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 gaseous and particulate emissions – the four regulated pollutants for si and diesel engines
  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 Stoichiometric 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
13.00 Lunch
13.45 Flame ionisation detection of hydrocarbons and chemiluminescent detection of oxides of nitrogen
  Rick Spurgeon, HORIBA UK Limited
14.45 EPA 40-CFR-1065 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 SOF and fuel/lube analysis
  Professor Gordon Andrews, Energy Research Institute, University of Leeds
17.30 End of day one
  Welcome reception Stables Pub, Weetwood Hall

TUESDAY 25 JUNE 2019
PASSENGER CAR EMISSIONS MEASUREMENT - 1

08.15 Registration and coffee
08.30 Transient lube oil consumption measurement and the SO2 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 – 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 HFIDs and soot particle detection
Yoshinori Otsuki, HORIBA JAPAN

11.30 Emissions measurement procedures for Hybrid Electrical Vehicles on chassis dynamoseters
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 GHG 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

09.30 Heavy Duty Diesel (HDD) RDE and PEMs
Dr David Cooper, Volvo Group Trucks Technology

10.45 Coffee

11.00 Legislative engine dynamometer test procedures
Rick Spurgeon, HORIBA UK Limited

11.45 Transient HC, NOx, CO, CO2 and particle measurements in IC engines
Mark Peckham, Cambustion Ltd

12.30 Lunch

13.15 Enhanced CVS and emission analysis for gasoline SULEV / EU Stage 5/6 legislation
Les Hill, HORIBA UK Limited

14.45 Alternative techniques to CVS including direct exhaust volume measurement
Les Hill, HORIBA UK Limited

15.30 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
Tony Collier, Powertrain Testing Europe, Ford Motor Company

17.15 End of day four
**FRIDAY 28 JUNE 2019**

**ENGINE VOC AND PAH EMISSIONS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tr>
<td>08.15</td>
<td>Registration and Coffee</td>
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<tr>
<td>08.30</td>
<td><strong>Current CVS designs for HD engines/vehicles</strong></td>
<td>Les Hill, HORIBA UK Limited</td>
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<td>09.15</td>
<td><strong>Heavy duty hybrid engine and vehicle testing</strong></td>
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<td>10.00</td>
<td>Coffee</td>
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<td>10.15</td>
<td><strong>Ultra low emissions from diesel vehicles and engines</strong></td>
<td>Les Hill, HORIBA UK Limited</td>
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<td>11.30</td>
<td><strong>Design principles for partial flow systems for PM mass</strong></td>
<td>Yoshinori Otsuki, HORIBA JAPAN</td>
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<td>12.30</td>
<td>Lunch</td>
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<tr>
<td>13.15</td>
<td><strong>HC speciation and carbonyl analysis for determining reactivity adjusted NMOG, including some fuel and engine effects</strong></td>
<td>Professor Gordon Andrews, Energy Research Institute, University of Leeds</td>
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<td>14.15</td>
<td>Tea</td>
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<td>14.30</td>
<td><strong>Particulate PAH analysis</strong></td>
<td>Professor Paul Williams, Energy Research Institute, University of Leeds</td>
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<td>15.15</td>
<td><strong>GC-MS in the analysis of PAH, Coupled chromatography methods in the analysis of PAH and their derivatives</strong></td>
<td>Dr Amanda Lea-Langton, School of Mechanical, Aerospace and Civil Engineering The University of Manchester</td>
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<td>16.00</td>
<td>End of day five and course</td>
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