

# INTERNAL COMBUSTION ENGINES AND POWERTRAIN SYSTEMS FOR FUTURE TRANSPORT

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ENGINEERS**

11-12 December 2019  
**Fazeley Studios, Birmingham**

Powertrain Systems and Fuels Group  
**Conference**

## KEY SPEAKERS INCLUDE:

Paul McCarthy, Chief Engineer: Performance, Controls and Integration  
**JCB**

Andy Ward, Head of Core R&D  
**Ricardo Ltd.**

Benjamin Waters, Lead engineer, Performance and Emissions team  
**Changan UK R&D Centre Limited**

Carsten Weber, Manager Powertrain Research & Advanced Engineering Europe  
**Ford Motor Company**



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# INTERNAL COMBUSTION ENGINES AND POWERTRAIN SYSTEMS FOR FUTURE TRANSPORT

11-12 December 2019, Fazeley Studios, Birmingham

**HEAR HOW BOTH INDUSTRY AND RESEARCHERS ARE DEVELOPING THE INTERNAL COMBUSTION ENGINE AND FUTURE POWERTRAIN TECHNOLOGIES TO IMPROVE EFFICIENCY WHILE MEETING EMISSIONS REQUIREMENTS.**

As the automotive market continues to rapidly develop with new powertrain systems and growing external pressures, attend the **Internal Combustion Engines and Powertrain Systems for Future Transport Conference** to learn about the role of the IC Engine in the ever changing landscape. Providing a forum for IC engine, fuels and powertrain experts, the conference looks closely at developments in powertrain technology required to meet the demands of the low carbon economy and global competition.

Make the most of the projected **4.67% CAGR growth** in the IC Engine market during the forecast period 2019-2025 by hearing about the latest developments in IC Engine and hybrid applications. Understand how particular issues for the IC engine market are being managed as well as about the impact of alternative powertrains on the propulsion industry. You will also hear from experts in the transportation sectors including off-highway on how they are working towards greater efficiency.

Network with leading engine and powertrain R&D experts from **vehicle OEMs, tier one manufacturers** and **research organisations**.

#### **ORGANISING COMMITTEE:**

Powertrain Systems and Fuels Group Committee  
**Institution of Mechanical Engineers**

#### **MEMBER CREDITS:**

Hua Zhao, Vice Dean Research, College of Engineering, Design and Physical Sciences  
Brunel University London  
Steve Sapsford, Managing Director, SCE Ltd.  
Roy Horrocks, Supervisor, Ford Motor Company Ltd, Dunton Technical Centre  
Jamie Turner, Professor of Engines and Energy Systems, University of Bath  
Roger Cracknell, Technology Expert - Combustion Chemistry, Shell Global Solutions (UK)

#### **ATTEND THIS CONFERENCE TO:**

- Access 12+ hours of content on the cutting edge technologies on internal combustions (IC) engines and future powertrains from representatives from the UK, Germany, US, Belgium, Italy, China, and Malta
- Hear latest approaches to IC engine and future powertrain development from JCB, MAHLE Powertrain Limited, Ricardo UK Ltd, Shell Global Solutions, Concawe and Istituto Motori CNR
- Discover how future legislation and drive cycle will impact the development of future powertrain technologies at your organisation

#### **KEY PROGRAMME HIGHLIGHTS:**

- **Ford Motor Company** share their vision for the Internal Combustion Engine of the future in light of targets on fuel efficiency
- **University of Brighton** outline their work on the use of Cryogenic Fluids for Zero Toxic Emission Hybrid Engines
- **HORIBA MIRA** address the challenges of meeting Real Driving Emissions
- **Changan** reveal the combustion system development of the second generation 'new engine' family
- **University of Bath** share their work on an application of a rotary expander as an energy recovery system for a modern wankel engine

Rob Morgan, Principal Research Fellow, University of Brighton  
Steve Whelan, Global Development and Application Centre Leader, HORIBA MIRA  
Hugh Blaxill, Managing Director, MAHLE Powertrain LLC  
Richard Osborne, Global Technical Expert - Gasoline Combustion, Ricardo  
Sean Harman, Engineering Manager, Ford Motor Company  
Alan Tolley, Group Director, Powertrain, JCB  
Frank Atzler, Chair of Combustion Engines and Drive Train Systems, Technische Universität Dresden

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# PROGRAMME

**WEDNESDAY 11 DECEMBER 2019**

08:30 REGISTRATION AND REFRESHMENTS

**09:00 CHAIR'S WELCOME AND INTRODUCTION**

**09:10 MORNING KEYNOTE: OFF HIGHWAY AND HEAVY DUTY COMBUSTION ENGINES: HOW DO WE ACHIEVE ZERO EMISSIONS?**

Paul McCarthy, Chief Engineer, Performance, Controls and Integration, JCB  
Alan Tolley, Group Director, Powertrain, JCB

## **SESSION 1: INTERNAL COMBUSTION ENGINES AND COMBUSTION ELEMENTS**

**09:40 ASSESSING THE LOW LOAD CHALLENGE FOR JET IGNITION ENGINE OPERATION**

Michael Bunce, Hugh Blaxill, Nathan Peters, Sai Pothuraju Subramanyam, MAHLE Powertrain LLC

**10:00 EFFECTS OF INJECTION TIMING OF DME ON MICRO FLAME IGNITION (MFI) COMBUSTION IN A GASOLINE ENGINE**

Tao Chen, Yifang Feng, Hui Xie, Tianjin University and Xinyan Wang, Hua Zhao, Brunel University London

**10:20 QUESTION AND ANSWER SESSION**

10:35 NETWORKING REFRESHMENT BREAK

## **SESSION 2: HYBRID APPLICATIONS**

**11:05 THE DEVELOPMENT AND TESTING OF A FREE-PISTON ENGINE GENERATOR FOR HYBRID ELECTRIC-VEHICLE APPLICATIONS**

Andrew Smallbone and Tony Roskilly, Swan Centre, Newcastle University

**11:25 OPTIMISING GASOLINE ENGINES FOR FUTURE HYBRID ELECTRIC VEHICLES**

Roscoe Sellers, Richard Osborne and David Sweet, Ricardo UK Ltd

**11:45 MAHLE MODULAR HYBRID POWERTRAIN**

Mike Bassett, Martin Berger, Simon Reader, Ian Reynolds, MAHLE Powertrain Limited and Adrian Cooper, MAHLE Powertrain GmbH

**12:05 QUESTION AND ANSWER SESSION**

12:20 NETWORKING LUNCH

**13:20 AFTERNOON KEYNOTE: FUTURE TRANSPORT CHALLENGES AND OPPORTUNITIES**

Andy Ward, Head of Core R&D, Ricardo Ltd.

## **SESSION 3: EMISSIONS AND AFTER-TREATMENT**

**13:50 MODELING OF THREE-WAY CATALYST DYNAMICS DURING FAST TRANSIENT OPERATION FOR A CNG HEAVY-DUTY ENGINE**

Carlo Beatrice, Dario Di Maio, Valentina Fraioli, Istituto Motori CNR, Stefano Golini, Francesco Giovanni Rutigliano, FPT Industrial SpA and Marco Riccardi, Università degli Studi di Napoli "Federico II"

**14:10 USE OF CRYOGENIC FLUIDS FOR ZERO TOXIC EMISSION HYBRID ENGINES**

Konstantina Vogiatzaki, Robert Morgan, Penny Atkins, Guillaume DeSercey, Simon Harvey, Morgan Heikal, Jaya Vignesh MadanaGopal, University of Brighton and Andrew Atkins, Ricardo

**14:30 FORECASTING THE IMPLICATIONS OF EURO 7 ON THE POWERTRAIN SUPPLY CHAIN**

Graham Evans and Michael Southcott, IHS Markit

**14:50 QUESTION AND ANSWER SESSION**

15:10 NETWORKING REFRESHMENT BREAK

## **SESSION 4: FUELS AND FUEL INJECTION**

**15:40 DEFOSSILISING TRANSPORT WITH SUSTAINABLE, SYNTHETIC, CARBON BASED FUELS**

Matthew G. Davidson, Professor of Sustainable Chemical Technologies and Director of the Centre for Sustainable Chemical Technologies at the University of Bath, UK

**16:00 EVALUATING THE POTENTIAL OF A LONG CARBON CHAIN OXYGENATE (OCTANOL) ON SOOT REDUCTION IN DIESEL ENGINES**

Irene Ruiz-Rodriguez, Thanos Megaritis, Lionel Ganippa, Brunel University London and Roger Cracknell and Michael Parkes, Shell Global Solutions

**16:20 IMPINGEMENT BEHAVIOR OF SINGLE DROPLET ON LIQUID FILM**

Lili Lu, Imperial College London and Yiqiang Pei, Jing Qin, Qingyang Zhu, Zhenshan Peng, Tianjin University

**16:40 QUESTION AND ANSWER SESSION**

**16:55 CHAIR'S CLOSING REMARKS**

17:00 END OF CONFERENCE DAY ONE

# PROGRAMME

## THURSDAY 12 DECEMBER 2019

08:30 REGISTRATION AND REFRESHMENTS

09:00 **CHAIR'S WELCOME AND INTRODUCTIONS**

09:10 **MORNING KEYNOTE: THE INTERNAL COMBUSTION ENGINE OF THE FUTURE – CONTRADICTION OR REALITY?**

Carsten Weber, Manager Powertrain Research and Advanced Engineering Europe, Ford Motor Company

### SESSION 5: INCREASING EFFICIENCY AND REDUCING EMISSIONS

09:40 **MEETING THE CHALLENGES OF REAL DRIVING EMISSIONS WITH ADVANCED POWERTRAIN DEVELOPMENT TOOLS AND TECHNIQUES**

Luke Bates, Alex Mason, Richard Mumby, Phil Roberts, Steve Whelan, HORIBA MIRA

10:00 **EFFECTIVE ENGINE TECHNOLOGIES FOR OPTIMUM EFFICIENCY AND EMISSION CONTROL OF THE HEAVY-DUTY DIESEL ENGINE**

Wei Guan, Hua Zhao, Brunel University London and Zhibo Ban, Tiejian Lin, Guangxi Yuchai Machinery Company and Zunqing Zheng, Tianjin University

10:20 **IMPROVEMENTS IN DRIVE-CYCLE FUEL CONSUMPTION BY CO-OPTIMISATION OF ENGINE AND FUEL**

Heather Hamje, Concawe, John Williams, BP, Andreas Kolbeck, Shell, Walter Mirabella, Lyondell Basel, Jeff Farenback-Brateman, ExxonMobil Research & Engineering, Cyrille Callu, Total, Dolores Cardenas, Repsol and Elena Rebesco, ENI

10:40 **QUESTION AND ANSWER SESSION**

11:00 NETWORKING REFRESHMENT BREAK

### SESSION 6: INTERNAL COMBUSTION ENGINES

11:30 **MEASUREMENT OF SCAVENGING EFFICIENCY AND ITS EFFECT ON THE TWO-STROKE ENGINE**

Chenxi Wang, Yiqiang Pei, Jing Qin, Tianjin University and Ziwang Ye, Mengmeng Dong, Internal Combustion Engine Research Institute

11:50 **INVESTIGATION ON COMBINING PARTIALLY PREMIXED COMPRESSION IGNITION AND DIFFUSION COMBUSTION FOR GASOLINE COMPRESSION IGNITION**

Yu Zhang, Kukwon Cho and Mark Sellnau, Aramco Services Company, Aramco Research Centre

12:10 **APPLICATION OF A ROTARY EXPANDER AS AN ENERGY RECOVERY SYSTEM FOR A MODERN WANKEL ENGINE**

Giovanni Vorraro, James W.G. Turner, Md Rezaul Islam, Matt Turner, University of Bath

12:30 **QUESTION AND ANSWER SESSION**

12:45 NETWORKING LUNCH

13:45 **AFTERNOON OEM KEYNOTE PRESENTATION**

Speaker to be announced

### SESSION 7: SIMULATION OF INTERNAL COMBUSTION ENGINES

14:15 **IC ENGINE SIMULATION WITH CONVERGE**

Chris Riley, Business Development Manager, Convergent Science

14:35 **ONE-DIMENSIONAL SIMULATION OF THE PRESSURISED MOTORING METHOD: AN APPROACH TOWARDS RELIABLE MECHANICAL FRICTION PREDICTION**

Mario Farrugia, Carl Caruana, University of Malta, Gilbert Sammut, Jaguar Land Rover and Emiliano Pipitone, University of Palermo

14:55 **QUESTION AND ANSWER SESSION**

15:10 NETWORKING REFRESHMENT BREAK

### SESSION 8 : DESIGN AND DEVELOPMENT OF INTERNAL COMBUSTION ENGINES

15:40 **COMBUSTION SYSTEM DEVELOPMENT OF THE SECOND GENERATION 'NEW ENGINE' FAMILY FOR THE CHINESE MARKET**

Benjamin Waters, Lead engineer; Performance and Emissions team and Martin Joyce, Engines Group Chief Engineer, Changan UK R&D Centre Limited

16:00 **QUESTION AND ANSWER SESSION**

16:10 **CHAIR'S CLOSING REMARKS**

16:15 END OF CONFERENCE

**For the most up-to-date and detailed programme for the event, please visit:**  
[www.imeche.org/icengines](http://www.imeche.org/icengines)

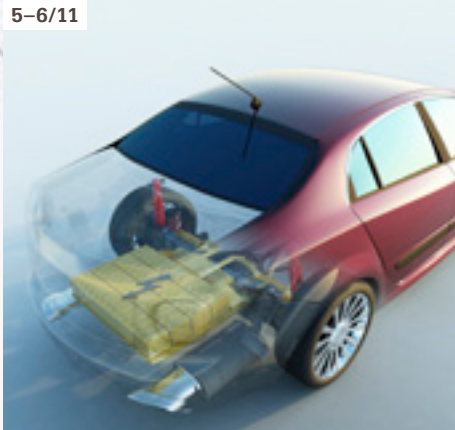
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- The Institution is not responsible for the views or opinions expressed by individual speakers.

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## Featured Events

5-6/11



5-6 November 2019  
Kia Oval, London

### **INTERNATIONAL EV BATTERIES 2019: COST-EFFECTIVE ENGINEERING FOR HYBRID AND ELECTRIC VEHICLES**

International EV Batteries 2019 will bring you cutting-edge technical updates from OEMs, researchers and regulators. Hear from mechanical engineers on how they are cost-effectively increasing range, guaranteeing performance and ensuring durability and range of electric and hybrid vehicles. Understand how industry is planning to meet future demands on material resourcing, manufacturing, recycling and second life of EV and HEV batteries.

#### KEY SPEAKERS INCLUDE:

- Parmjeet Plahe, Senior Manager High Voltage Battery Design, Jaguar Land Rover
- Duncan Engeham, Global Engineering Director - Battery Systems, Cummins
- Daniel Gribben, Engineering Manager, Envision AESC
- Cedric Rouaud, Global Technical Expert - Thermal Systems, Ricardo

[www.imeche.org/evbatteries](http://www.imeche.org/evbatteries)

21/11



21 November 2019  
Science and Industry Museum,  
Manchester

### **INSTITUTION OF MECHANICAL ENGINEERS ANNUAL DINNER 2019**

Home to a cornucopia of engineering heritage – including Whitworth's planing machine, one of the world's largest collections of working steam mill engines and one of the first ever rechargeable batteries – the Science and Industry Museum will provide an inspirational backdrop to the evening's festivities.

Why not take this perfect opportunity to entertain clients, network with colleagues and reward employees in the company of the most influential engineers and industry leaders?

There are many ways to participate, ranging from individual tickets to event sponsorship. Capacity is strictly limited, and tables and individual tickets are offered on a first-come, first-served basis, so ensure you take advantage of the early booking discount and register today to avoid disappointment.

[www.imeche.org/annualdinner](http://www.imeche.org/annualdinner)

13-14/05



13-14 May 2020  
Twickenham Stadium, London

### **14TH INTERNATIONAL CONFERENCE ON TURBOCHARGERS AND TURBOCHARGING**

The world leading International Conference on Turbochargers and Turbocharging returns in 2020. It will address current and novel turbocharging system choices and components with a renewed emphasis to address the challenges posed by emission regulations and market trends.

The conference will focus on the development of air management solutions and waste heat recovery ideas to support thermal propulsion systems leading to high thermal efficiency and low exhaust emissions. These can be in the form of internal combustion engines or other propulsion technologies (eg. Fuel cell) in both direct drive and hybridised configuration. It particularly focuses on turbochargers, superchargers, waste heat recovery turbines and related air managements components in both electrical and mechanical form.

There's never been a better time to get involved: join us in May to benefit from the specialist community of engineering thought-leaders from around the world.

[www.imeche.org/turbo](http://www.imeche.org/turbo)

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## WHO SHOULD ATTEND?

All engineers, OEMs, tier one suppliers and researchers involved with engine and powertrain systems will benefit from the content, knowledge sharing and networking opportunities, particularly:

- Powertrain Engineers
- Engine Design Engineers
- Powertrain Development Engineers
- Engine Development Engineers
- Hybridisation Engineers
- Applications Engineers
- Engine Testing Engineers
- Research and Development Engineer
- Emissions Engineers
- Performance Engineers

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## FEEDBACK FROM PREVIOUS EVENTS:

“A GREAT INSIGHT INTO THE DIFFERENT STANCES IN INDUSTRY.”

Graduate Trainee, Perkins Engines Co. Ltd.

“AN INTERESTING AND INFORMATIVE EVENT, FILLED WITH GOOD DISCUSSION”

Performance Simulation Engineer, Mercedes AMG HPP

“I FOUND THIS A VERY USEFUL CONFERENCE, WITH VERY RELEVANT TOPICS AND IT WAS WELL ATTENDED. THE CONVERSATIONS THIS PROMOTED WERE VERY VALUABLE”

Principal Engineer, Cosworth

“INTERESTING RANGE OF TOPICS COVERED THAT GAVE ME FOOD FOR THOUGHT AND GOOD TO HAVE THE OPPORTUNITY TO MEET/NETWORK WITH OTHER LIKE-MINDED PEOPLE.”

Applications Engineer, Federal-Mogul Coventry Ltd.

“THE IMECHE’S ORGANISATION OF THIS CONFERENCE WAS EXCELLENT. THERE WAS A GOOD SPREAD OF PAPERS - FROM STRATEGIC OVERVIEW TO HIGHLY TECHNICAL - AND THE CONFERENCE WAS ALSO AN INTERESTING NETWORKING OPPORTUNITY.”

Project Director, Covaxe Ltd

“THIS HAS BEEN A VERY GOOD EVENT. THE ATMOSPHERE AND POSITIVE NETWORKING HAVE BEEN VERY APPARENT.”

Manager, Combustion & Emissions Research, Jaguar Land Rover

“PROVIDES AN IDEAL ENVIRONMENT TO SHOWCASE OUR CAPABILITIES & KNOWLEDGE.”

Sales & Marketing Manager, MAHLE Powertrain

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# INSTITUTION OF MECHANICAL ENGINEERS ANNUAL DINNER 2019

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**21 November 2019**

Science and Industry Museum, Manchester



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# HOW TO BOOK YOUR PLACE

## FEES AND CHARGES

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

Delegate Type	EARLY BIRD RATE Until 11 October 2019	STANDARD RATE
Member, Institution of Mechanical Engineers / Supporting Organisation	£560 + VAT = £672	£660 + VAT = £792
Non-member	£680 + VAT = £816	£805 + VAT = £966
Full-time Student/Retired	£225 + VAT = £270	£265 + VAT = £318
Presenting Author	£199 + VAT = £238.80	£240 + VAT = £288

## THREE WAYS TO BOOK

- 1 online:  
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- 2 email:  
[eventenquiries@imeche.org](mailto:eventenquiries@imeche.org)
- 3 phone:  
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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

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### Cancellation

For a refund (minus £25+VAT admin charge), cancellations must be received at least 30 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 the 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. 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.

### 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.

### CONFERENCE VENUE

Fazeley Studios  
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Birmingham  
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## OTHER EVENTS TO LOOK FOR



### INTERNATIONAL EV BATTERIES 2019: COST-EFFECTIVE ENGINEERING FOR HYBRID AND ELECTRIC VEHICLES

5-6 November 2019, London

This two-day conference address the critical engineering challenges being faced and the latest innovations for cost-effectively increasing range, enhancing performance and improving durability.

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