Engine Emissions Measurement
Monday 24 – Friday 28 June 2019
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Course director
Professor Gordon Andrews
School of Chemical and Process Engineering

Course aims
A specialist course, with extensive participation by presenters from Horiba Instruments that is aimed at teaching the latest developments in automotive and industrial engine emissions measurement procedures and regulation, compliance procedures. The course is directed at both emissions legislation compliance and at engine and catalyst development for low emissions. Passenger car emissions legislation requirement measurement are fully detailed for ultra-low emission Si and diesel vehicles. Heavy duty diesel emissions legislation measurement methods for on-road and off-road engine uses are fully described, including the latest European proposals for measurement of particle number as well as mass. The specialist areas of time resolved emissions in test cycles for emissions control engine development is also covered in detail. The accurate determination of CO₂ emissions and fuel consumption from the legislated test cycles is a major theme of the course. The course also covers the fast growing area of in-vehicle emissions measurement for real world driving emissions measurement. Several areas are covered that are currently not regulated in the USA but are in the USA and maybe regulated in future in Europe. This includes VOC speciation for ozone forming potential evaluation as well as air toxics and PAH speciation of diesel particulates for carcinogenic toxics emission evaluations.

Who should attend
The course is aimed at engine emissions measurement personnel and their supervisors. It is particularly suitable for newly appointed staff in these areas, who need to learn quickly about emission measurement methods. It is also relevant to operators of diesel and gas turbine electric generation equipment who have to make emissions measurements, perhaps for the first time, under the Environmental Protection Act. The course covers both existing instrumentation and new developments in emissions measurement techniques and instruments, and will be of interest to those who wish to learn about the latest developments in emissions measurement technology.

Accreditation
This course is in association with the Institution of Diesel and Gas Turbine Engineers, which is devoted to the advancement of Diesel and Gas Engines, Gas Turbines and related products and technology.

What our previous delegates say:
“
A great course for anyone who needs a broad understanding of what is involved in tackling vehicle emissions and meeting legislation”
Vehicle Certification Agency

“A great course! It provided a great deal of technical information, instrument theory, regulation background as well as real world problems.”
Nissan

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Programme

Monday 24 June 2019
Engine Test Bed Direct Exhaust Gas Analysis for Development Work and for Test Cycle Modal Analysis

08.00 Registration and coffee
08.30 Health hazards of particulates and particulate emissions – the four regulated pollutants for SI engine emissions
Professor Gordon Andrews, Energy Research Institute, University of Leeds
10.00 Coffee
10.15 Non-dispersive infra-red exhaust emissions analysis: cold and hot gas
Rick Spurgeon, HORIBA UK Limited
11.30 Quantum cascade laser infra-red spectroscopic analysis for nitrogen derived components
Rick Spurgeon, HORIBA UK Limited
12.00 Stechiometric engine control development and cold start emissions measurement requirements and the need for fast response emissions analysis
Professor Gordon Andrews, Energy Research Institute, University of Leeds
13.45 Flame ionisation detection of hydrocarbons and chemiluminescent detection of oxides of nitrogen
Rick Spurgeon, HORIBA UK Limited
14.45 EPA 40-CFR-1066 and CFR-1066 regulations
Rick Spurgeon, HORIBA UK Limited
15.45 Tea
16.00 Particulate mass direct exhaust measurements
Professor Gordon Andrews, Energy Research Institute, University of Leeds
16.30 Particle size and fuel analysis
Professor Gordon Andrews, Energy Research Institute, University of Leeds
17.30 End of day one
Welcome reception

Tuesday 25 June 2019
Passenger Car Emissions Measurement – 1

08.15 Registration and coffee
08.30 Transient tube oil consumption measurement and the SSG technique during emissions testing
Professor Gordon Andrews, Energy Research Institute, University of Leeds
09.00 Heated sample handling systems for exhaust emissions measurements
Les Hill, HORIBA UK Limited
10.00 Coffee
10.15 Dilution tunnels
Professor Gordon Andrews, Energy Research Institute, University of Leeds
11.15 The origins and principles of legislated CVS sampling systems and their relation to modal analysis
Professor Gordon Andrews, Energy Research Institute, University of Leeds
11.45 MEXA 1370 PM On-Line PM mass measurement and speciation
Yoshinori Otsuki, HORIBA JAPAN
12.15 Lunch
13.00 Legislative chassis dynamometer test procedures
Rick Spurgeon, HORIBA UK Limited
14.00 On-road in-vehicle direct exhaust sampling for RDE real world driving in congested traffic: Introduction to the reason for RDE, the RDE cycle limits and impacts of traffic congestion on emissions
Professor Gordon Andrews, Energy Research Institute, University of Leeds
15.00 Tea
15.15 On-road in – vehicle gaseous emissions analysis
Yoshinori Otsuki, HORIBA JAPAN
16.30 On-road in – particulate emissions analysis
Yoshinori Otsuki, HORIBA JAPAN
17.30 End of day two
19.00 Course Dinner

Wednesday 26 June 2019
Passenger Car Emissions Measurement – 2

08.15 Registration and coffee
08.30 Constant volume sampling (CVS) systems for light duty vehicles
Les Hill, HORIBA UK Limited
09.30 Integrated gas analysis systems Part 1 Engine cell applications
Rick Spurgeon, HORIBA UK Limited
10.30 Coffee
10.45 Continuous PM measurement techniques using differential HFPDs and soot particle detection
Yoshinori Otsuki, HORIBA JAPAN
11.30 Emissions measurement procedures for fast response emissions analysis on chassis dynamometers
Les Hill, HORIBA UK Limited
12.30 Lunch
13.15 Integrated gas analysis systems part 2: Chassis cell applications
Rick Spurgeon, HORIBA UK Limited
14.30 Emissions measurement requirements created by engine TWC, catalytic lean NOx control (SCR and NSC), PM traps and GHS legislation
Professor Gordon Andrews, Energy Research Institute, University of Leeds
15.30 Tea
15.45 Measurement problems for particle size and number and mass distribution
Professor Gordon Andrews, Energy Research Institute, University of Leeds
17.00 End of day three

Thursday 27 June 2019
Heavy Duty Diesel Emissions Measurement

08.15 Registration and coffee
08.30 Particle number counting legislative methods
Yoshinori Otsuki, HORIBA JAPAN
08.45 Heavy Duty Diesel (HDD) RDE and PEMs
Dr David Cooper, Volvo Group
10.45 Coffee
11.00 Legislative engine dynamometer test procedures
Rick Spurgeon, HORIBA UK Limited
11.45 Adventic HC, NOx, CO, CO₂ and soot particulate measurements in IC engines
Mark Peacham, Cambustion Ltd
12.30 Lunch
14.00 On-road in-vehicle direct exhaust sampling for RDE real world driving in congested traffic: Introduction to the reason for RDE, the RDE cycle limits and impacts of traffic congestion on emissions
Professor Gordon Andrews, Energy Research Institute, University of Leeds
15.00 Tea
15.45 On-line analysis of non-regulated pollutants using alternative techniques
Les Hill, HORIBA UK Limited
16.30 Experience in using FTIR and mass spectrometry instrumentation
Yoshinori Otsuki, HORIBA JAPAN
17.15 End of day four

Friday 28 June 2019
Engine VOC and PAH Emissions

08.15 Registration and coffee
08.30 NVCS designs for HD engines/vehicles
Les Hill, HORIBA UK Limited
09.15 Heavy duty hybrid engine and vehicle testing
Les Hill, HORIBA UK Limited
10.30 Coffee
10.50 Ultra low emissions from diesel vehicles and engines
Les Hill, HORIBA UK Limited
12.30 Lunch
13.15 HC speciation and carbon number analysis for determining reactively adjusted AMDG, including some fuel and engine effects
Professor Gordon Andrews, Energy Research Institute, University of Leeds
14.15 Tea
14.30 Particulate PAH analysis
Professor Paul Williams, Energy Research Institute, University of Leeds
15.15 Off-line analysis of PAH: Coupled chromatography methods in the analysis of PAH and their derivatives
Dr Amanda Lea-Langton, School of Mechanical, Aerospace and Civil Engineering, The University of Manchester
16.00 End of day five and course
Further details

Venue
The venue for the course is Weetwood Hall Conference Centre and Hotel which offers first-class hotel facilities, a business centre and ample parking facilities.

Weetwood Hall Hotel is ideally situated 15 minutes north of the centre of Leeds in wooded grounds at the junction of the Otley Road and the outer ring road. It is just 15 minutes from Leeds Bradford International Airport and a short distance from the A1, M1, M606, M621 and M62 motorways.

Further details can be found at www.weetwood.co.uk

Course fees
The following course fees include the cost of tuition, course materials, lunches and light refreshments for the day(s) of attendance:

£1800 Full five days
£450 Any one day

Delegates are responsible for their own evening meals except on Tuesday 25 June when the course dinner is included.

Accommodation
Bed and breakfast accommodation is available at the course venue, Weetwood Hall Conference Centre and Hotel. We have negotiated the following special rates per night:

Sunday evening, bed and breakfast £82
Monday – Thursday, evening, bed and breakfast £86

Hotel accommodation at the course venue can be booked by contacting the hotel direct on T: 0113 230 6000 (Emma Barker), E: reservations@weetwood.co.uk Please quote “University of Leeds CPD Unit” and the course name when contacting Weetwood Hall to book accommodation.

Please note that accommodation bookings must be made two weeks before the course commences at the latest to qualify for the special rates and to guarantee room availability. Any accommodation requests after this date will be subject to availability and rates. A list of alternative hotels is available on request.

Course dinner
The course dinner will be held at a Leeds city centre restaurant and is included in the course fee. This will take place on Tuesday evening and transport from and to Weetwood Hall Hotel is provided. The dress code is smart casual. If you would like to attend please indicate when booking.

Accessibility
Please let us know if you have any specific requirements including any access or dietary requirements in relation to this course.

How to Book
Booking for this course should be completed through our secure online store using debit or credit card. To complete your booking please follow the instructions below:

Online Booking
1. Access our online store at: https://store.leeds.ac.uk
2. Select Conferences and Events in the left-hand navigation bar.
3. Select CPD Faculty of Engineering
4. Select the course or event for which you wish to register and click on “Book”.
5. If you are a new user, please follow the instructions to register.
6. Complete the application process as directed by the booking system.

You will receive an automatic confirmation email within 24 hours of your booking.

Our privacy notice tells you what to expect us to do with your personal information when you make contact with us or use one of our services: https://tinyurl.com/CPD-Privacy-Notice

For online booking queries and for all other enquiries please contact:
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E: cpd@engineering.leeds.ac.uk
W: www.engineering.leeds.ac.uk/short-courses
@LeedsUniCPD
CPD, Conference and Events Unit, University of Leeds

Terms and conditions for booking
Payment in full should accompany your booking. The course fee is exempt from VAT. Fees must be paid in full no later than 15 working days before the course commences. Failure to pay may result in attendance being refused. Registrations are accepted on the understanding that the printed programme is given in good faith but may have to be re-scheduled or the speakers changed for reasons outside our control. The University of Leeds reserves the right to cancel or postpone the course, in which case fees will be refunded in full. In the event of cancellation, the University will not be held liable for delegates travel or accommodation expenses. Delegates will receive a full refund for cancellations made within 7 days of online booking, except where the booking has been made for an event commencing within the next 7 days. Where a delegate wishes to cancel a registration after this 7 day period, written cancellations received up to 15 working days before the course will be subject to an administrative charge of 20% of the total remittance. After this date the full fee is chargeable and no refunds will be made, this also applies for non-attendance but copies of the course documents will be sent. Substitutions may be made at any time. If you are unable to complete your registration using the online booking system please contact the CPD, Conference & Events Unit to discuss alternative arrangements. The CPD Unit take your privacy seriously and we will only use your information to provide information on our CPD courses and relevant engineering events. We will not pass your details to any other organisations. If you have opted in to receive details of future CPD courses from us you can unsubscribe at any time by emailing us at cpd@engineering.leeds.ac.uk and your details will be removed from our database.