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, keynote address, and technical tour.

We would like to thank the Federal Railroad Administration (FRA) and the 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
Christopher P.L. Barkan
Marcus S. Dersch

J. Riley Edwards
David A. Lange
Arthur de Oliveira Lima

Conrad Ruppert, Jr.
Erol Tutumluer

RailTEC Infrastructure Research Sponsors

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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) 12:00pm - 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
- Reception at The Blind Pig Brewery 6:00pm - 7:30pm

**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
- Memorial Stadium Dinner (see page 12-13) 6:00pm - 9:00pm

**Remarks by David A. Lange (American Concrete Institute (ACI))**

**THURSDAY 17 MAY**

- Registration (Yeh Center Atrium, 1st Floor) 7:00am - 11:50am
- Light Breakfast 7:00am - 8:00am
- Technical Session 8 & 9 8:00am - 10:15am
- Break 10:15am - 10:45am
- Technical Session 10 10:45am - 11:50am
- Lunch (Crane Bay, Newmark) 11:50am - 12:30pm
- Start of AREMA Committee 30 Meeting 12:30pm
- Informal Dinner on Engineering Quad 6:00pm

**WiFi Access Information**

- Choose the "IllinoisNet_Guest" wireless network.
- Open a web browser and the University of Illinois page should load.
- Select the "Register a temporary guest account" link below the Log In button.
- Fill out the registration form, accept the terms of use, and click Register. The University is legally required to collect your information before providing you with network access.
- Click the Log In button at the bottom of your confirmation page.
- For help with the Illinois WiFi, please contact the Help Desk at 217-244-7000.

Note: Registration forms are valid for a 24-hour period. A new registration form will need to be completed to gain access after the 24-hour period has expired.
Symposium Locations

**Newmark Civil Engineering Laboratory**
*All Technical Sessions will be held in 1310 Yeh Center, unless noted.*
205 N. Mathews Ave., Urbana, IL 61801

**Electrical and Computer Engineering (ECE) Building**
306 N. Wright St., Urbana, IL 61801

**The Blind Pig Brewery**
120 N. Neil St., Champaign, IL 61820

**Memorial Stadium** (See page 13 for directions)
1402 S. 1st St., Champaign, IL 61820

**Campustown’s Parking Deck** (Accepts credit cards)
*Parking on campus is extremely limited.*
509 E. Healey St., Champaign, IL 61820

Download of Presentation

PDFs of Spoken Presentations Available for Download after the Symposium at:
Spoken Presentations

*All technical sessions will be held in 1310 Yeh Center, unless noted.*

**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 (LB Foster)*

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))*

Introduction to Chicago’s Metra Commuter Rail System and Types of Infrastructure

*Bruce Marcheschi (Metra)*

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)

5:30  Adjourn Technical Session

5:45  Reception - The Blind Pig Brewery
120 N. Neil St., Champaign, IL 61820
Spoken Presentations

**Wednesday 16 May**

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

8:00  **Composite Crossties (Session 5)**

*Session Moderator: Mike McHenry (Amtrak)*

AAR and FRA Research Supporting Polymer Composite Tie Design and Testing Recommendations

Yin Gao (TTCI)
Mike McHenry (Amtrak)

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)*

**Room 2311**

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 Engineering 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)
Tony Mauricio (GREX)

12:00  Lunch - Yeh Center Newmark
**Wednesday 16 May**

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.

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**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

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**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.

Waivers are required for voestalpine Nortrak Inc. Please ensure you sign one and return to the registration desk.

**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 RAIL (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)
    Tony Mauricio (GREX)
  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)
  Room 2311
  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
    Michael 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
**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)

**Impact of Water on Cyclic Behavior of Concrete Crossties**  
Josue Bastos (University of Illinois at Urbana-Champaign)

**Poster Presentations**

**Poster Presentation Session (Room 1311)**

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)

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)

Effects of Cover, Compressive Strength, and Wire Typer on Bond Performance in Prismatic Prestressed Concrete Members  
Adrijana Savic, B. Terry Beck, Aaron A. Robertson, Robert J. Peterman, 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)
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.

Memorial Stadium Dinner Remarks

Dr. David A. Lange
President, American Concrete Institute (ACI)
Director, Center of Excellence for Airport Technology
Professor, University of Illinois at Urbana-Champaign

David A. Lange holds a B.S. (Valparaiso University 1981) in civil engineering, MBA (Wichita State University 1984), and Ph.D. (Northwestern University 1991) in civil engineering. He has been on the faculty of the department of Civil and Environmental Engineering at the University of Illinois since 1992. He is the Director of the Center of Excellence for Airport Technology (CEAT) which is funded by the Federal Aviation Administration and the O'Hare Modernization Program. Dr. Lange teaches graduate and undergraduate courses in civil engineering materials, repair of civil structures, systems engineering and engineering economics. Dr. Lange is a fellow of the American Ceramic Society and is currently serving as President of the American Concrete Institute (ACI).
Memorial Stadium Dinner

Memorial Stadium Itinerary
5:45 PM  Bus Departs Newmark Lab for Memorial Stadium
6:00 PM  Reception
7:00 PM  Dinner
7:30 PM  Dinner Remarks
8:30 PM  Bus Departs Memorial Stadium to Newmark Lab

Bus Transportation will be provided from the Yeh Student Center. If you wish to drive there are 2 parking options:

Parking Option 1 - Campus Recreation (metered spots, requires payment)
201 East Peabody Drive, Champaign, IL 61820

Parking Option 2 - Assembly Hall (free parking)
1800 South 1st Street Champaign, IL 61820
Railway Engineering Short Course
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Previous Attendees:
-CN Railway
-Metro-North Railroad
-Metrolink
-MARTA (Atlanta)
-Terminal Railroad Assoc. of St. Louis
-Federal Railroad Administration
-Dept. of Homeland Security / TSA
-Dept. of Transportation / PHMSA
-Dept. of Transportation / OIG
-Virginia Dept. of Rail and Public Transportation

Keolis Commuter Services
-Booz Allen Hamilton
-National Research Council Canada
-ADM
-Cleveland Track Material
-Enon International LTD
-INCOFER
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