OnBoard Diagnostics - Day 1
Session Code: OBD100
Room Indiana A-E  Session Time: ALL DAY
Organizers - Paul A. Baltusis, Ford Motor Co.; Bernard Challen, Shoreham Services; Michael J. McCarthy, California Air Resources Board; John Van Gilder, General Motors Company; Hal Zatorski, Chrysler Group LLC; Andrew Zettel, General Motors Co.; Benjamin Zwissler, Cummins Inc.

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<tr>
<th>Time</th>
<th>Paper No.</th>
<th>Title</th>
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<tbody>
<tr>
<td>8:15 a.m.</td>
<td>ORAL ONLY</td>
<td>Keynote Address</td>
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<td>John German, International Council On Clean Transport</td>
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<tr>
<td>9:00 a.m.</td>
<td>ORAL ONLY</td>
<td>CARB Update on Light-Duty</td>
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<td>Mike Regenfuss, California Air Resources Board</td>
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<tr>
<td>9:30 a.m.</td>
<td>ORAL ONLY</td>
<td>OBD Worldwide Requirements</td>
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<td>OBD system requirements were first developed by the California Air Resources Board, the U.S. Environmental Protection Agency, and the European Commission. New OBD requirements should be as consistent as possible with existing requirements to maximize reliability and to minimize system complexity, proliferation of configurations, and consumer cost. New OBD requirements from around the world are briefly reviewed and most are consistent with the original U.S. and European requirements. Worldwide OBD requirements are being further harmonized under the United Nations, Economic Commission for Europe, World Forum for Harmonization of Vehicle Regulations (WP29). David H. Ferris, General Motors Co.</td>
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<tr>
<td>10:00 a.m.</td>
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<td>BREAK</td>
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<tr>
<td>10:30 a.m.</td>
<td>ORAL ONLY</td>
<td>Updated SAE Standards (J2012, J1979, J1930, J1699)</td>
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<td>Paul A. Baltusis, Ford Motor Co.; Robert Gruszczynski, Volkswagen of America</td>
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<td>11:10 a.m.</td>
<td>ORAL ONLY</td>
<td>OBD Experiences: Chrysler Perspective</td>
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<td>Hal Zatorski, Chrysler Group LLC</td>
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<td>11:50 a.m.</td>
<td>ORAL ONLY</td>
<td>OBD Experience: Volkswagen Perspective</td>
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<td>This paper will discuss Volkswagen’s view of selected OBD challenges. Remote OBD challenges &amp; SAE J3005, Insurance telematics challenges and UDS as alternative OBD protocol. Robert Gruszczynski, Volkswagen of America</td>
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<td>1:30 p.m.</td>
<td>ORAL ONLY</td>
<td>OBD Experiences: Toyota Perspective</td>
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<td>Morton M. Smith, Toyota</td>
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</table>
2:00 p.m.  ORAL ONLY  
**SUBARU’s Experience with Test-Out of OBD Monitoring for Individual Components and Systems**

The purpose of this presentation is to share Subaru’s experience to request Test-Out for OBD monitors related to the Engine Stop Start System of the SUBARU Hybrid Electric Vehicle. In this presentation, the worst case driving cycle for Test-Out will be shown, and the investigations and analysis for determining the worst case driving cycle will be explained. Using this worst case driving cycle, Subaru demonstrated that emissions were not adversely affected by malfunctioned components of the Engine Stop Start System.

Yosuke Ohtomo, Subaru (Fuji Heavy Industries Ltd.)

2:30 p.m.  ORAL ONLY  
**Brazilian OBD Regulations and Local Market Conditions**

Brazil is the 4th largest automotive market in the world, however, it has unique requirements for emissions, OBD regulations, fuel specifications and usage. The requirements for the large truck fleets and flex-fuel vehicles (FFVs) are not well understood by many people in the international automotive engineering community. This presentation will focus on the Brazilian OBD regulations and local market conditions for passenger, light and heavy duty commercial vehicles. There are different regulations for gasoline, diesel and heavy duty vehicles as well as different phase-in timing for each regulation, e.g. OBDBr-1, OBDBr-2, OBDBr-D and HD OBD. Most of the Brazilian OBD requirements are based on the European Regulations, but they were significantly changed for local conditions, for example: de-rating for heavy duty applications was reduced to account for average high road gradients; monitor demonstration, A/F Ratio enablement ranges and malfunction thresholds were adjusted for flex fuels and the applicable tailpipe emission standards. Assuming that Brazil calibrations can be carry-over from EOBD calibrations (unfortunately, a common idea) will most likely lead to inaccurate program assumptions which are not compliant with Brazilian regulations.

Michel Zambon Alves, Ford Motor Co. Brasil Ltda

3:00 p.m.  BREAK

3:30 p.m.  ORAL ONLY  
**Hybrids & Electrification Update**

Andrew Zettel, General Motors Co.

4:00 p.m.  ORAL ONLY  
**Function Safety Process, Requirements, and Principles**

Functional safety is a process implemented by many companies to satisfy system safety requirements. These safety requirements define the product performance not only under normal use conditions, but also for various failure modes. The functional safety process covers all of the stages of the product, from conception to production. The process and principles used to confirm a system meets system safety requirements will be examined. This includes strategies for internal diagnostics, rationality diagnostics, sensor redundancy, sensor diagnostics, and remediation of possible failure.

Aubrey Downs, GM

4:30 p.m.  ORAL ONLY  
**12 Volt Stop/Start Technology**

12 Volt Stop/Start Technology is a green technology that can be applied to non-hybrid vehicles. The technology reduces automotive internal combustion engine CO2 emissions and increases fuel economy. It does so by automatically stopping the engine when a driver brings the vehicle to a stop and subsequently restarting the engine when the driver demands propulsion. The basic principles of how the technology works will be provided. Some of the technical aspects of diagnosing the system to meet On Board Diagnostic II regulatory requirements will be discussed.

Jeff S. Richards, General Motors

5:00 p.m.  ORAL ONLY  
**Ford Experiences**

Paul A. Baltusis, Ford Motor Co.
Thursday, September 26

BREAKOUT SESSION - Diesel Misfire Monitoring

Session Code: OBD700
Room Florida
Session Time: 10:15 a.m.
Organizers - David Mathews, GM Powertrain

Thursday, September 26

BREAKOUT SESSION - Communication Standards

Session Code: OBD600
Room Illinois
Session Time: 10:15 a.m.
Chairpersons - Paul A. Baltusis, Ford Motor Co.; Mark Stepper, Cummins Inc.

Thursday, September 26

OnBoard Diagnostics - Day 2

Session Code: OBD200
Room Indiana A-E
Session Time: ALL DAY

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<th>Time</th>
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<tr>
<td>8:15 a.m.</td>
<td>ORAL ONLY</td>
<td>Question / Answer Session with Organizers</td>
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<td>Moderators - Bernard Challen, Shoreham Services</td>
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<td>Panelists - Paul A. Baltusis, Ford Motor Co.; Mike Regenfuss, California Air Resources Board; John Van Gilder, General Motors Company; Hal Zatorski, Chrysler Group LLC; Andrew Zettel, General Motors Co.; Benjamin Zwissler, Cummins Inc.; Bernard Challen, Shoreham Services</td>
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<tr>
<td>9:15 a.m.</td>
<td>ORAL ONLY</td>
<td>Full Range Diesel Misfire Detection</td>
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<td>David Mathews, GM Powertrain</td>
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<td>9:45 a.m.</td>
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<td>BREAK</td>
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<td>10:15 a.m.</td>
<td>ORAL ONLY</td>
<td>Breakout Sessions</td>
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<td>Bernard Challen, Shoreham Services</td>
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<td>1:00 p.m.</td>
<td>ORAL ONLY</td>
<td>Summary Reports on Breakout Sessions</td>
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<td>Paul A. Baltusis, Ford Motor Co.; Andrew Zettel, John Van Gilder, General Motors Co.; Hal Zatorski, Chrysler Group LLC; Mark Stepper, Cummins Inc.; David Mathews, GM Powertrain</td>
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<td>2:00 p.m.</td>
<td>ORAL ONLY</td>
<td>The Challenges faced by JLR in Certifying to OBD II</td>
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<td>The presentation covers some of Jaguar Land Rover’s lessons learnt from certifying to ARB’s OBD II regulation over nearly 20 years. Three topics will be discussed, communication with ARB staff, experiences of an ARB investigation into OBD compliance and how JLR collects IUMPR data from small populations of vehicles.</td>
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<td>Martin Haggett, Jaguar Land Rover</td>
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With satellite navigation systems becoming standard equipment in a larger range of vehicles, the possibilities arise to make the vehicle aware of the environment it is driving in and allowing it to adapt to its environment. Within BRACE Automotive’s OBD cluster a case study was performed to understand the implications. The case considered a mid-range delivery truck that would be made aware of whether it would be driving uphill or downhill. Situations where for example; high exhaust temperature is needed for DPF regeneration may be mapped to uphill and higher load driving to benefit in the amount of fuel needed to reach those high exhaust temperatures. Other situations where learning or diagnostic algorithms require a long fuel cut-off phase that can conflict with other fuel cut-off phase algorithms can cause difficulty in getting enough IUMPR. When the coming downhill phases can be predicted, a better scheduling of these algorithms can be done and the fuel cut-off phases that exist can be used more efficiently. Not only does the involvement of GPS introduce new failure modes, it also introduces a new set of errors or tolerances that can impact emissions and fuel economy. The same new set of tolerances makes the definition of a failed and a passed system more complex as well. The baseline emissions of the vehicle in the real world will also deviate even more from the on-cycle dynamometer emissions than in a traditional set-up.

Marcel Romijn, BRACE Automotive

With evermore more stringent emissions thresholds and corresponding OBD thresholds, it becomes increasingly difficult to monitor components by passive observation of their behavior. One possible remedy to this situation is the use of so called Intrusive monitors, where the monitor takes command of an actuator to create better conditions for diagnosis. Intrusive monitors can create the specific conditions that will allow them to more robustly differentiate good from bad components. In many cases, such intrusive action goes accompanied by an increase in emissions. This can happen either because the feed gas constituents are increased, or because the after treatment efficiency is decreased. In this presentation we investigate the effect on tail pipe emissions of some intrusive monitors relevant for the diesel powertrain, and compare this effect against the increased emissions of the failed component. In particular, we propose to demonstrate this effect for an intrusive DOC (diesel oxidation catalyst) monitor and an intrusive SCR (selective catalytic reduction) monitor.

Michiel Van Nieuwstadt, Ford Motor Co.

Heavy Duty Hybrid OBD continues to be a topic of concern for heavy duty hybrid and engine manufacturers and their customers. This presentation will summarize the requirements derived from the OBD regulations that are applicable to heavy duty hybrids as well as the impacts of these requirements on existing and new designs, and the current progress towards understanding the test required and the OBD approval process. The presentation will provide an update on progress towards applying these requirements, overcoming the challenges that exist between hybrid and engine manufacturers to achieve OBD approval, and summarize the efforts in the SAE J1939 Hybrid Communication Task Force to standardize interfaces between hybrid power systems.

Christopher Charles Jones, BAE Systems Inc.

Mike Regenfuss, California Air Resources Board
Thursday, September 26

BREAKOUT SESSION - Diesel Aftertreatment

**Session Code:** OBD400  
**Room Indiana A-E**  
**Session Time:** 10:15 a.m.

**Chairpersons** - John Van Gilder, General Motors Company; Hal Zatorski, Chrysler Group LLC

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**5:00 p.m. ORAL ONLY**  
**Heavy Duty OBD J1939 Communications**

This presentation will discuss the SAE J1939 serial communications interface. The material covered will include a high-level review of J1939, the service tool interface requirements of the various OBD regulations, Q&A update, and the J1939 changes that have occurred since the last year. In addition, the presentation will review the standardized J1939 communications that can be used for accomplishing vehicle functions.

Mark Stepper, Cummins Inc.

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Thursday, September 26

BREAKOUT SESSION - Hybrid OBD

**Session Code:** OBD500  
**Room Michigan/Texas**  
**Session Time:** 10:15 a.m.

**Chairpersons** - Andrew Zettel, General Motors Co.

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Friday, September 27

OnBoard Diagnostics - Day 3

**Session Code:** OBD300  
**Room Indiana A-E**  
**Session Time:** 8:00 a.m.

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<tr>
<td>8:00 a.m.</td>
<td>ORAL ONLY</td>
<td><strong>Panel Discussion: HD/Diesel OBD Topic</strong></td>
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<td><strong>Moderators</strong> - Benjamin Zwissler, Cummins Inc.</td>
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<td><strong>Panelists</strong> - Caetano Ma Calviti, Navistar; Lennart Lindholm, Volvo 3P; Michiel Van Nieuwstadt, Ford Motor Co.;</td>
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<td>9:00 a.m.</td>
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<td><strong>BREAK</strong></td>
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<tr>
<td>9:30 a.m.</td>
<td>ORAL ONLY</td>
<td><strong>Vehicle Integration Challenges in Heavy Duty OBD</strong></td>
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<td>Benjamin Zwissler, Cummins Inc.</td>
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Kinetic Model Based SCR Management to Minimize Base Control Complexity and Maximize OBD Opportunity

For decades, urea based Selective Catalytic Reaction (SCR) has been a prominent aftertreatment methodology for NOx reduction. Although SCR application was predominant in industrial and research areas, the dominant leap in urea distribution and availability paved the way for SCR systems to be used for on-highway applications. Today, the majority of NOx aftertreatment uses SCR. Engineering advancements in urea delivery, hydrolysis, mixing, NH3 distribution, deposits and NH3 slip control, make it a viable solution for future automotive applications. However, recent OBD implementations on SCR systems have unveiled fundamental challenges. One such fundamental challenge is that the SCR system performance management has no direct feedback to measure and control. The lack of feedback requires interesting and complex control logic to determine that urea being dosed meets known NH3 demand and NH3 storage on the SCR catalyst drives the NOx conversion efficiency; efficiency is measured by means of NOx decrease. However, consideration must be given due to the NOx sensor sensitivity to NH3 when used for feedback. In this context, SCR performance monitoring is certainly a challenging task.

Harsha K. Nanjundaswamy, FEV Inc.

Diesel and Gasoline Systems and Automotive Aftermarket

This presentation is intended to share interesting Bosch experiences with respect to the continuously growing scope of OBD requirements. These experiences are shared to assist others in development of robust, compliant OBD systems.

Kevin John Respondek, Robert Bosch LLC; Roland Commenda, Robert Bosch GmbH

Challenges in Design of DOC NMHC Conversion Efficiency Monitor

DOC is an expensive component and improper detection can either lead to certification issues or high warranty costs, along with customer dis-satisfaction. This presentation will discuss Navistar’s experience in design and implementation of DOC NMHC conversion monitor for medium and heavy duty applications.

Vadiraj P. Kulkarni, Navistar Inc.

Granularity of Monitors/PinPointing: How Many Failure Modes Shall an OBD Monitor Be Able To Distinguish?

How many failure modes shall an OBD monitor be able to distinguish? OBD has been a key challenge in the engine control system business for many years. Within these years the OEMs, suppliers, authorities have achieved a shared understanding of the needs as well as the technical feasibilities. Reading the legislation text without this grown experience is not always so easy.

Carsten Bruns, Continental Automotive GmbH

ACEA Euro VI Heavy Duty Soot Sensor Technology Survey and Performance Meta-Study: Update

As a contribution to the European Commission’s review of the feasibility of complying with the 25mg/kWh Euro VI PM OBD threshold limit (OTL) that becomes mandatory from September 2014, ACEA commissioned Ricardo to analyse test data from ACEA stakeholders assessing the performance of various soot sensors on engine test benches, when installed in heavy-duty vehicles and to evaluate commercial readiness of soot sensors.

Andrew David Noble, Ricardo UK, Ltd.

Friday, September 27
Room Indiana A-E

**Session Time:** 8:00 a.m.

**Moderators** - Benjamin Zwissler, Cummins Inc.

**Panelists** - Caetano Ma Calviti, Navistar; Lennart Lindholm, Volvo 3P; Michiel Van Nieuwstadt, Ford Motor Co.;