UNIVERSITY OF DELAWARE®

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

BIG DATA IN RAILROAD MAINTENANCE PLANNING
2016

UNIVERSITY OF DELAWARE | NEWARK, DELAWARE
DECEMBER 15-16

Converting the mountain of data collected by railway systems into effective maintenance planning information with a focus on railway needs and practical applications

PRESENTED BY:

University of Delaware Railroad Engineering and Safety Program

University of Delaware Big Data Center

University of Delaware Professional Engineering Outreach

railroadengineering.engr.udel.edu

Modern Railways are making increasing use of new generation track inspection and operating technology to obtain more and more data on the condition of the track and equipment.

This extensive amount of data, which includes data of increasing complexity as well as volume, has led to a condition known as "Big Data", where the volume of data is such that traditional analysis techniques are no longer viable to efficiently make use of all of this large volume of data. Thus, important information is often buried in this "mountain" of data. Since railways need to convert this data into useable information to help them plan their capital maintenance programs, there is a need for the application of new and improved analysis techniques to make this conversion from data into information. One such area of improved data analysis is the use of "Big Data" statistical analysis techniques. Others include improved engineering modeling and more traditional statistical analysis techniques.

The 2016 conference is intended to expand on previous years' conferences and introduce these new and emerging analysis techniques and to show how they can be applied to the large volume of inspection data collected by railways to improve their planning of the critical capital and maintenance programs. This year's conference focuses on the railway's specific needs and practical applications to date of "Big Data" analytics.

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BIG DATA IN RAILROAD MAINTENANCE PLANNING

DAY 1: THURSDAY, DECEMBER 15, 2016

8:30 AM
WELCOME AND INTRODUCTION TO THE NEEDS OF THE RAILROAD INDUSTRY

Allan M. Zarembski | *Professor, Director, Railroad Research and Safety Program, University of Delaware*

Babatunde A. Ogunnaike | *Dean, College of Engineering, and William L. Friend Professor of Chemical & Biomolecular Engineering, University of Delaware*

Harry W. Shenton, III | *Professor and Chairperson, Civil & Environmental Engineering, University of Delaware*

David Staplin | *Deputy Chief Engineer Amtrak (retired) and Chairman of the Railroad Advisory Board at University of Delaware*

KEYNOTE SPEAKER
Lisa Stabler | *President Transportation Test Center, Inc. (TTCI)*

LEVERAGING BIG DATA AND MACHINE LEARNING FOR RAIL SAFETY
Gary Carr | *Chief, Track Research Division, USDOT Federal Railroad Administration*

10:00–10:15 AM | BREAK

10:15 AM
SESSION I: RAILROAD NEEDS FROM BIG DATA

CSX AUTOMATED TRACK CONDITION ASSESSMENT – THE JOURNEY BEGINS
Leopold Kreisel | *Director, Track Testing*
Srini Manchikanti | *Technical Director, Engineering Field Applications,*
CSX Transportation

Dwight W. Clark | *General Director Engineering Technology -*
Union Pacific Railroad

THE USE OF BIG DATA TO EVALUATE RAILROAD ASSETS AND PLAN FOR THE FUTURE
J. Shane Rice | *Assistant Chief Engineer-MW&S, Norfolk Southern Railway*

Shaun Levandier | *Senior Manager, Engineering Technology, CN Rail*

TURNOUT PERFORMANCE
David Friss | *Director, Reliability Engineering, BNSF*

12:15–1:30 PM | LUNCH

1:30 PM
SESSION II: BIG DATA : APPLICATIONS AND CASE STUDIES

RAIL JOINT MANAGEMENT USING AUTOMATED INSPECTION TECHNOLOGY
Lariza Stewart | *Project Engineer, Inspection Technologies, Georgetown Rail*
Anamaria Bonilla | *Assistant Chief Engineer, Track Structures, Metro-North*

CONVERGING BIG DATA TO TRACK PERFORMANCE MANAGEMENT
INDICATORS FOR ASSET MANAGEMENT
Jackie van der Westhuizen | *Business Line Director, ENSCO*

USE OF BIG DATA IN RAIL WEAR FORECASTING
Joseph Palese | *Senior Director, Inspection Services, Harsco Rail*

UTILIZING UNMANNED AERIAL VEHICLES ON RAILROAD PROJECTS: CALIFORNIA HIGH SPEED RAIL AND METROLINK CASE STUDIES

Jacqueline L. Patterson | *President and Founder of J.L. Patterson & Associates*
Marc A. Canas | *Vice President and Director, Freight Rail Services, Jacobs Engineering*

CREATING RAIL VALUE WITH DATA
Jeffrey A. Keller | *Associate Partner, IBM Global Services,*

3:30–3:45 PM | BREAK

3:45 PM
SESSION III: BIG DATA APPLICATION AND INTERNATIONAL CASE STUDIES

BIG DATA RISK ANALYSIS (BDRA) TO ENHANCE THE GREAT BRITAIN RAILWAY SAFETY SYSTEMS
Coen van Gulijk | *Institute of Railway Research, University of Huddersfield, United Kingdom*

EXTRACTING INFORMATION FROM "BIG DATA" FOR OPTIMIZED TRACK MAINTENANCE AND RENEWAL PLANNING
Pietro Pace | *Product Line Manager, Mermec SpA, Italy*

AUTOMATIC DETECTION OF RAIL SURFACE DEFECTS USING VIBRATION AND VIDEO IMAGE: A CASE STUDY IN THE DUTCH RAILWAYS
Alfredo Nunez Vicencio | *Assistant Professor, Section of Railway Engineering, Delft University of Technology, The Netherlands*

ACTION INSTEAD OF REACTION: FROM DATA COLLECTION TO PREDICTIVE MAINTENANCE
Ellen Linnenkamp | *Managing Director, Strukton Rail North America*

5:30 PM | DAY 1 SESSIONS END

6:30–8:00 PM
COCKTAIL RECEPTION: ATRIUM, STAR CAMPUS, UNIVERSITY OF DELAWARE

DAY 2: FRIDAY, DECEMBER 16, 2016

8:15 AM
SESSION IV-A: BIG DATA ANALYSIS THEORY AND TECHNIQUES

LEADING EDGE ANALYSIS TECHNIQUES FOR BIG DATA
Busby Nii Attoh-Okine | *Professor, Civil & Environmental Engineering, and Director, Big Data Center, University of Delaware*

UAV-BASED VISUAL DATA ANALYTICS FOR RAILWAY INSPECTION, MAINTENANCE AND CONSTRUCTION PERFORMANCE
C. Tyler Dick | *Sr. Railway Research Engineer, RailTec, University of Illinois*

Royce A. Francis | *Assistant Professor, Department of Engineering Management and Systems Engineering, George Washington University*

BIG DATA IN RAILROAD AND TRANSIT CONSTRUCTION
Edgar P. Small | *Associate Professor, Director, Construction Engineering Program, University of Delaware*

9:55 – 10:10 BREAK

10:10 AM
SESSION IV-B

DATA-DRIVEN TRACK MAINTENANCE STRATEGIES
Qing He | *Assistant Professor, Civil & Environmental Engineering, University at Buffalo, SUNY*

ROLE OF BIG DATA IN IMPROVING RISK MANAGEMENT ON RAILWAYS
Xiang Liu | *Assistant Professor, Rutgers University*

DATA DRIVEN METHODS TO IMPROVE TRAIN ETAS FOR EFFECTIVE TRACK MAINTENANCE PLANNING
C. Tyler Dick | *Sr. Railway Research Engineer, RailTec, University of Illinois*

A BIG DATA ANALYSIS ON CORRELATING BALLAST VOLUME DEFICIT WITH THE DEVELOPMENT OF TRACK GEOMETRY EXCEPTIONS
Allan M. Zarembski | *Director, Railroad Engineering and Safety Program, University of Delaware*

11:45
CONCLUDING REMARKS

David Staplin | *Deputy Chief Engineer Amtrak (retired) and Chairman of the Railroad Advisory Board, University of Delaware*

Allan M. Zarembski | *Director, Railroad Engineering and Safety Program, University of Delaware*

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PROGRAM ENDS

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