



**Virginia Polytechnic Institute and State University**  
**University of Delaware**  
**University of Nevada, Las Vegas**



## **SYMPOSIUM**

**Railroad Infrastructure Diagnosis and Prognosis**

**October 16-17, 2018**

**Professional Development Seminar**  
**Introduction to Rail Dynamics**

**October 15, 2018**

**Registration Deadline: September 15, 2018**

**University of Nevada Las Vegas (UNLV)**

**Sponsored by:**

USDOT Tier 1 University Transportation Center on Railroad Durability and Sustainability  
<https://www.unlv.edu/news-story/symposium-railroad-infrastructure-diagnosis-and-prognosis-and-seminar-rail-dynamics>



**BOMBARDIER**



This symposium will feature experts that will discuss the practice and the state of art in railroad infrastructure diagnosis and prognosis. These professionals will present the new technologies and methods in monitoring and maintaining railroad infrastructure that includes both the track and rolling stocks. The research results from the University Transportation Center on Railroad will be presented in oral and poster sessions. All the modes of rail transportation will be discussed: passenger and freight rail including high speed rail. Significant time will be dedicated to an open discussion with the panel of the experts and the participating professionals in which the issues with the current and proposed technologies and methods will be identified.

**FREE Professional Development Seminar**

Introduction to Rail Dynamics

Mehdi Ahmadian, PhD

Dan Pletta Professor and Director

Railway Technologies Laboratory at Virginia Tech

The primary objective of this seminar is to present an introduction to the engineering fundamentals of rail dynamics. The course will start with a review of the basics of dynamic systems and some aspects of rail dynamics, starting from the wheel-rail contact dynamics and extending into railcar dynamics. Some emphasis will be placed on vehicle dynamics, such as the 3-piece trucks used by the U.S. freight railroads and steerable trucks.

**Railroad Infrastructure Diagnosis and Prognosis**

**October 16, 2018**

7:30 am	<b>BREAKFAST</b>	
8:00 am	Infrastructure investment in the U.S.	<b>Keynote speaker:</b> Congresswoman Dina Titus (invited)
8:20 am	Railroad research in FRA	<b>Keynote speaker:</b> Maryam Allahyar, Director, FRA Office of Research (confirmed)
8:40 am	Practice of infrastructure diagnosis and prognosis in American railroads	<b>Keynote speaker:</b> Melody A. Sheahan AAR (confirmed)
	<b>RAILROAD MONITORING</b>	
9:00 am	Railroad track monitoring	<b>Keynote speaker:</b> Mehdi Ahmadian, Virginia Tech (confirmed)
9:30 am	<b>BREAK</b>	
9:40 am	Identifying curve points using machine learning and optimization techniques	Milad Hosseinipour, Amtrak (confirmed)
10:00 am	A derailment investigation leads to broken spikes	Brad Kerchof, Norfolk Southern Railroad (confirmed)

10:20 am	Mechanical monitoring technologies developed in Amsted (tentative)	Speaker from Amsted (invited)
10:40 am	Top of rail (ToR) lubricity assessment using laser optic reflective sensors	Abdullah Mohammed Hasan, Virginia Tech (confirmed)
11:00 am	<b>BREAK</b>	
11:20 am	<b>Panel discussion</b>	
<b>12:00 pm</b>	<b>LUNCH</b>	
	<b>RAIL MAINTENANCE</b>	
1:00 pm	Rail track maintenance	<b>Keynote speaker:</b> Allan Zarembski, University of Delaware (confirmed)
1:30 pm	Big data in rail wear	Joseph William Palese, University of Delaware (confirmed)
1:50 pm	Upgrading existing lines for higher speed (has big data implications)	David Staplin, former Amtrak Deputy Chief Engineer (confirmed)
2:10 pm	Big data in track geometry degradation and forecasting	Nii Attoh-Okine, University of Delaware (confirmed)
2:30 pm	Data visualization, actionable insights key to Big Data applications (tentative)	Michael Craft, Amtrak (confirmed)
2:50 pm	<b>BREAK</b>	
3:10 pm	<b>Panel discussion</b>	
3:50 pm	<b>ADJOURN</b>	

**6:00 pm – 8:00 pm reception**

**October 17, 2018**

7:30 am	<b>BREAKFAST</b>	
	<b>HIGH SPEED RAIL MONITOR AND MAINTENANCE</b>	
8:00 am	Monitor and Maintenance in California High Speed Rail	<b>Keynote speaker:</b> Frank Vacca, California High Speed Rail Authority (confirmed)
8:40 am	High speed track maintenance in Amtrak	David Staplin, former Amtrak Deputy Chief Engineer (confirmed)
9:00 am	Tilt Train operation and maintenance (1)	Nicolas Flix, Alstom (confirmed)
9:20 am	Tilt Train operation and maintenance (2)	Nicolas Flix, Alstom (confirmed)
9:40 am	High speed rail communication maintenance (tentative)	Speaker from Bombardier (confirmed)
10:00 am	<b>BREAK</b>	
10:20 am	<b>Panel discussion</b>	
11:00 am	<b>ADJOURN</b>	

**Hotel:** There are many hotels located along Las Vegas Boulevard between Flamingo Road and Tropicana Avenue, which are located two miles west of the UNLV campus.

**Symposium Location:** University of Nevada, Las Vegas – Main Campus, Stan Fulton Building, 801 E. Flamingo Road, Las Vegas, NV 89154

**NO REGISTRATION FEE. Registration Form**

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Professional Development Hours: By attending this symposium you are entitled to earn 2 Continuing Education Units (CEUs) or 12 Professional Development Hours (PDHs).

Please complete and send this form to:

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Railroad University Transportation Center  
Department of Civil and Environmental Engineering and Construction  
University of Nevada, Las Vegas  
4505 Maryland Parkway, Box 454015  
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Phone: 702-858-0013  
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**Sponsorship Options:**

The sponsorship options for the Symposium are:

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# Professional Development Seminar

## Introduction to Rail Dynamics

**October 15, 2018**

This seminar will help railroad engineers to gain a fundamental understanding of railroad system. This seminar is also valuable for university students and faculty. Learn how to perform better at your current position and open new career opportunities. Connect with experienced professionals on practical and academic matters.

### Agenda

7:30 am	<b>BREAKFAST</b>
8:00 am	Dynamics Terminology • Definitions • Mathematical Basics
9:00 am	Wheel-Rail Dynamics • Rolling Body Dynamics • Creep • Wheel-rail Rolling Contact Theories and Models • Traction Dynamics
10:00 am	Track Dynamics • Track Geometry Parameters • FRA Track Standards • Track Geometry • Track Geometry Variations
11:30 am	<b>LUNCH</b>
1:00 pm	Suspension Dynamics • What Are Suspensions? • What Do They Do? • Primary Suspensions • Secondary Suspensions • Design Issues for Suspensions • Primary Damper Tuning Effects
2:00 pm	Train Dynamics - Tangent Track • Traction • Lateral Stability • Hunting Analysis • Wheel-rail Wear
3:00 pm	Train Dynamics - Curved Track • Dynamics of Curving • Straight Trucks vs. Steerable Trucks • L/V Force Analysis • Wheel-Rail Wear
4:00 pm	Ride Analysis • Introduction • Ride Dynamics • Ride Measurement Techniques • Ride Modeling
4:30 pm	<b>ADJOURN</b>

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**Seminar Location:** University of Nevada, Las Vegas – Main Campus, Stan Fulton Building, 801 E. Flamingo Road, Las Vegas, NV 89154

**Instructor:** Mehdi Ahmadian, Ph.D., Professor, Virginia Tech

Dr. Mehdi Ahmadian is a Dan Pletta Professor of Mechanical Engineering at Virginia Tech, where he also holds the position of Director of Center for Vehicle Systems and Safety (CVeSS), and the Railway Technologies Laboratory (RLT). Dr. Ahmadian has authored more than 130 archival journal publications and more than 250 conference publications, including a number of keynote lectures. He has served as Editor or Editor-in-Chief for four journals on Vehicle System Dynamics, Vibration and Control, Shock and Vibration and Automobile Engineering. Dr. Ahmadian is Fellow of American Society of Mechanical Engineers of the American Institute for Aeronautics and Astronautics (AIAA). He has received many distinguished scholar awards.

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Do you have any disabilities requiring special assistance or equipment? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, Please describe _____		

Professional Development Hours: By attending this seminar you are entitled to earn 2 Continuing Education Units (CEUs) or 6 Professional Development Hours (PDHs).

Please complete and send this form to:

Boniphase Kutela, Program Coordinator  
 Railroad University Transportation Center  
 Department of Civil and Environmental Engineering and Construction  
 University of Nevada, Las Vegas  
 4505 Maryland Parkway, Box 454015  
 Las Vegas, NV 89154-4015  
 Phone: 702-858-0013  
 Fax: 702-895-3936  
 Email: kutela@unlv.nevada.edu