THE STEPHENSON CONFERENCE
RESEARCH FOR RAILWAYS

21-23 April 2015
One Birdcage Walk, London
www.imeche.org/stephenson

Railway Division
Conference

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THE STEPHENSON CONFERENCE
RESEARCH FOR RAILWAYS
21-23 April 2015, One Birdcage Walk, London

THE STEPHENSON CONFERENCE IS AN INTERNATIONAL EVENT COVERING A WIDE RANGE OF CURRENT WORLDWIDE RESEARCH INTO ROLLING STOCK, RAILWAY INFRASTRUCTURE AND CONTROL SYSTEMS.

This major rail conference will bring together researchers to present, debate and develop their work at the birthplace of global railway engineering. High-quality research papers will be complemented by practical case studies, illustrating the value of what good rail research can bring to the competitive development of the railway industry.

BENEFITS OF ATTENDANCE:

• Learn about the latest technological developments in the global rail industry
• Network with senior industry experts and peers in an open forum
• Develop an understanding of research outputs and relevant emerging technologies
• Hear from specialist researchers and rail professionals who are planning for the future
• Understand the practical aspect of the latest thinking in rail

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# PROGRAMME

## DAY 1  
TUESDAY 21 APRIL 2015

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<tbody>
<tr>
<td>13:00</td>
<td>REGISTRATION AND REFRESHMENTS</td>
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</table>
| 13:30 | **KEYNOTE ADDRESS**  
Chris Fenton, Chief Executive, Rail Safety and Standards Board (RSSB), UK |
| 14:00 | **CASE STUDY: TOMORROW'S RAILWAY AND CLIMATE CHANGE ADAPTATION**  
J Lane & J Dora, RSSB, UK |
| 14:30 | **FROM RESEARCH TO RULE-MAKING IN THE FEDERAL RAILROAD ADMINISTRATION**  
J Tunna, Federal Railroad Administration, Office of Research and Development, US Department of Transportation, USA |

### PARALLEL SESSIONS

<table>
<thead>
<tr>
<th>Time</th>
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</table>
| 15:00 | **VIDEO MEASUREMENT TECHNIQUES FOR UNDERSTANDING WHEEL-INDUCED LATERAL FORCES AND TRACK COMPONENT DEFLECTIONS**  
P Waterfall, University of Bristol; B Temple, C Hardwick, LB Foster, Rail Technologies; J Sharam, A Plumb, Imetrum, UK |
|       | **A 2D DEM ANALYSIS OF RAILWAY BALLAST VIBRATION UNDER CYCLIC LOADS**  
X Zhang, C P Zhao, W M Zhai, State Key Laboratory of Traction Power, Southwest Jiaotong University, China |
|       | **RAILWAY BRIDGE MAINTENANCE MODELLING**  
B Le, J Andrews, Nottingham Transportation Engineering Centre, University of Nottingham, UK |
|       | **MULTI-DOMAIN SIMULATION OF HYBRID DIESEL-DRIVEN RAILWAY VEHICLES AND COMPARISON OF ELECTRICAL ENERGY STORAGE SYSTEMS**  
S Schmid, Voith Turbo GmbH & Co. KG, Research and Development, Germany; K Ebrahimi, University of Bradford, School of Engineering, Design and Technology, UK; W Commerell, UAS Ulm, Institute of Energy and Drive Technologies, Germany |

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>15:30</td>
<td><strong>NETWORKING REFRESHMENT BREAK</strong></td>
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</table>

| 16:00 | **PREDICTION OF WHEEL-RAIL CONTACT FORCES BASED ON A LOCOMOTIVE DYNAMIC INVERSE MODELLING**  
Y Q Sun, M Spiryagin, C Cole, Central Queensland University, Centre for Railway Engineering, Australia |

<table>
<thead>
<tr>
<th>Time</th>
<th>Stream A</th>
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</table>
| 16:30 | **OVERALL CONSIDERATION OF THE WHEEL/RAIL CONTACT: KEY FACTOR FOR RELIABLE PREDICTIONS OF VEHICLE TRACK INTERACTION**  
K Six, A Meierhofer, G Trummer, C Marte, G Müller, B Luber, M Rosenberger, Virtual Vehicle Research Centre, Austria; P Dietmaier, Institute for Applied Mechanics, Graz University of Technology, Austria |

| 17:00 | **DEVELOPMENT OF A TRAM-TRAIN WHEEL PROFILE FOR DUAL-OPERATION**  
D Crosbee, P D Allen, University of Huddersfield, UK; R Carroll, Sheffield Supertram, UK |
### DAY 2
**WEDNESDAY 22 APRIL 2015**

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<thead>
<tr>
<th>Time</th>
<th>Session/Activity</th>
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<tbody>
<tr>
<td>08:30</td>
<td><strong>KEYNOTE SPEAKER</strong>&lt;br&gt;Dr Norimichi Kumagai, Executive Director, Rail Technical Research Institute, Japan</td>
</tr>
<tr>
<td>09:00</td>
<td><strong>REGISTRATION AND REFRESHMENTS</strong></td>
</tr>
<tr>
<td>09:30</td>
<td><strong>STREAM A</strong>&lt;br&gt;Critical velocities effects on high-speed train at Ledsgaard, Sweden&lt;br&gt;S Mezher, P K Woodward, O Laghrhouche, G Kouroussia, G Medero, D P Connolly, Institute for Infrastructure and Environment, Heriot-Watt University, UK</td>
</tr>
<tr>
<td>10:00</td>
<td><strong>Bayesian reconstruction of three-dimensional railway track geometry: improvements and developments in the system toward practical use</strong>&lt;br&gt;A Yoshimura, Tokyo University of Technology, School of Computer Science, Japan</td>
</tr>
</tbody>
</table>

### PARALLEL SESSIONS

#### STREAM A

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<td>10:00</td>
<td><strong>Bayesian reconstruction of three-dimensional railway track geometry: improvements and developments in the system toward practical use</strong>&lt;br&gt;A Yoshimura, Tokyo University of Technology, School of Computer Science, Japan</td>
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#### STREAM B

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<tr>
<th>Time</th>
<th>Session/Activity</th>
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<tbody>
<tr>
<td>16:00</td>
<td><strong>Case study: The rail trackform stiffness tester: from idea to commercial reality</strong>&lt;br&gt;P Sharpe, C Govan, URS</td>
</tr>
<tr>
<td>16:30</td>
<td><strong>An experimental study of dynamic performance of CRTS II slab track using a full scale test rig</strong>&lt;br&gt;W Mingze, Y Xuancheng, Z Shengyang, C Chengbiao, State Key Laboratory of Traction Power, Southwest Jiaotong University, China</td>
</tr>
<tr>
<td>17:00</td>
<td><strong>The influence of support conditions on short and long-term track behaviour</strong>&lt;br&gt;I Grossoni, Y Bezin, Institute of Railway Research, University of Huddersfield, UK</td>
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#### STREAM C

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<tr>
<th>Time</th>
<th>Session/Activity</th>
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<tbody>
<tr>
<td>16:00</td>
<td><strong>Scoping prediction of re-radiated ground-borne noise and vibration near high-speed rail lines with variable soils</strong>&lt;br&gt;D P Connolly, P K Woodward, O Laghrhouche, B Suryanto, G Medero, Heriot-Watt University, UK; M C Forde, University of Edinburgh, UK; G Kouroussia, Department of Theoretical Mechanics, Dynamics and Vibrations, University of Mons, Belgium</td>
</tr>
<tr>
<td>16:30</td>
<td><strong>Study on radiation contribution of wheel/rail system noise</strong>&lt;br&gt;Q Yin, C Cai, S Zhu, Z Chen, State Key Laboratory of Traction Power, Southwest Jiaotong University, China</td>
</tr>
<tr>
<td>17:00</td>
<td><strong>Modelling of train-induced vibration</strong>&lt;br&gt;E Ntotsios, S G Koroma, D J Thompson, ISVR, University of Southampton, UK; H E M Hunt, J P Talbot, W I Hamad, Engineering Department, University of Cambridge, UK; M F M Hussein, ISVR, University of Southampton, UK &amp; Department of Civil and Architectural Engineering, Qatar University, Qatar</td>
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#### STREAM D

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>16:00</td>
<td><strong>Determining system-wide energy use in an established metro network</strong>&lt;br&gt;J P Powell, A González-Gil, R Palacin, P Batty, Newcastle University, UK</td>
</tr>
<tr>
<td>16:30</td>
<td><strong>Viable flywheel system for rail</strong>&lt;br&gt;J C Wheals, W To, J Dalby, M Vigar, J Hodgson, J Buchanan, Ricardo UK; A Robertson, J MacPherson, J Taylor, Artemis IP; W Lane, M Heaton, Bombardier Transportation, UK</td>
</tr>
<tr>
<td>17:00</td>
<td><strong>Metro traction and power system energy optimisation</strong>&lt;br&gt;N Zhao, Z Tian, S Hillmansen, C Roberts, The Birmingham Centre for Railway Research and Education, School of Electronic, Electrical and Computer Engineering, University of Birmingham, UK; M Yuan, J Li, Guangzhou Metro Corporation; H Shi, Guangzhou Metro Design &amp; Research Institute Co, China</td>
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All delegates to make their way back to the Lecture Theatre

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<tr>
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<tbody>
<tr>
<td>17:30</td>
<td><strong>KEYNOTE SPEAKER</strong>&lt;br&gt;Keir Fitch, Deputy Head of Cabinet, European Commission</td>
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<tr>
<td>18:30</td>
<td><strong>EVENING DRINKS RECEPTION</strong></td>
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<td><strong>09:30</strong></td>
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<td><strong>09:30</strong></td>
<td>STREAM D</td>
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<td><strong>10:00</strong></td>
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**PARALLEL SESSIONS**

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<tr>
<th>TIME</th>
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<tbody>
<tr>
<td><strong>11:00</strong></td>
<td><strong>STUDYING VARIATIONS OF SKYHOOK METHOD FOR COMFORT IMPROVEMENT</strong>&lt;br&gt;A Qazizadeh, S Stichel, Division of Rail Vehicles, KTH Royal Institute of Technology; R Persson, Rolling Stock Central &amp; Northern Europe and Asia, Bombardier Transportation, Sweden</td>
</tr>
<tr>
<td><strong>11:30</strong></td>
<td><strong>HUNTING STABILITY AND IMPROVEMENT MEASURES FOR HIGH-SPEED VEHICLES</strong>&lt;br&gt;J Zeng, L Wei, M Chi, J Wang, State Key Laboratory of Traction Power, Southwest Jiaotong University, China</td>
</tr>
<tr>
<td><strong>12:00</strong></td>
<td><strong>THE SUSTRAIN FREIGHT VEHICLE</strong>&lt;br&gt;S D Iwnicki, Institute of Railway Research, University of Huddersfield, UK; A Orlova, Petersburg State Transport University, Russia; P A Jonsson, Division of Railway Vehicles, KTH Royal Institute of Technology, Sweden; M Fartan, REARUL Engineering, Cluj, Romania</td>
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<tr>
<th>TIME</th>
<th>STREAM B</th>
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<tr>
<td><strong>11:00</strong></td>
<td><strong>EFFECT OF DISABLED CEMENT ASPHALT MORTAR LAYER ON DYNAMIC BEHAVIOUR OF SLAB TRACK</strong>&lt;br&gt;J Han, L Ling, X B Xiao, Z F Wen, X S Jin, State Key Laboratory of Traction Power, Southwest Jiaotong University; G T Zhao, State Key Laboratory of Traction Power, Southwest Jiaotong University &amp; China Railway Corporation, China</td>
</tr>
<tr>
<td><strong>11:30</strong></td>
<td><strong>THE EFFECTS OF RAILWAY TRAFFIC ON TRACKBED STABILITY AND DEFORMATION DUE TO CLAY FILL PERFORMANCE</strong>&lt;br&gt;G R Taylor, R Tan, A S O’Brien, Mott MacDonald Limited, UK</td>
</tr>
<tr>
<td><strong>12:00</strong></td>
<td><strong>ESTIMATING THE DAMAGE AND MARGINAL COST OF DIFFERENT VEHICLE TYPES ON RAIL INFRASTRUCTURE: A COMBINED ENGINEERING AND STATISTICAL APPROACH</strong>&lt;br&gt;A S J Smith, University of Leeds; A Kaushal, S D Iwnicki, University of Huddersfield; UK, K Odolinski, Swedish National Road and Transport Research Institute, Department of Transport Economics, Sweden</td>
</tr>
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</table>
11:00
CASE STUDY: THE PRIZES OF MANAGING ADHESION
Dr Alan Lawton, Independent Engineering Consultant

11:30
STREAM D
ADDRESSING NODAL CONSTRAINTS ON RAILWAY CAPACITY
J Armstrong, University of Southampton, Civil, Maritime and Environmental Engineering and Science & Arup; J Preston, University of Southampton, Civil, Maritime and Environmental Engineering and Science; UK

12:00
INVESTIGATION INTO THE EFFECT OF MOISTURE ON RAIL ADHESION
J Fisk, T Armitage, Arup; R Lewis, D Fletcher, M Evans, A Arnall, University of Sheffield, Department of Mechanical Engineering, UK

12:30
PARALLEL SESSIONS

13:30
STREAM A
DEVELOPMENT OF A METHODOLOGY FOR CO-SIMULATION OF TILTING TRAINS IN SIMPACK-SIMULINK
N Kuka, Railway Dynamics/Engineering, ALSTOM Transport 23; C Ariaudo, R Verardi, Railway Dynamics/Engineering, ALSTOM, Italy

14:00
APPARENTLY INDEPENDENTLY ROTATING WHEELSET - A POSSIBLE SOLUTION FOR ALL NEEDS?
A Bracciali, University of Florence & AB Consulting, Italy

14:30
HUNTING STABILITY AND IMPROVEMENT MEASURES FOR HIGH SPEED VEHICLES
J Zeng, L Wei, M Chi, J Wang, State Key Laboratory of Traction Power, Southwest Jiaotong University, China

13:30
STREAM B
FAILURE ANALYSIS OF RAILROAD CONCRETE CROSSTIES IN CENTRE BINDING CONDITIONS USING FINITE ELEMENT METHOD
H Yu, B P Marquis, D Y Jeong, Structures and Dynamics Division, Volpe National Transportation Systems Centre, USA

14:00
INSULATED RAIL JOINT ENHANCEMENT: TESTING AND ANALYSIS
A E Beagles, P Beaty, D I Fletcher, R Lewis, Department of Mechanical Engineering, University of Sheffield, UK; B Temple, LB Foster Rail Technologies, UK

14:30
FORMALISED FINITE ELEMENT ANALYSIS AND DESIGN OF CAST MANGANESE CROSSINGS FOR SWITCH AND CROSSING LAYOUTS
H Persson, J M Ritchie, Institute of Mechanical, Process and Energy Engineering, School of Engineering & Physical Sciences, Heriot-Watt University, UK; M Westoby, Progress Rail Services UK

13:30
STREAM C
REAL-TIME ONBOARD MONITORING OF TRAIN WHEELS AND AXLE BEARING CONDITION
I Corni, N Symonds, R J K Wood, National Centre for Advanced Tribology- Southampton Faculty of Engineering and the Environment, University of Southampton, UK; A Wasenckuk, D Vincent, Perpetuum, UK

14:00
CONDITION MONITORING OF ROLLER BEARINGS USING ACOUSTIC EMISSION TECHNIQUES
M Entezami, L Saade, E Stewart, C Roberts, P Weston, The University of Birmingham, UK; R Lewis, TWI Ltd, UK

14:30
MODERN INNOVATIONS ON THE APPLICATION OF THE ROTATING ULTRASONIC PROBE TO IN-SERVICE INSPECTION OF FREIGHT SOLID AXLES: EXPERIMENTS AND MAPOD APPROACH
M Carboni, Department of Mechanical Engineering, Politecnico di Milano; S Cantini, Lucchini RS SpA, Lovere (BG), Italy
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| 13:30 | CASE STUDY: THE ‘ON-TIME’ PROJECT  
Meena Dasigi, Principal Engineer, Network Rail, UK |
| 14:00 | ROBUST MULTI-TRAIN TRAJECTORY OPTIMISATION FOR REAL WORLD CONDITIONS USING A ‘NOISY’ GENETIC ALGORITHM  
J Goodwin, D I Fletcher, Department of Mechanical Engineering, R F Harrison, Department of Automatic Control & Systems Engineering, University of Sheffield, UK |
| 14:30 | SAFECAP: THE TRAIN ADVISORY SYSTEM FOR REAL-TIME TRAFFIC MANAGEMENT  
A Iliasov, A Romanovsky, Newcastle University, School of Computing Science, UK |
| 15:00 | NETWORKING REFRESHMENT BREAK |

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| 15:30 | EVALUATION OF BOGIE ROTATIONAL RESISTANCE  
T Tanaka, K Iida, M Suzuki, T Iida, N Watanabe, T Miyamoto; Vehicle Mechanics Laboratory, Railway Dynamics Division, Railway Technical Research Institute, Japan |
| 16:00 | INVESTIGATION OF THE APPLICATION OF ADJUSTABLE AIR SUSPENSION UNDER TRACTION CONTROL FOR HEAVY HAUL LOCOMOTIVES  
M Spiryagin, YQ Sun, C Cole, Central Queensland University, Centre for Railway Engineering; P Wolfs, Central Queensland University, Power and Energy Centre, Australia; V Spiryagin, Rostov Electric Locomotive Repair Plant, Russia; I Persson, AB DEsolver, Ostersund, Sweden |
| 15:30 | STREAM B |
| 15:30 | CONDITION MONITORING OF AUDIO FREQUENCY TRACK CIRCUITS  
L Saade, P Weston, C Roberts, University of Birmingham, UK |
| 16:00 | A 10GBIT/S ETHERNET INFRASTRUCTURE FOR FUTURE-PROOFED RAILWAY COMMUNICATIONS  
G Koczian, S Walker, University of Essex, UK; G Howell, B Simpkin, LPA Connect, UK |
| 15:30 | STREAM C |
| 15:30 | APPLICATION OF FRA NEW VEHICLE-TRACK SYSTEM QUALIFICATION REQUIREMENTS  
B P Marquis, Structures and Dynamics Division, Volpe National Transportation Systems Centre; A Tajaddini, Office of Research and Development, Federal Railroad Administration; M Trosino, National Railroad Passenger Corporation, USA; H P Kotz, Siemens – Infrastructure and Cities, Rail Systems Division Locomotives & Components, BG EN SDS VD, Austria; W Breuer, Siemens – Infrastructure and Cities, Rail Systems Division Locomotives and Components, EN SC, Germany |
| 16:00 | CASE STUDY: IMPROVING TRACK TOLERANCES USING VIRTUAL HIGH FIXITY  
Peter Woodward, Heriot-Watt University, UK |
| 15:30 | STREAM D |
| 15:30 | THE DEVELOPMENT AND APPLICATION OF A LEAN FUTURE STATE DESIGN METHODOLOGY TO THE RAILWAY POSSESSION AND ISOLATION AUTHORISATION PROCESS  
S Stiles, University of Nottingham, SHE Solutions, UK; W Garner, Coventry University, UK |
| 16:00 | MODERN COMMUNICATION TOOLS AND THE GENERALISED COST OF TRAVEL  
S Pani, F Schmid, Birmingham Centre for Railway Research and Education, School of Civil Engineering; N G Harris, Railway Consultancy, UK |
16:30 KEYNOTE SPEAKER
Professor Manuel Seabra Pereira, Department of Mechanical Engineering, Instituto Superior Técnico, University of Lisbon, Portugal

19:00 CONFERENCE DINNER

DAY 3
THURSDAY 23 APRIL 2015

08:30 REGISTRATION AND REFRESHMENTS

09:00 KEYNOTE SPEAKER
Professor Richard Parry-Jones CBE, Chairman, Network Rail, UK

PARALLEL SESSIONS

STREAM A

09:30 INFLUENCE OF VARYING INPUT PARAMETERS ON MODEL VALIDATION RESULTS
G Götz, Technische Universität Berlin, Institute of Rail Vehicles, Germany; O Polach, Bombardier Transportation AG, Switzerland

10:00 A COMPARISON OF FULL SCALE AND MODEL SCALE MEASUREMENTS OF TRAIN AERODYNAMIC CHARACTERISTICS
C Baker, A Quinn, H Hemida, M Sterling, M Gallagher, J Morden, School of Civil Engineering, Birmingham Centre for Railway Research and Education, University of Birmingham, UK

STREAM B

09:30 NEW ADVANCES IN WIRELESS MESH SENSORS ARE TRANSFORMING ASSET CONDITION MONITORING IN RAIL
S Maddison, B Smith, Senceive, UK

10:00 DEPLOYING A LOW ENERGY POWER MODEL WITHIN DATA LOGGERS AND SENSORS FOR THE REMOTE MONITORING OF ASSETS
R J Preece, Arrowvale Electronics & University of Birmingham, UK; T M Hanif, R J Amos, Arrowvale Electronics; E J C Stewart, University of Birmingham, UK

STREAM C

09:30 FATIGUE EVALUATION OF HIGH-SPEED CAR BODY UNDER RANDOM LOADING
P B Wu, F S Li, State Key Laboratory of Traction Power, Southwest Jiaotong University; A Q Tian, X L Sun, CSR Qingdao Sifang Locomotive & Rolling Stock Co, China

10:00 REVISING U.S PASSENGER RAILCAR OCCUPIED VOLUME STRENGTH REQUIREMENTS
J Gordon, Federal Railroad Administration, Office of Research and Development, US Department of Transportation, USA

STREAM D

09:30 EVALUATING OPTIONS FOR A FAULT TOLERANT RAILWAY SYSTEM
C Fecarotti, J Andrews, R Remenyte-Prescott, Department of Civil Engineering, UK

10:00 THE PAPER THAT ELIMINATES PAPER
M Davies, Software Solutions, Interfleet, UK

10:30 NETWORKING REFRESHMENT BREAK
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<tbody>
<tr>
<td>11:00</td>
<td>THEORETICAL AND EXPERIMENTAL ANALYSIS OF THE HXN3 LOCOMOTIVE CAB VIBRATION ISOLATION SYSTEM</td>
<td>11:00</td>
<td>ICE-S VEHICLE REACTION MEASUREMENT AND TRACK GEOMETRY MEASUREMENT ON THE SAME MEASURING TRAIN: RESULTS OF THE COMPARISON OF THE TWO DIFFERENT TRACK INSPECTION METHODS</td>
</tr>
<tr>
<td></td>
<td>C S Li, S H Luo, W H Ma, State Key Laboratory of Traction Power, Southwest Jiaotong University; T W Qu, Dalian Locomotive and Rolling Stock Co, CNR Group, China</td>
<td></td>
<td>T Kolbe, R Kratochwille, Department for Vehicle Dynamic Tests, DB Systemtechnik GmbH Deutsche Bahn AG, Germany</td>
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<tr>
<td>11:30</td>
<td>VIBRATION ISOLATION DESIGN OF UNDER CHASSIS EQUIPMENTS FOR HIGH-SPEED EMU TRAINS</td>
<td>11:30</td>
<td>DETECTION OF VERTICAL TRACK FAULTS USING AN INSTRUMENTED IN-SERVICE VEHICLE: CONSIDERING EFFICIENT REAL-TIME FAULT DETECTION</td>
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<td></td>
<td>D Gong, J Zhou, W Sun, Institute of Railway &amp; Urban Mass Transit Research, Tongji University, China</td>
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<td>G J Yeo, P F Weston, C Roberts, University of Birmingham, UK</td>
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<tr>
<td>12:00</td>
<td>FLEXIBLE CAR BODY VERTICAL VIBRATION CHARACTERISTIC OF A HIGH-SPEED TRAIN</td>
<td>12:00</td>
<td>DETERMINATION OF VERTICAL ALIGNMENT OF TRACK USING ACCELEROMETER READINGS</td>
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<td></td>
<td>H Cao, Traction Power State Key Laboratory, Southwest Jiaotong University &amp; Southwest University of Science &amp; Technology; W Zhang, B Miao, Traction Power State Key Laboratory, Southwest Jiaotong University &amp; Southwest University of Science &amp; Technology, China</td>
<td></td>
<td>E J O’Brien, School of Civil, Structural and Environmental Engineering, University College Dublin; C Bowe, Irish Rail, Technical Department, Engineering &amp; New Works; P Quirke, School of Civil, Structural and Environmental Engineering, University College Dublin; I Eireann, Irish Rail, Technical Department, Engineering &amp; New Works, Ireland</td>
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<td>STREAM C</td>
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<tr>
<td>11:00</td>
<td>CRASHWORTHINESS RESEARCH ON DIESEL MULTIPLE UNIT FUEL TANKS</td>
<td>11:00</td>
<td>CRASHWORTHINESS RESEARCH</td>
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<tr>
<td></td>
<td>K M Jacobsen, M E Carolan, Volpe National Transportation Systems Centre, US Department of Transportation, USA</td>
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<td>D C Tyrell, F Llana, Volpe National Transportation Systems Centre, US Department of Transportation, USA</td>
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<tr>
<td>11:30</td>
<td>LOCOMOTIVE CRASHWORTHINESS RESEARCH</td>
<td>12:00</td>
<td>SIMULATION AND VALIDATION OF RADIAL EXPANSION TUBES FOR ENERGY ABSORPTION</td>
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<td>C Moreno, D J Hughes, R Dashwood, WMG, University of Warwick; T Williams, OLEO International, UK</td>
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<td>12:00</td>
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<td>STREAM D</td>
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<tr>
<td>11:00</td>
<td>LEAN PRINCIPLES AND SUSTAINABLE OPERATION OF HIGH-SPEED RAILWAYS</td>
<td>11:00</td>
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<td>D Hasegawa, G Nicholson, C Roberts, B Schmid, Birmingham Centre for Railway Research and Education, The University of Birmingham, UK; V Novak, Virginia Polytechnic Institute and State University, USA</td>
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<td>11:30</td>
<td>CONSIDERATION OF THE POTENTIAL TRADE-OFFS BETWEEN OPERATIONAL ENERGY CONSUMPTION AND EMISSIONS AND EMBEDDED ENERGY CONSUMPTION AND EMISSIONS IN RAIL INFRASTRUCTURE</td>
<td>11:30</td>
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<td>J A Pritchard, Transportation Research Group, University of Southampton, UK</td>
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<td>12:00</td>
<td>ADVANCED SYSTEMS INTEGRATION IN MAJOR RAIL PROJECTS</td>
<td>12:00</td>
<td>NETWORKING LUNCH</td>
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<td>S Bhamra, G Georgiou, M Georganas, Bechtel and Crossrail, UK</td>
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<td>All delegates to make their way back to the Lecture Theatre</td>
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13:30  **CASE STUDY: RAILWAY ACCIDENTS: RESEARCH CHALLENGES**  
Winston Rasaiah, Rail Accident Investigation Branch, UK

14:00  **CASE STUDY: DIGITAL RAILWAY**  
Jerry England, Group Asset Management Director, Network Rail, UK

14:30  **KEYNOTE SPEAKER**  
Chris Jackson, Railway Gazette, UK  
Following the close of Chris Jackson’s presentation, Professor Simon Iwnicki, Chair of the Railway Division, will present the Best Paper Award

15:00  **CLOSE OF CONFERENCE**

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Find out more about our speakers at www.imeche.org/stephenson

- This programme is subject to change.
- The Institution is not responsible for the views or opinions expressed by individual speakers.

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EVENT CODE: C1408AB
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21-23 April 2015
One Birdcage Walk, London SW1H 9JJ

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Registration fees include entry to the sessions, refreshments, lunch and a copy of the event proceedings.

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<th>TOTAL</th>
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<td>£540.00+VAT</td>
<td>£640.00+VAT</td>
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<td>£430.00+VAT</td>
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<td>Conference Dinner</td>
<td>£35.00+VAT</td>
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OTHER EVENTS TO LOOK FOR:

9 February 2015
London
**SUPPLYING THE 21ST CENTURY RAILWAY - STRATEGIC DEVELOPMENT OF RAILWAY COMPONENTS AND SYSTEMS**
Supplying the 21st Century Railway - Strategic Development of Railway Components and Systems, will be presented by Terence Watson of the Supply Group.

9 March 2015
London
**BEYOND THE WIRE - SOLUTIONS FOR BI-MODE RAILWAY TRACTION FOR FREIGHT AND PASSENGER**
Solutions for Bi-Mode Railway Traction for Freight and Passenger, presented by James Ambrose, Network Rail and Andrew Martlew, Direct Rail Services.

13 March 2015
London
**RAILWAY DIVISION ANNUAL LUNCHEON**
The Institution of Mechanical Engineers’ Annual Luncheon is the must-attend event in the railway calendar, attracting over 1,100 people from all sectors of industry.

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