mr. Harper has worked for the CTA in a variety of engineering and maintenance roles, primarily associated with train control. As Chief Engineer, Mr. Harper is associated with a wide range of design, construction, maintenance, regulatory and community issues. Current programs underway at CTA include major rehabs/replacements/expansions of traction power substations, signal systems, rail stations, rail shops, bus garages, track systems. CTA is also embarking on a $2 billion Core Capacity program to completely rebuild and expand a portion of a 100 year old rail line.
Spoken Presentations

Tuesday 15 May

7:00 Registration/Continental Breakfast (Yeh Center Atrium, 1st Floor)

8:00 Welcome and Safety Briefing - RailTEC Research Scientist and Senior Lecturer Riley Edwards

8:10 Opening Plenary Session (Session 1)
Session Moderator: Marcus Dersch (University of Illinois)
Class I Prospective - BNSF’s Crosstie and Fastening System Design and Performance Experience and Future Trends
  Erik Frohberg (BNSF Railway)
Tie Demand Forecasting & Marketplace Scenarios
  Jim Gauntt (Railway Tie Association (RTA))
FRA Crosstie and Fastener Research: Overview and Value Assessment
  Cameron Stuart (Federal Railroad Administration (FRA))

9:20 Break

9:45 Rail Transit (Session 2)
Session Moderator: Steven Melniczuk (Amtrak)
Speculating on Rail Transit Specifications – A Special View
  Bill Moorhead (TRAMMCO, LLC)
Overview of MetroLink’s Light Rail Operations and Current Infrastructure Research
  Chuck Clemins (St. Louis MetroLink)
  Marcus Dersch (University of Illinois at Urbana-Champaign)
Overview of Direct Fixation Fasteners in Major US Transit Systems
  Korhan Ciloglu (LBFoster)
Use of Direct Fixation Rail Transit Fastening Systems at WMATA and Current Research
  Ravi Amin (WMATA)
  Riley Edwards (University of Illinois at Urbana-Champaign)
Overview of Commuter Rail Operations and Challenges in the Los Angeles Region
  Tim Harris (The Southern California Regional Rail Authority (Metrolink))
(Tentative) History and Development of Track Standards and Fastening Systems at LIRR
  Yifeng Mao & Steven Abramopaulos (MTA – Long Island Rail Road)

12:00 Lunch - ECE Building - Room 3002
306 N. Wright St., Urbana, IL 61801
1:30  Concrete Crossties - Part 1 (Session 3)
Session Moderator: Robert Peterman (Kansas State University)
Mechanistic Design of Concrete Crossties for Amtrak’s Shared Corridor Operation
Steven Melniczuk (Amtrak)
Ricardo Quiros (University of Illinois at Urbana-Champaign)
Factors that Contribute to Concrete Crosstie Abrasion Damage
Kyle Riding (University of Florida)
Robert Peterman (Kansas State University)
Opportunities to Balance Concrete Tie Capacity with Track Support Requirements
Theodore Sussmann (U.S. DOT/Volpe Center)
Impact of Tendon Anchoring Method on Reliability and Durability of Pre-stressed Concrete Railway Crossties
Andrzej Cholewa (Track Tec S.A.)

3:15  Break

3:45  Fastening Systems (Session 4)
Session Moderator: John Bosshart (BNSF, Retired)
Innovative Materials and Installation Methods for Fastening Systems
Brandon Van Dyk (Vossloh Fastening Systems North America)
Review of Measurement Data for Different Classes of Railway with Reference to Laboratory Test Standards
Pelle Duong & David Herron (Pandrol)
Broken Spikes in Timber Crosstie Premium Fastening Systems - Survey Results and Preliminary Findings
Tom Roadcap (University of Illinois at Urbana-Champaign)
Evaluation of Different Rail Pad Materials with an Accelerated Mechanical/Wear Test
Patrick Macedo (VLI)
Field Measurements of Concrete Crosstie Rail Seat Pressure in Different Types of Rail Pads
Antonio Merheb (University of Sao Paulo)

5:30  Adjourn Technical Session

5:45  Dinner
<table>
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<th>Time</th>
<th>Event</th>
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<tr>
<td>7:00</td>
<td>Registration/Continental Breakfast (Yeh Center Atrium, 1st Floor)</td>
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<td>8:00</td>
<td><strong>Composite Crossties (Session 5)</strong></td>
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<td>Session Moderator: Mike McHenry (Transportation Technology Center, Inc. (TTCI))</td>
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|           | AAR and FRA Research Supporting Polymer Composite Tie Design and Testing Recommendations  
|           | Yin Gao & Mike McHenry (TTCI)                                         |
|           | Recent developments in Testing of Composite Ties                      
|           | David Hoffmann (Technical University of Munich)                       |
|           | Effective Modeling of the Sustainable Composite Crosstie in Revenue Service  
|           | Brian Arkwood (IntegriCo)                                             |
|           | The Impact from Variations of Recycled Polymer and Fiber Properties on Composite Railroad Crosstie Performance Using Constitutive Modelling within Finite Elements  
|           | Daniel Pulipati (Baylor University)                                    |
| 8:30      | **Steel and Other Alternative Crossties (Session 6)**                  |
|           | Session Moderator: Arthur Lima (University of Illinois)               |
|           | Performance and Analysis of Failures in Steel Sleepers in a Brazilian Railway  
|           | Renato Lataliza Vasconcelos (Vale SA)                                   |
|           | Structural Performance of Plain Concrete and Fiber-reinforced Concrete Railway Ties Prestressed with Basalt-Fiber Reinforced Polymer (BFRP) Bars  
|           | Mohsen Issa (University of Illinois at Chicago)                        |
|           | Restoration of Timber Railroad Ties Using Inorganic Polymers  
|           | Ghassan Al-Charr (U.S. Army Engineer Research & Development Center (ERDC) Construction Engineering Research Laboratory (CERL)) |
| 9:45      | Break                                                                 |
| 10:15     | **Timber Crossties (Session 7)**                                       |
|           | Session Moderator: Jim Gauntt (Railway Tie Association (RTA))         |
|           | Best Practices for Sustainable Railroad Tie Recovery  
|           | Curtis Schopp (National Salvage & Service Corporation)                |
|           | Sustainable Disposal Method for Timber Crossties  
|           | James Gaspard (Biochar Now LLC)                                       |
|           | Biobased Technologies for Timber Crosstie Applications  
|           | Lou A. Honary (Environmental Lubricants Manufacturing, Inc.)          |
|           | Sustainable Ties – the Next 100 Years  
|           | Jeff Lloyd (Nisus Corporation)                                        |
|           | Internal Density Signature of Wooden Crossties to Refine Predictive Life Expectancy Modeling  
|           | Michael Brick (BNSF Railway)                                          |
| 12:00     | Lunch - Yeh Center Newmark                                             |
The Rail Transportation and Engineering Center (RailTEC) would like to welcome you to the 2018 Symposium Technical Tour to the Research and Innovation Laboratory (RAIL) and voestalpine Nortrak and Getzner facilities in Decatur, IL. RailTEC would like to extend our appreciation to voestalpine Nortrak Inc. and Getzner for hosting the technical tour at their facility.

**Bus 1 (voestalpine Nortrak, Getzner and RAIL)**

- 12:30-1:30 PM Travel from Yeh Center to voestalpine Nortrak Decatur, IL
- 1:30-2:45 PM Tour voestalpine Nortrak Decatur
- 2:45-3:45 PM Travel from voestalpine Nortrak Decatur to RAIL
- 3:45-4:45 PM Tour RAIL
- 4:45-5:15 PM Travel from RAIL to Yeh Center
- 5:15 PM Arrive at Yeh Center

**Bus 2 (RAIL, voestalpine Nortrak, and Getzner)**

- 12:30-1:00 PM Travel from Yeh Center to RAIL
- 1:00-2:00 PM Tour RAIL
- 2:00-3:00 PM Travel from RAIL to voestalpine Nortrak Decatur, IL
- 3:00-4:15 PM Tour voestalpine Nortrak Decatur
- 4:15-5:15 PM Travel from voestalpine Nortrak Decatur to Yeh Center
- 5:15 PM Arrive at Yeh Center

**Bus 3 (RAIL ONLY)**

- 1:45-2:15 PM Travel from Yeh Center to RAIL
- 2:15-3:30 PM Tour RAIL
- 3:30-4:00 PM Travel from RAIL to Yeh Center
- 4:00 PM Arrive at Yeh Center

**IMPORTANT REQUIREMENTS FOR TOUR:**

**Steel toed boots are required at both voestalpine Nortrak Inc. and RAIL.**

Please plan accordingly when packing for this trip. Safety glasses will be provided to conference attendees on site.

**Non-US Citizens:**

A portion of the technical tour takes place on the US Army Corps of Engineers facility that houses RAIL. All non-US Citizens that submitted their passports by the requested deadline (13 April 2018) **MUST** bring their passport on the day of this tour (Wednesday 16 May 2018).

**US Citizens:**

You **MUST** bring a state ID (driver’s license) on the day of the tour in order to access RailTEC’s Research and Innovation Laboratory (Wednesday 16 May 2018).
THURSDAY 17 MAY

7:00 Registration/Continental Breakfast (Yeh Center Atrium, 1st Floor)

8:00 Inspection Technologies (Session 8)
*Session Moderator: Cameron Stuart (FRA)*

Demonstration of Commercial off the Shelf (COTS) Change Detection on Railway Images
*Cameron Stuart (FRA)*
*Eric Sherrock (ENSCO)*

Investigation of the Correlation between Track Geometry Defect Occurrence and Wood Crosstie Condition
*Allan Zarembski (University of Delaware)*

Versatility and Value of Automated Track Inspection Data on Norfolk Southern
*J. Shane Rice (Norfolk Southern)*

The Application of Deep Learning for Railroad Inspection
*Richard Fox-Ivey (Railmetrics)*

Critical Crosstie and Other Infrastructure Evaluations Utilizing UAS Technologies
*Nick Dryer (BNSF Railway)*

Tie Life Condition Assessment and Tracking: More Information = Better Management
*Todd Euston (Georgetown Rail Equipment Company)*

8:00 Crosstie and Substructure Interaction (Session 9)
*Session Moderator: Ted Sussmann (U.S. DOT/Volpe Center)*

Improvement of Crosstie-Ballast Contact Using Under Tie Pads in Heavy Haul Lines
*Antonio Merheb (University of Sao Paulo)*

Influence of Tie Support Condition on Ballast Behavior under Static and Dynamic Loading
*Wenting Hou & Erol Tutumluer (University of Illinois at Urbana-Champaign)*

Monitoring of Track Infrastructure and Long Time Performance of UTP
*Micahael Mach (Austrian Federal Railways - OeBB)*

Benefits of Under Tie Pads on Ballast Stress State - A Laboratory Study
*Arthur Lima & Jake Branson (University of Illinois at Urbana-Champaign)*

Improved Track Quality using of Elasto-plastic Under Tie Pads
*Harald Steger (Getzner USA, Inc.)*

10:15 Break

10:45 Remarks from David A. Lange, President of American Concrete Institute (ACI)
10:50  Concrete Crossties - Part 2 (Session 10)
Session Moderator:  David Lange (University of Illinois)

Performance Specification for Concrete Materials Used In Crossties
  Kyle Riding (University of Florida)
  David Lange (University of Illinois at Urbana-Champaign)

Developing Qualification Tests to Ensure Proper Selection and Interaction of Pretensioned Concrete Crosstie Materials
  Robert Peterman (Kansas State University)

Entropy as a Damage Index for Concrete Crossties
  Josue Bastos (University of Illinois at Urbana-Champaign)

12:15  Adjourn Symposium

1:00  Start of AREMA Committee 30 (Ties) Meeting

Poster Presentation Session (Date and Time TBD)

Theoretical and Test Analysis on the Natural Frequencies of Rail Fastening Systems of Ballastless Track in Chinese High Speed Railway Lines
  Xiao Junheng (China Academy of Railway Sciences)

Lateral Resistance Experimental Investigation of Frame, Frictional, and Ladder Sleepers
  Guoqing Jing (Beijing Jiaotong University)

Structural Evaluation of Wooden Railway Fastening Components as Per AREMA Testing Standards
  Mohsen Issa (University of Illinois at Chicago)

Flexural Behavior of Wooden Crossties Rehabilitated with Basalt FRP Sheets
  Mohsen Issa (University of Illinois at Chicago)

Determining the Remaining Prestress Force in Concrete Railroad Ties over 25 years Old
  Robert Peterman, Terry Beck, James Scott, & Chih-Hang John Wu
  (Kansas State University)

High-Resolution Automated Prestressing Wire Indent Profiling for Verification of Wire-Concrete Mix Compatibility
  Robert Peterman, Terry Beck, Aaron Robertson, Adrijana Savic, & Chih-Hang John Wu (Kansas State University)

Transfer Length Characterization of Entire Crosstie Plant Casting Bed using Continuously Traversing Dual-Camera Non-Contact Optical Strain Sensors
  Robert Peterman, Terry Beck, Aaron Robertson, Kyle Riding, & Chih-Hang John Wu (Kansas State University)

Field Validation of Crosstie Ballast Support Mechanics through an Analytical Back Calculation Tool
  Ricardo Quiros (University of Illinois at Urbana-Champaign)
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