11TH INTERNATIONAL CONFERENCE ON TURBOCHARGERS AND TURBOCHARGING.

Combustion Engines & Fuels Group Conference

13–14 May 2014
London
www.imeche.org/events/C1384

SPECIAL OFFER
15% OFF REGISTRATION FOR CONFERENCE + WORKSHOP
SEE PAGE 6 FOR DETAILS

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INTRODUCTION

Legislation and environmental trends for reducing CO₂ and fuel consumption are the major market forces in the land transport industry today. The internal combustion engine is the key product and downsizing, efficiency and economy are the driving forces for development for both spark ignition (SI) and compression ignition (CI) engines.

The future market forces and environmental considerations in the passenger car and commercial vehicle sector mean more stringent engine downsizing is far more prevalent. Therefore, novel systems are required to provide boosting solutions including hybrid, electric-motor and exhaust waste energy recovery systems for high efficiency, response, reliability, durability and compactness.

For large engines, the big challenge is to enhance the high specific power and efficiency, whilst reducing emission levels (NOx and SOx) with variable quality fuels. This will require turbocharging systems for very high boost pressure, efficiency and a high degree of system flexibility.

This international conference is the latest in the highly successful and prestigious series held regularly since 1978. It will cover all current and novel aspects of turbocharging systems design and boosting solutions for engine downsizing and improvements in efficiency.

WHEN 13–14 May 2014
WHERE The British Museum, Great Russell Street, London WC1B 3DG
BOOK ONLINE www.imeche.org/events/C1384

TECHNICAL ADVANTAGES:
• Study advances in 1D simulation and validation
• Enhance your systems’ transient response
• Learn ways to reduce turbine fatigue
• Find out about new methods to improve turbine unsteady flow
• Network with experts from industry and academia

SPONSORSHIP & EXHIBITION OPPORTUNITIES
GET INVOLVED
Attending this event as either an exhibitor or sponsor will give you the opportunity to display your solutions, services and products to the right people at the right time.
This is an excellent way to enhance your company profile and communicate effectively to your target audience.

BENEFITS OF SPONSORING
• Showcase new products
• Raise awareness of your operation
• Improve perception of your brand
• Influence other organisations’ spending plans

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## PROGRAMME

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<tr>
<th>DAY 1</th>
<th>TUESDAY 13 MAY 2014</th>
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<tbody>
<tr>
<td><strong>SESSION 1: NOVEL APPLICATIONS; SI ENGINES</strong></td>
<td>09:00</td>
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<tr>
<td>09:30</td>
<td>CHAIRMAN'S WELCOME</td>
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<tr>
<td>Dr K Banisoleiman, Principal Consultant – Marine, Lloyd’s Register</td>
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</tr>
<tr>
<td>09:35</td>
<td>KEYNOTE PRESENTATION</td>
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<tr>
<td>Brett Hinda, Chief Engineer – Engine Design, Ford Europe</td>
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</tr>
<tr>
<td>10:00</td>
<td>COOL2POWER – EXTENDING THE BOOST LINE OF A PASSENGER CAR SI-ENGINE USING THE AC-SYSTEM FOR INTERCOOLING</td>
</tr>
<tr>
<td>S Kadunic, R Baar, TU Berlin; F Scherer, Bundesanstalt für Materialprüfung und Forschung (BAM); I Friedrich, IAV GmbH, Germany</td>
<td></td>
</tr>
<tr>
<td>10:20</td>
<td>ASSESSMENT OF THE SUPERCHARGING BOOSTING COMPONENT FOR HEAVILY DOWNSIZED GASOLINE ENGINES</td>
</tr>
<tr>
<td>A Romagnoli, W Bin Wan-Salim, R F Martinez-Botas, Imperial College London, UK; J W G Turner, N Luard, Powertrain Research and Technology, Jaguar Land Rover Limited, UK; R Jackson, L Matteucci, Lotus Engineering, UK; C J Brace, S Akehurst, A G J Lewis, C Copeland, University of Bath, UK</td>
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<tr>
<td>10:50</td>
<td>Q&amp;A WITH PANEL SPEAKERS</td>
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<tr>
<td>11:05</td>
<td>REFRESHMENT BREAK &amp; EXHIBITION</td>
</tr>
<tr>
<td>11:25</td>
<td>SPLIT EXHAUST PERIOD FOR EXTREMELY DOWNSIZED TURBOCHARGED SI ENGINE</td>
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<tr>
<td>B Hu, C Brace, S Akehurst, C Copeland, University of Bath; J W G Turner, Jaguar Land Rover Limited, UK</td>
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<tr>
<td>11:45</td>
<td>ADVANCED BOOSTING TECHNOLOGIES FOR FUTURE SI ENGINES CONCEPTS</td>
</tr>
<tr>
<td>P Grigoriadis, L Böttcher, E Binder, M Sens, IAV GmbH, Germany</td>
<td></td>
</tr>
<tr>
<td>12:05</td>
<td>Q&amp;A WITH PANEL SPEAKERS</td>
</tr>
<tr>
<td>12:20</td>
<td>LUNCH &amp; EXHIBITION</td>
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</tbody>
</table>

### SESSION 2: PARALLEL SESSIONS

#### SESSION 2A: COMRESSOR DESIGN (CFD)

| 13:35 | DESIGN AND TESTING OF A TRANSONIC MIXED FLOW COMPRESSOR FOR EXTREME COMPRESSOR DUTY |
| H R Hazby, PCA Engineers Ltd, UK; M V Casey PCA Engineers Ltd, UK & Institute of Thermal Turbomachinery (ITSM), University of Stuttgart, Germany; R Numakura, Turbo Machinery and Engine Technology Department, IHI Corporation, Japan; H Tamaki Corporate Research and Development, IHI Corporation, Japan |
| 13:55 | AERODYNAMIC DESIGN OPTIMISATION OF CENTRIFUGAL COMPRESSOR IMPELLER BASED ON ARTIFICIAL NEURAL NETWORK AND GENETIC ALGORITHMS |
| S Ibaraki, Mitsubishi Heavy Industries Ltd, Japan; R Van den Braembussche, T Verstraete, Z Alsalihi, von Karman Institute for Fluid Dynamics, Belgium; K Sugimoto, I Tomita, Mitsubishi Heavy Industries Ltd, Japan |
| 14:15 | A NEW OPERATING RANGE ENHANCEMENT DEVICE COMBINED WITH A CASING TREATMENT AND INLET GUIDE VANES FOR CENTRIFUGAL COMPRESSORS |
| I Tomita, B An, T Nanbu, Mitsubishi Heavy Industries Ltd, Japan |
| 14:45 | INLET RECIRCULATION IN AUTOMOTIVE TURBOCHARGER CENTRIFUGAL COMPRESSORS |
| P X L Harley, S W T Spence, J Early, School of Mechanical & Aerospace Engineering, Queen’s University Belfast, UK; D Filsinger, M Dietrich, IHI Charging Systems International GmbH, Germany |
| 15:05 | Q&A WITH PANEL SPEAKERS |
| 15:25 | REFRESHMENT BREAK & EXHIBITION |

#### SESSION 2B: ADVANCED SIMULATION 1D, HEAT TRANSFER AND MULTIBODY OPTIMISATION

<p>| 10:00 | MODELLING OF TURBOCHARGER HEAT TRANSFER UNDER STATIONARY AND TRANSIENT ENGINE OPERATING CONDITIONS |
| R D Burke, Department of Mechanical Engineering, University of Bath, UK; P Olmeda, F J Arns, M Reyes-Belmonte, CMT – Motores Térmicos, Universitat Politècnica de València, Spain |
| 13:35 | A ONE-DIMENSIONAL PERFORMANCE MODEL FOR TURBOCHARGER TURBINE UNDER PULSATING INLET CONDITION |
| H Chen, National Laboratory of Engine Turbocharging Technologies, China; D E Winter bone, Formally UMIST, UK |
| 14:15 | A ONE-DIMENSIONAL ANALYTICAL CODE FOR THE DESIGN AND MULTI-OBJECTIVE OPTIMISATION OF HIGH PRESSURE COMPRESSORS WITHIN TWO-STAGE TURBOCHARGERS FOR MARINE APPLICATIONS |
| O F Okhuahesogie, J Stewart, M J W Riley, School of Engineering, University of Lincoln, UK; P Reyes, P Roach, Napier Turbochargers Ltd, UK |
| 14:45 | IMPROVEMENT OF A GASOLINE TURBOCHARGER BY-PASS VALVE |
| L Toussaint, M Marques, N Morand, P Davies, C Groves, Honeywell, France; F Tomanec, M Zatko, D Vlachy, R Mrazek, Honeywell, Czech Republic |</p>
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<tr>
<th>TIME</th>
<th>SESSION 3A: TRANSIENT RESPONSE</th>
<th>SESSION 3B: TURBOCOMPOUND AND 2-STAGE</th>
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<tr>
<td>16:10</td>
<td>EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF IMPLEMENTING A BALL BEARING TURBOCHARGER ON A PRODUCTION DIESEL ENGINE</td>
<td>THE EXHAUST ENERGY UTILISATION OF A TURBOCOMPOUND ENGINE COMBINED WITH DIVIDED EXHAUST PERIOD</td>
</tr>
<tr>
<td></td>
<td>Q Zhang, T Duda, R Burke, S Akehurst, C Brace, University of Bath, UK; G Capon, P Dowell, Ford Motor Company, UK; P Davies, Honeywell, France</td>
<td>H Aghaali, HE Angström, KTH - Royal Institute of Technology, CGGEx, Internal Combustion Engines, Sweden</td>
</tr>
<tr>
<td>16:30</td>
<td>TWO-CYLINDER ENGINE EXHAUST SYSTEM DESIGN</td>
<td>FURTHER DEVELOPMENT OF TWO STAGE TURBOCHARGING SYSTEMS FOR LARGE ENGINES</td>
</tr>
<tr>
<td></td>
<td>J J Dalby, J B Wray, J D Mullineux, A Ward, Ricardo, UK; C M Meano, A Racca, General Motors Powertrain – Europe S.r.l. (GMPTE), Italy</td>
<td>E Codan, C Christen, ABB Turbo Systems Ltd, Switzerland</td>
</tr>
<tr>
<td>16:50</td>
<td>OPTIMISATION OF TRANSIENT RESPONSE OF A GASOLINE ENGINE WITH A VARIABLE GEOMETRY TURBINE TURBOCHARGER</td>
<td>PANEL DISCUSSION</td>
</tr>
<tr>
<td></td>
<td>H Tang, S Akehurst, C J Brace, University of Bath, UK; S Garrett, Cummins Turbo Technologies Limited, UK; L Smith, Jaguar Land Rover Limited, UK</td>
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</tr>
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**SESSION 4: NOVEL APPLICATIONS: EURO 6 AND ELECTRIC ASSIST**

**SESSION 5: PARALLEL SESSIONS**

**SESSION 5A: TURBOCHARGER GAS STAND**

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<tr>
<th>TIME</th>
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<th>SESSION 5B: BURST CONTAINMENT AND WASTEGATE MATERIALS</th>
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<tbody>
<tr>
<td>11:40</td>
<td>RECOMMENDED PRACTICES FOR CONTEMPORARY TURBOCHARGER GAS STAND TESTING</td>
<td>CONTAINMENT SIMULATION AND VALIDATION OF TURBOCHARGER HOUSING DESIGN</td>
</tr>
<tr>
<td>12:00</td>
<td>CRITICAL ASPECTS IN TURBOCHARGER TESTING</td>
<td>THE HIGH TEMPERATURE TRIBOLOGICAL PERFORMANCE OF TURBOCHARGER WASTEGATE MATERIALS</td>
</tr>
<tr>
<td></td>
<td>H Bole, Kratzer Automation AG, A Rinaldi, CRITT M2A, A Kaufmann, Hochschule Weingarten, Germany</td>
<td>M Burkinshaw, D Blacker, Cummins Turbo Technologies, UK</td>
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**DAY 2 WEDNESDAY 14 MAY 2014**

**SESSION 5B: BURST CONTAINMENT AND WASTEGATE MATERIALS**

<table>
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<td>FURTHER DEVELOPMENT OF TWO STAGE TURBOCHARGING SYSTEMS FOR LARGE ENGINES</td>
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<td></td>
<td>E Codan, C Christen, ABB Turbo Systems Ltd, Switzerland</td>
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### PROGRAMME (CONTINUED)

**SESSION 6A: ENGINE CRANK ANGLE RESOLVED TURBONETWORK PERFORMANCE MEASUREMENTS BY CONTACTLESS SHAFT TORQUE DETECTION**
- B Lüddecke, D Filsinger, IHI Charging Systems International GmbH; M Bargende, Universität Stuttgart, Germany

**SESSION 6B: EXPERIMENTAL AND NUMERICAL INVESTIGATIONS ON AN AUTOMOTIVE TURBONETWORK WITH A TRANSPARENT BEARING SECTION**
- W Köhl, Technische Universität Darmstadt, Institute of Structural Dynamics; M Kreschel, IHI Charging Systems International GmbH; D Filsinger, IHI Charging Systems International GmbH, Germany

**SESSION 6C: AN ANALYTICAL INVESTIGATION OF TURBONETWORK-ROTOR BEARING DYNAMICS WITH ROLLING ELEMENT BEARINGS AND SQUEEZE FILM DAMPERS**
- A Ashitekar, Cummins Turbo Technologies, USA; L Tian, C Lancaster, Cummins Turbo Technologies, UK

**SESSION 7A: ENGINE CRANK ANGLE RESOLVED TURBONETWORK PERFORMANCE MEASUREMENTS BY CONTACTLESS SHAFT TORQUE DETECTION**
- B Lüddecke, D Filsinger, IHI Charging Systems International GmbH; M Bargende, Universität Stuttgart, Germany

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**SESSION 7D: EXPERIMENTAL AND NUMERICAL INVESTIGATIONS ON AN AUTOMOTIVE TURBONETWORK WITH A TRANSPARENT BEARING SECTION**
- W Köhl, Technische Universität Darmstadt, Institute of Structural Dynamics; M Kreschel, IHI Charging Systems International GmbH; D Filsinger, IHI Charging Systems International GmbH, Germany

**SESSION 7E: AN ANALYTICAL INVESTIGATION OF TURBONETWORK-ROTOR BEARING DYNAMICS WITH ROLLING ELEMENT BEARINGS AND SQUEEZE FILM DAMPERS**
- A Ashitekar, Cummins Turbo Technologies, USA; L Tian, C Lancaster, Cummins Turbo Technologies, UK

**SESSION 7F: EXPERIMENTAL AND NUMERICAL INVESTIGATIONS ON AN AUTOMOTIVE TURBONETWORK WITH A TRANSPARENT BEARING SECTION**
- W Köhl, Technische Universität Darmstadt, Institute of Structural Dynamics; M Kreschel, IHI Charging Systems International GmbH; D Filsinger, IHI Charging Systems International GmbH, Germany

**SESSION 7G: AN ANALYTICAL INVESTIGATION OF TURBONETWORK-ROTOR BEARING DYNAMICS WITH ROLLING ELEMENT BEARINGS AND SQUEEZE FILM DAMPERS**
- A Ashitekar, Cummins Turbo Technologies, USA; L Tian, C Lancaster, Cummins Turbo Technologies, UK

**SESSION 7H: EXPERIMENTAL AND NUMERICAL INVESTIGATIONS ON AN AUTOMOTIVE TURBONETWORK WITH A TRANSPARENT BEARING SECTION**
- W Köhl, Technische Universität Darmstadt, Institute of Structural Dynamics; M Kreschel, IHI Charging Systems International GmbH; D Filsinger, IHI Charging Systems International GmbH, Germany

**SESSION 7I: AN ANALYTICAL INVESTIGATION OF TURBONETWORK-ROTOR BEARING DYNAMICS WITH ROLLING ELEMENT BEARINGS AND SQUEEZE FILM DAMPERS**
- A Ashitekar, Cummins Turbo Technologies, USA; L Tian, C Lancaster, Cummins Turbo Technologies, UK

**SESSION 7J: EXPERIMENTAL AND NUMERICAL INVESTIGATIONS ON AN AUTOMOTIVE TURBONETWORK WITH A TRANSPARENT BEARING SECTION**
- W Köhl, Technische Universität Darmstadt, Institute of Structural Dynamics; M Kreschel, IHI Charging Systems International GmbH; D Filsinger, IHI Charging Systems International GmbH, Germany

**SESSION 7K: AN ANALYTICAL INVESTIGATION OF TURBONETWORK-ROTOR BEARING DYNAMICS WITH ROLLING ELEMENT BEARINGS AND SQUEEZE FILM DAMPERS**
- A Ashitekar, Cummins Turbo Technologies, USA; L Tian, C Lancaster, Cummins Turbo Technologies, UK

**SESSION 7L: EXPERIMENTAL AND NUMERICAL INVESTIGATIONS ON AN AUTOMOTIVE TURBONETWORK WITH A TRANSPARENT BEARING SECTION**
- W Köhl, Technische Universität Darmstadt, Institute of Structural Dynamics; M Kreschel, IHI Charging Systems International GmbH; D Filsinger, IHI Charging Systems International GmbH, Germany

**SESSION 7M: AN ANALYTICAL INVESTIGATION OF TURBONETWORK-ROTOR BEARING DYNAMICS WITH ROLLING ELEMENT BEARINGS AND SQUEEZE FILM DAMPERS**
- A Ashitekar, Cummins Turbo Technologies, USA; L Tian, C Lancaster, Cummins Turbo Technologies, UK

Find out more about our speakers at: www.imeche.org/events/C1384

- This programme is subject to change.
- The Institution is not responsible for the views or opinions expressed by individual speakers.
This one-day workshop is designed to enable individuals to gain an understanding of the principles and challenges associated with boosting downsized engines.

Aimed at those whose role includes the design, selection and development of air management systems, it will expand your understanding of the fundamental issues related with turbocharging technology.

As part of the course, all delegates will be invited to visit the Imperial College test facility where they will have the opportunity to learn about state-of-the-art experimental methods for boosting technology.

Places are limited, so book early to avoid disappointment.

**TRAINERS**
- Prof Ricardo Martinez-Botas
- Dr Aaron Costall
- Dr Mingyang Yang
- Dr Colin Copeland
- Dr Apostolos Pesiridis
  – all affiliated to the Imperial College London Turbocharger Research Group

**AGENDA**
Depending on the number and background of attendees, the workshop can be tailored to specific requirements. A detailed agenda will be sent out ahead of the workshop.

**MORE INFORMATION**
Please contact:
Dr Aaron Costall
Email: a.costall@imperial.ac.uk
BOOKING FORM

COMBUSTION ENGINES & FUELS GROUP
11TH INTERNATIONAL CONFERENCE ON TURBOCHARGERS AND TURBOCHARGING
13–14 MAY 2014

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Family Name
First Name
Membership No
Name of Organisation (for name badge)
Address for correspondence

Town/City
Postcode
Contact Telephone
Email

How did you hear about this event? ☐ Direct mail ☐ Website ☐ Colleague ☐ Other

FEES AND CHARGES Please complete the appropriate box.

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

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<td>Conference dinner (delegate)</td>
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<td>Conference dinner (guest)</td>
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<td>Invoice charging (if applicable)</td>
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Receive a 15% discount on registration fees when attending both the conference and the workshop (see page 6 for details).

Please contact our enquiry team on +44 (0)20 7973 1258 or email eventenquiries@imeche.org

PAYMENT DETAILS

Payment must accompany this conference registration form. Registration will be confirmed only on receipt of full payment.

Please indicate method of payment: ☐ Cheque ☐ Credit Card ☐ BACS ☐ Invoice (see below)

Cheques should be made payable to IMechE and crossed. Please note international delegates may pay only by credit card, BACS or banker’s draft. A copy of the draft must accompany this form. It is the delegate’s responsibility to pay any bank charges.

Credit Card: ☐ Visa ☐ MasterCard (please note we cannot accept American Express, Diners Club or Maestro)

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Amount to be Deducted
Signature

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Name and Address for Invoicing

Tel Fax

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Sort code: 60-40-05 Acc No: 00817767
Swift Code: NWBKGB2L

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Please complete and return this form to:

EVENT REGISTRATIONS
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Fax +44 (0)20 7222 9881

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Please read the information listed below as each booking is subject to the Institution’s standard terms and conditions.

CONDITIONS OF BOOKING

Completed application forms should be returned to the address above, along with the correct payment. Attendance at the event will be confirmed on receipt of the full balance. All participants are advised to bring a copy of their confirmation with them on the day, to ensure the fastest possible entry.

SPECIAL REQUIREMENTS

Please inform us of any special requirements, ie dietary or access, on the relevant section of this form.

CANCELLATION

For a refund (minus £25 +VAT admin charge), cancellations must be received at least 14 days prior to the event. Replacement delegates are welcome at any time. The Institution reserves the right to cancel any event. In this case, the full fee will be refunded unless a mutually convenient transfer can be arranged. In the event that the Institution postpones an event for any reason and the delegate is unable or unwilling to attend on the rescheduled date, they will receive a full refund of the fee paid.

The Institution is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. The Institution shall assume no liability whatsoever if this event is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, unforeseen occurrence or any other event that renders performance of this conference impracticable, illegal or impossible. For purposes of this clause, a fortuitous event shall include, but not be limited to: war, fire, labour strike, extreme weather or other emergency.

Please note that while speakers and topics were confirmed at the time of publishing, circumstances beyond the control of the organisers may necessitate substitutions, alterations or cancellations of the speakers and/or topics. As such, the Institution reserves the right to alter or modify the advertised speakers and/or topics if necessary without any liability to you whatsoever. Any substitutions or alterations will be updated on the event’s webpage as soon as possible.

SUPPORTING ORGANISATIONS

See list on page 2.

VENUE

This event will be held at The British Museum, Great Russell Street, London WC1B 3DG

LIABILITY

The organisers do not accept liability for any injuries or losses of any nature incurred by delegates and/or accompanying persons, nor for loss or damage to their luggage and/or personal belongings.

ACCOMMODATION

Quote ID number www.corporateteam.com/events/8488ictt

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We are the market leader among professional engineering bodies. We’ve been supporting engineers since 1847 and have 100,000 members in over 120 countries, working in the world’s most dynamic and important industries. Our comprehensive events programme brings you the latest research and best practice from industry and academia.

OTHER EVENTS TO LOOK FOR:

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<th>Event Name</th>
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<tr>
<td>1 May 2014</td>
<td>Coventry</td>
<td>CAN GREEN BE FAST AND FUN? IMPLEMENTING LOW CARBON TECHNOLOGIES IN HIGH PERFORMANCE VEHICLES</td>
<td>This seminar will address the conundrum of global warming and the ongoing assault on “gas guzzling” vehicles and their CO₂ emissions. The seminar will provide positive solutions that can be applied to the mainstream automotive market that will benefit the entire industry.</td>
</tr>
<tr>
<td>25 – 26 June 2014</td>
<td>Nuneaton</td>
<td>THE ROUTE TO AUTONOMOUS VEHICLES</td>
<td>Presenting knowledge from the forefront of technology, this seminar will help people in the industry to understand the current development and future potential of automated technology in the automobile industry.</td>
</tr>
<tr>
<td>11 September 2014</td>
<td>London</td>
<td>GASEOUS FUELS FOR ROAD VEHICLES</td>
<td>Examining the application and use of gaseous fuels in vehicles, delegates will be able to explore the different types of gases that can be used as fuels, and gain an insight into the benefits that gaseous fuels have over traditional liquid fuels.</td>
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