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DAY 1 MORNING SESSION

TEST AUTOMATION IN REAL AND SIMULATED ENVIRONMENTS

10:15 Vehicle CG and inertia measurements with a review of NHTSA NCAP SSF measurements

Ronald A. Bixel, project analyst, SEA Ltd

Vehicle Centre-of-Gravity (CG) location and Moments of Inertia (MOI) are important properties when analysing vehicle safety as well as handling, ride and performance quality. Automotive and safety engineers rely on accurate measurements of overall vehicle CG and MOI properties, as deriving these properties from information on component level properties is time consuming and expensive. Facilities for making CG and MOI measurements for passenger vehicles (Vehicle Inertia Measurement Facility (VIMF)) and large military vehicles (Vehicle Inertia Parameter Evaluation Rig (VIPER)) will be presented. For the past eight years, the US DOT National Highway Traffic Safety Administration (NHTSA) has been using measured Static Stability Factor (SSF) values as part of its New Car Assessment Programme (NCAP) rating for rollover resistance. The SSF is computed as one-half of the vehicle track width divided by the vehicle CG height (measured using the VIMF). A review of the NHTSA's NCAP SSF, track width and CG height values for various vehicle categories (cars, SUVs, pickup trucks and vans) over the past eight years will be presented. Trends in these values will be highlighted.

10:40 Sled test methodology for achieving enhanced side-impact performance in vehicle design according to pole-impact scenarios

Fausto Mozzarelli, Mechanical Division, CSI SpA

11:05 Manipulating data streams by using FlexRay to FlexRay gateways – challenges, pitfalls and available solutions

Florian Wandling, product line manager, Elektrobit Austria GmbH

The gateway for efficient FlexRay testing and debugging. Structuring complex FlexRay data networks requires assessment of the logical ECU characteristics and the physical signal transmission. This abstract (particularly the final paper) will

describe a set of tools for efficient testing and data manipulation in the FlexRay network as well as for an accelerated development of FlexRay networks. Test engineers often face these FlexRay challenges: on one hand, there are the characteristics of individual Test-ECUs with faults, malfunctions or delays in the signal transmission. On the other hand, and in regard to applications, data must be synchronised and manipulated in one FlexRay network or between two FlexRay networks. The following scenarios will be covered in the final paper: 1) Data manipulation. A frequent test case is the manipulation of the data of a control unit. So far, this has not been possible without an intervention in the control unit itself. This paper will demonstrate how it is possible to change data on the path from the control unit to the bus and, of course, also in the other direction from the bus to the control unit. Thus, simple faults, such as missing signal values, artificial time delays or complex error scenarios, can be spread over signal and frame level, and the reaction of the control unit, as well as the entire network, can be tested.
2) Manipulating and extending signals and frames. The targeted fault interference for the testing of an ECU is, however, only one important topic for the test engineer. Particularly interesting is the integrated testing of all ECUs within the network.
3) Cluster emulation. A further scenario will be highlighted with the proposed article: Testing a test-ECU with another, incomplete, FlexRay cluster requires not only the synchronisation of the data streams between the clusters, but also needs the emulation of the missing nodes on the bus.

11:30 Simple testing and commissioning of control units through the simulation of complex wheel speed sensors
Alexander Hess, product manager/project manager test instruments, Smart Electronic Development GmbH

Advanced control units in modern vehicles require real signals from connected sensors and actuators to achieve their normal operating status. If a control unit does not receive any useful input signals it switches to emergency operation. For the development and testing of control units, this means that the necessary sensors either have to be available or simulated. However, real sensors only represent 'Go' situations and it is therefore not easy to conduct marginal checks or fault testing. Sensor simulation makes it possible to perform marginal checks and fault testing on control units. Simulation can be implemented employing standard techniques such as function generators. This standard simulation method is, however, not adequate for dealing with complex signals from the connected sensors, as is the case with wheel speed signals for example. The advantage of using wheel speed sensor simulation for the development or testing of application software is that it permits the simulation of limit values and faults in addition to 'Go' situations. The purpose of this presentation is to outline the options available and the resultant user benefits. This includes a description of the standard sensors (of type DF11 and sensors with VDA standardised data protocol) and their various data protocols as well as the corresponding simulation. The presentation is rounded off by practical examples such as utilisation on an automobile manufacturer's vibration test bench or the use of wheel speed simulation in control unit testing (e.g. ABS, ESP).

11:55 The Cambustion DPG: diesel particulate filter test facility
Mark Rushton, senior engineer, Cambustion Ltd

This presentation describes the development and optimisation of a system for automated testing of diesel particulate filters with better repeatability and at lower cost than engine testing. It incorporates a diesel-fuelled burner and electric blower to produce flows, temperatures and soot properties in a filter under tests representative of diesel engines. Soot generation can be set independently of DPF temperature and flow between 2 and 20 g/h, and the system can also preheat the test filter without soot generation. The flow is drawn through the part under test by a blower on the exhaust side. Therefore the soot generator is unaffected by the backpressure of the filter under test, giving very constant soot generation. The measurement capabilities of the system are discussed. Filtration efficiency is measured as a function of fill state of the filter, taking advantage of the stable conditions and controllable soot generation rate. Measurements of the backpressure rise during the loading of a filter resolve the behaviour during pore filling accurately, due to the ability to test at stable flow and temperature conditions having preheated the test part before initiating loading. Regeneration behaviour is studied by adjusting the fuel and air flows to increase the flow temperature.

12:20 Integrating mobile communications and service-oriented telematics – a solution for proving grounds
Michael Meiser, managing director, mm-lab GmbH

Safety is paramount – in the operation of an automotive proving ground and especially for the test drivers. A multi-facetted set of requirements covering the various functional fields for the operation of a proving ground is complemented by the challenging technical environment defined by mm-lab's client: "Test your communication infrastructure on our winter test site in Sweden. If it works there, it will work almost everywhere." This was one of the challenges mm-lab had to meet in its role as system integrator for an end-to-end solution trial performed in January 2009. mm-lab, together with partners from the telecommunications industry, demonstrated an IP-based, service-oriented telematics solution which includes: effective voice and data communication between the staff operating a proving ground and the test vehicle drivers using Voice over IP (VoIP); the feasibility of WiMAX and WLAN technologies for mobile communications; exact positioning and tracking of vehicles using (D)GPS; safety monitoring and warning functions (e.g. detection of wrong driving direction); access management and control on a gate-free, open lake infrastructure; a cost accounting solution for the proving ground modules (handling course, braking action…); data dissemination/messaging. The presentation will summarise the major findings.

12:45 Automated release of standard software with generically developed test cases based on the example of the Flash Conformance Test

Joachim Tauscher, general manager, Smart Electronic Development GmbH

The HIS working committee (standard software initiative of the German automotive industry) has largely standardised the field of 'Flashing' over the last three years and is now concentrating on the widespread implementation of these HIS standards or AUTOSAR standards. At the same time, vehicle data description was standardised with the aid of the ODX standards. The focal point of this presentation is the Flash Conformance Test, the last essential step in the quality assurance process. The presentation will explain the concept and the basic requirements for a Flash Conformance Test. Application of the Flash Conformance Test will be described with respect to embedded standard software flash release for the automobile manufacturers Volkswagen, Daimler AG and BMW by way of example. The method and possible solutions will be illustrated on the basis of a specific example involving the following steps: requirement; test plan; test specification; generic test case; test implementation; test report. Benefits and characteristics of the technologies, findings and solutions described: 1) As well as being maintained and used by the particular OEM and their suppliers on a standard, worldwide basis, generic test libraries can also be supplemented to suit individual requirements; 2) The application of automated regression tests as described reduces the costs of development and software release while at the same time enhancing software quality; 3) The method presented is widely applicable: the method and procedure are generally suitable for the testing and release of embedded standard software irrespective of the branch of industry concerned.

13:10 Capturing a noise source in an interior enclosure

Paul Amery, product line manager acoustics, LMS International

Sound source localisation (SSL), such as NAH and beam-forming, have been around for decades. SSL techniques have been mainly used for free-field conditions, and it is only in the last couple of years that these techniques have found their way into interior acoustic applications where non-free-field conditions are met. In this paper a two-step test procedure is proposed to perform a detailed interior SSL localisation. In the first step, a solid spherical antenna is used to perform an SSL on the complete interior compartment. The uniqueness of this solution lays in the fact that the SSL propagation is not only based on a beam-forming solution, but also takes into account the acoustic diffractions that happen around the solid sphere. This method, solid sphere and processing, is a patented technique owned by MicrodB and Airbus. The first step gives an overview of all sources present in the interior enclosure, but with a limited spatial resolution. In the second step this spatial resolution is improved by taking a second measurement focusing in at certain areas of the enclosure. For these measurements a cylindrical array is used and the data is processed using focalisation. Focalisation is a beam-forming technique adapted for measurements in the near-field. The combination of the two methods leads to an accurate SSL in an interior enclosure in a more efficient way, which until now has been done using masking techniques.

13:35 Executing neutral test descriptions for any testbed hardware

Dr Robert Patzke, managing director and partner, MFP GmbH

The description of test plans and of handling test results, filing and evaluation, is mostly dependent on the specific components of the testbed used. Whenever a neutral test description is defined, before execution, it has to be adapted to the real testbed, which is time-consuming and takes a lot of work. The automation of this procedure is near at hand, but it will work only with a specific kind of testbed and changes of test requirements and/or testbed need adaptations. With the definition of a testbed abstraction layer, a door for new concepts of testbed configuration is opened. A resultant configuration procedure copies the content of the neutral test description via the testbed abstraction layer to the involved hardware and software components of the testbed. The testbed abstraction layer is realised with the ASAM GDI standard (Generic Device Interface) and is a request to the testbed to implement this interface, or it is provided with the configuration tools. Describing test plans with modern XML technologies is another facility for data handling with undreamt of possibilities for the user. XML schemas are the templates for test plans and may be adapted to the special needs of any application environment. Also, the capabilities of the testbed components are described with XML schemas and the matching of test plans and testing resources is implicitly visible. Thus a feedback of resource capabilities to the test plan construction prevents mismatches. A configuration tool is presented, which was developed jointly by Daimler AG, MBtech GmbH and MFP GmbH based on this new concept. This tool is able to create test plan schemas and test plans and to configure the testbed accordingly via the testbed abstraction layer.

DAY 1 AFTERNOON SESSION

SIMULATION / HARDWARE IN THE LOOP

14:00 Ease of use of MATLAB/Simulink models in a test field environment

Dr Klaus Rothbart, product manager, AVL List GmbH

The integration of MATLAB/Simulink models in a test field environment usually not only results in high costs for licensing but also forces testbed users to deal with the complexity of the simulation models. AVL ARTE.Lab is a tool to seamlessly integrate MATLAB/Simulink models in a test field environment while hiding the model complexity from the testbed user. Depending on the required application on the testbed, the visible model complexity can be adapted for ease of use of the model. This is achieved by the capability of the complete abstraction of the model parameters and the I/O complexity. The model I/O abstraction enables the usage of the same algorithm all over the test field without the need for model adaptation or recompilation. Thus, even automated distribution of the simulation models over the test field is possible without changing the model I/O. The simulation model developed with AVL ARTE.Lab runs in hard real time and is fully integrated in the automation/control system. This results in easy access to all measurements in the automation system. Due to this integration, costs are reduced as no expensive MATLAB/Simulink licence or external real-time hardware for the model execution is needed on the testbed. While running the simulation model on the testbed, parameters can be easily changed online. With AVL ARTE.Lab, MATLAB/Simulink models can be operated and parameterised on a testbed without in-depth knowledge of the model or MATLAB/Simulink.

14:25 HyHIL – new test platform for the development of hybrid vehicles

Gilles Corde, IFP, head of signal processing, automation and control department, D2T

D2T, Renault, IFP, LMS and G2ELAB have together launched HyHIL, a new test platform for the development of hybrid vehicles. HyHIL uses a suite of generic tools, such as D2T's MORPHEE 2 automation system, to reproduce and assess the complex architecture of hybrid vehicles in a unique and flexible way (MORPHEE 2 is a unique real time system for automation, simulation and calibration). Combining an IC engine with an electric motor is complex: it increases the number of parameters to calibrate during the development. This means increased time and cost, while the market demand is to reduce them. HyHIL helps to solve this problem: it enables us to define the best architecture of a hybrid powertrain at the early stages of development. The platform evaluates hybrid powertrain concepts and the benefits of different levels of hybridisation in an engine testbed, due to real-time simulations developed with LMS's

AMESim simulation platform and executed by D2T's MORPHEE 2 automation system.

MORPHEE 2 executes real-time models required to simulate both hybrid vehicle and driver. The MORPHEE 2 flexibility allows switching easily between the three hybrid architectures retained for this project: pure thermal mode, with simulation of an alternator-starter; stop and start mode, with simulation of the engine's frequent stop/start phases; hybrid mode, with simulation of electric propulsion, energy recovery during deceleration phases and battery recharging.

These architectures have been tested over several standard driving cycles (NEDC, FTP, Artemis, etc.) using an energy supervisor developed by IFP, which is sufficiently generic not to require specific calibration.

The results obtained on the engine testbed were compared to results obtained on a real vehicle; the simulation proved to be a very realistic representation.

Simulation, with the use of an environment such as AMESim and MORPHEE 2, offers us a real way to assess complex powertrains without the need to manufacture the powertrain or even the complete car.

14:50 Tool-aided top-down solution guarantees traceability from DOORS requirements to CANoe test realisation

Martin Huck, SW development engineer, Vector Informatik GmbH

Increasing complexity in combination with challenging quality requirements demands an integrated solution for requirement management, test design and test realisation. A lot of tools are optimised for their application domain but have only limited capability to export information or to cooperate seamlessly. The CANoe Test Feature Set now offers extensions that support a fully integrated approach: starting with DOORS requirements, a systematic high-level test architecture is designed that results in generated and executable test module templates. The test modules reflect the structure of the intended test architecture and can be easily completed with the Vector Test Automation Editor. Following this top-down approach harmonises interfaces, reduces overhead costs and leads to a high test coverage respective product quality. In addition, the tight CANoe collaboration with DOORS automatically adds and maintains consistent traceability between DOORS, executable test cases and their test reports. If requirements and test modules have already been developed separately, the DOORS Integration provides the possibility to import the CANoe test module structure to DOORS; this adds traceability to the whole project in a simple step. In this presentation, the complete workflow and the benefits for your development process will be demonstrated.

15:15 AutomationDesk DOORS connect and sync

Alexander Tietz, application engineer, dSPACE GmbH

A special integration solution from dSPACE now couples AutomationDesk, the company's test automation software, with the Telelogic DOORS requirements management tool. The solution allows requirements and specifications for the testing of ECU software to be traced across tools. Test specifications from DOORS can be transferred automatically to AutomationDesk test projects. The test results from AutomationDesk are also available in DOORS. This greatly improves traceability and coverage analysis in the software development process. The connection between AutomationDesk and DOORS is made by a module called the AutomationDesk DOORS Connect & Sync Module. This synchronises the data and structures of the two tool worlds, and exchanges parameters between them. Thus, users can also run AutomationDesk tests from within DOORS. In the other direction, when test execution is completed, AutomationDesk passes the test results (such as passed, failed or undefined) back to DOORS. Test results from AutomationDesk can be displayed in DOORS and tracked across tools. The link between the two tools means that DOORS always has the current state of the requirements and the associated test results. Individual DOORS objects correspond to specific, identically structured elements in AutomationDesk. For example, a document in DOORS can be assigned to a corresponding project in AutomationDesk, and a folder or test sequence in AutomationDesk can be assigned to a test specification in DOORS. If test specifications have the same structure, based on predefined templates, the Connect & Sync module can convert them into AutomationDesk elements automatically. Users define the rules for mapping the DOORS data to AutomationDesk themselves. Test implementation in AutomationDesk no longer needs to be performed from scratch, as structures and parameters from the DOORS test specification can be used. The solution is successfully in use at several customer test environments. Based on experiences gained by customising Connect & Sync to customer needs, the topic's facts are supplemented with a hands-on live demonstration. This is to interactively point out the main benefits of synchronising DOORS and AutomationDesk and to make the configuration/synchronisation process more transparent to the attendees.

Questions on prerequisites, efficient use, tips and tricks are dealt with during the presentation.

15:40 Model-in-the-loop aerodynamic force control for vehicle road simulation

Dave Fricke, senior staff engineer, MTS Systems Corporation

The accuracy of physical vehicle system and component testing can be greatly improved if the dynamics of missing components or environmental inputs can be simulated virtually in conjunction with the test. Real-time model-in-the-loop testing allows accurate tests to be conducted in many cases without the requirement to first measure the direct road response for a particular vehicle configuration. This capability allows testing earlier in vehicle developments, and supports the common need to test a variety of component or vehicle setup variations. MTS has successfully implemented real-time models to enhance test control for a variety of applications, particularly in the area of vehicle dynamics testing and optimisation. A recent implementation will be discussed, which incorporates an aerodynamic loading model into the closed-loop control system for a motorsport seven-poster simulator. The aerodynamic model-in-the-loop system generates correct body force and moment loading in response to changes in the virtual vehicle road inputs, or as a result of changes in the vehicle suspension setup, enabling rapid optimisation of the vehicle configuration without repetitive track testing. In addition to the seven-poster implementation, additional applications of model-in-the-loop test control will be presented, such as the adaptive compensation of applied vehicle and chassis inertial loads that is typically required when a vehicle changes or degrades during test.

16:05 Automatic ASAM MCD-3 supported test

Dr Jens Luedemann, managing director, PikeTec GmbH

Testing on HiL systems is very common in the automotive industry, but the fully automatic test execution, empowered with parallel controller data measurement and test result assessment, is not very common. TPT, a test tool for embedded control systems, allows test execution on almost any platform. On HiL systems, TPT allows a parallel test execution and measurement via MCD-3. The measured data is available for the fully automated complex test assessment, which returns detailed results on the success of the test that can be found in a report. The current implementation supports test execution on a HiL system with a concurrent MCD-3 measurement connection that consecutively polls data from the MCD-3 server during test execution and automatically records the measured signals into an MDF file. This MDF file can be used during test assessment in order to give the tester a maximum amount of information. It will contain measurements that were obtained from a special hardware connection provided by the MCD-3 server. This includes CCP, XCP and ETK based on the capabilities of the measurement tool and the HiL setup. However, an extension of the MCD-3 integration is planned, which allows TPT to directly react to MCD-3 measurements during test execution. Additionally calibration and diagnostic support will allow the tester to read and write parameters before, after and during the test. A finalisation of this concept includes a connection with the MCD-3 diagnostics services in order to trigger diagnostic functions and to read out errors from the system under test. This results in a systematic testing environment, which executes a large variety of test cases without requiring a tester to be present.

16:30 It's just C: using Visual Studio for low-cost CANbus simulation and test

Dave Robins, president, Intrepid Control Systems Inc

Embedded engineers know the C language well. Therefore, when it comes to simulation or testing of their automotive ECU, the C language is a natural choice. But where should you start? How can you be the most productive? What about your budget? This presentation shows a methodology to combine a tool like Visual Studio with an environment built for database-backed, event-based CAN simulation and testing. The novelty of this approach compared with other market solutions is that this is not scripting – it is 100% ANSI C. Leveraging one of the best C integrated development environments available, Visual Studio is a key innovation. The Visual Studio debugger is exceptionally powerful for getting the test or simulation correct in a timely manner. Intelli-sense features of Visual Studio, when carefully applied to CANbus simulation, greatly improve the productivity of engineers. Finally, because a COTS (commercial off-the-shelf) tool is used instead of a proprietary C-like solution, the cost is dramatically lowered for both initial and future cost.

DAY 2 MORNING SESSION

MEASUREMENT, CALIBRATION AND TEST DATA ACQUISITION

10:15 Defined calibration of the particle measuring system according to PMP

Martin Schmidt, sales manager, Palas GmbH

The cleaner our environment is, or the cleaner are the rooms for the production of elements like semiconductor devices, the more counting measuring methods are used for monitoring the level of pollution. For the monitoring of clean rooms (i.e. low particle concentrations) counting particle measuring instruments, such as optical particle counters (OPC) and condensation nucleus counters (CNC), have been used with success for many years. At present, for monitoring emissions in the atmosphere, counting measuring methods (VDI 3867) are used only for research purposes. For monitoring EUROS 5/6, the legislator has prescribed with good cause counting measuring methods in the PMP. Since most counting measuring methods used at present for EUROS 5/6 were developed for other applications, they do not offer the optimal solution for the exhaust measurement of diesel soot. Further it must be ensured that the sampling and sample supply with the aerosol preparation (diluting, for example) is accomplished reliably. How can the measuring instruments and the dilution systems be calibrated meaningfully, or how can a clear function test be accomplished on-site? The answers to these questions are pointed out and discussed in this paper. Literature (1) Dilution System for Aerosol Measurements with Optical Single Particle Counters at very High Concentrations; Filtration & Separation 5 (1996), J. Blattner (2) Representative Dilution of Aerosols by a Factor of 10,000; Journal of Aerosol Science (1990), C. Helsper, W. Mölter, P. Haller, Spiez (CH) (3) Investigations of a New Aerosol Generator for the Production of Carbon Aggreagate Particles; Atmospheric Environment 27A/8 (1993), C. Helsper, W. Mölter, F. Löffler, C. Wadenpohl,S. Kauffmann (4) Counting and measuring particles sized from soot to pollen; China Particuology 5 (2007), M. Schmidt, S. Schütz, L. Mölter (5) Single Particle MS, SNMS, SIMS, XPS, and FTIR spectroscopic analysis of soot particles during the AIDA campaign; Journal of Aerosol Science 34 (2003), 1323-1346, U. Kirchner, R. Vogt, C. Natzeck, J. Goschnick (6) Performance of a venturi dilution chamber for sampling 3-20 nm particles; Journal of Aerosol Science Vol.36/4 (2005), 535-540, Y. J. Yoon, S. Cheavers, S. G. Jennings, C. O´Dowd (7) Minimum demands on a 'reference' filter test stand for air and gas filtration; F & S International Edition No. 3 (2003), L. Mölter, M. Schmidt. S. Schütz.

10:40 A PU probe array-based panel noise contribution analysis

Dr Oliver Wolff, acoustic consultant, Microflown Technologies

The latest developments of Microflown PU-based panel noise contribution analysis will be presented. The sensor allows the direct measurement of particle velocity. Some historical remarks are given and the latest developments of the technique are reported. Four steps are required to determine the panel noise contribution of the interior of a vehicle and to visualise the results in 3D. In comparison with traditional techniques, this technique works much faster (days instead of weeks measurement time) and is more accurate. In a first step the probes are positioned on the interior surfaces and their x,y,z coordinates are measured. Based on these data a 3D geometry model is created. The geometry data are acquired using a specially designed 3D digitiser. The second step is a measurement in a certain mode of operation. This step can be done in a laboratory but it is also possible to perform the measurement while driving the vehicle on the road. Stationary as well as non-stationary running conditions such as run ups are accessible and do not limit the applicability of the method. The third step is the determination of the transfer paths from the panels to a certain listening position. This measurement is done reciprocally. In a fourth and last step the transfer paths are linked with the operational data gathered in step two. The results are then visualised using the 3D geometry model. This paper describes the measurement of a conventional car with a resolution of 180 panels. Since an array of 45 probes was used, step 2 and step 3 had to be repeated four times.

11:05 Going green – current requirements and developments in measurement systems

Oliver Reik, global key account manager, Measurement & Calibration Systems, AFT Atlas Fahrzeugtechnik GmbH

Nowadays being green means being a trendsetter. Companies and society are both becoming more aware of the environment and ecology. More efficient fuel

consumption, the reduction of CO_2 and the consequently improved hybrid technology are areas of vehicle development in which engineers are particularly challenged and dependent on suitable measurement technology. The increasing acquisition and analysis of measurement data in the early stages of vehicle development support the engineering and improvement of simulations and models. From the corporate point of view, the benefits are the reduction of development time and of the number of prototypes. Measuring systems for data acquisition during early development phases have other requirements, which differ to some extent from those for series support. In contrast to measuring in the adaptation phase, when the engineer knows which data to expect, this may not be the case in earlier phases. Here, the aim is to generally test the system and its expected performance. The applied measurement systems must therefore have a high sampling rate for the precise recording of transient signals, especially if the repeatability of the test is limited. Such systems measure a wide range of data, are easy to handle and adapt to the changing conditions during the vehicle development process. The presentation of AFT Atlas Fahrzeugtechnik GmbH focuses on how measurement data acquisition accompanies the vehicle development and illustrates the benefits of a measurement system, which is an all-rounder and a specialist at the same time. This perfect mixture characterises the new measurement system from AFT: a transient recorder with analysis software. The system is designed for precise data acquisition, such as for rotational and torsion analysis and for general investigations at the beginning of the vehicle development. A high sampling rate along with the absolute time/angle-synchronous recording of signals enable the engineer to obtain basic, reproducible information on the test object, thus helping them significantly influence the vehicle development within the set timeframe.

11:30 XCP-on-Ethernet interface for ECUs

Burkhard Triess, ETAS GmbH

Among the typical tasks characterising the development and calibration of automotive ECUs are the acquisition of measurement data, the setting of parameter values, ECU flash memory programming, and the development of new vehicle functions on an experimentation system interconnected with the ECU in real time. The performance of development and calibration tasks calls for a sufficiently powerful ECU interface. Ethernet as an ECU interface provides for data transfer at high speeds of 100 Mbit/s or 1 Gbit/s. Ethernet is a globally distributed standard with proven long-term stability. Virtually all of today's PCs and notebooks are equipped with an Ethernet port. XCP-on-Ethernet is a standardised, high-performance data transfer protocol deployed in the development of automotive electronics. Making use of this standard, the XETK interface for electronic control units facilitates a direct ECU-to-PC connection. Due to the XCP-on-Ethernet standard protocol, XETK-equipped ECUs can be easily integrated with existing toolscapes. Paired with the proven Ethernet topology, the XETK's arbitration function facilitates new multiple-host applications featuring networked ECUs and/or ECUs equipped with multiple processors.

11:55 One-step device integration in applications

Bernd Wenzel, CEO, M & K GmbH

ASAM GDI consists of a large number of interfaces and components. The most well known are the application-neutral and device-neutral interface as well as the components coordinator, device driver, platform adapter and device capability description. More often than not, the capabilities and potential offered by GDI are not known or used. This is proved to be especially true in the case of coordinator use. It is possible to work with parameterisation (PID configuration) or to predetermine the function objects to be instanced by the application (service-oriented configuration). In the lecture the standard supported potential of the coordinator will be shown and subsequently an especially efficient and simple work will be presented using a continuous tool chain as an example. It this, any device functions (object-oriented DCD class view) of the application are directly available for use, where the coordinator is capsulated. This procedure makes it possible to work GDI version independent. Detailed knowledge of the coordinator is no longer necessary. The focus may be set directly to the creation of the application and its functional sequence regarding application-specific device driver use. Implementations in C++ and Python are available.

12:20 Advances in data acquisition technology

Jens Christensen, marketing manager, Brüel & Kjær

With higher and higher productivity demands, sound and vibration professionals are constantly being pressed to conduct more and more measurements. While many

advances have been made in software to ease this daunting task, no significant advances have been achieved in hardware technology to help accomplish the job. This paper explains how new technologies such as PoE (Power over Ethernet) and PTP (Precision Timing Protocol) change this fact. These and other technologies have been implemented in a new family of hardware acquisition products, allowing a number of possibilities: full flexibility is accomplished by using the same equipment to make a multichannel measurement using several large rack systems one day, and a simpler two-channel measurement system using a single module the next. The Gigabit LAN data backbone used in the system supports extreme data throughput, all modules communicate through LAN and even communication on the backplane of the frame and between frames and measurement PC use Gigabit LAN. For interconnecting frames and/or modules you can use standard LAN cables; these cables not only transfer data but also take care of synchronous sampling between modules and supply system power, thanks to Power over Ethernet (PoE). The big benefit is that it minimises the number of cables required and results in lower cost compared with using long, costly transducer cables. Sample synchronisation between modules is accomplished by the IEEE 1588 Precision Time Protocol, which provides a protocol for synchronising the clocks of modules in a distributed measurement system, thus providing correlated data acquisition across the complete measurement through communication on the standard LAN cables already installed.

12:45 EtherCAT with MORPHEE 2, D2T's automation system: a fast and reliable communication with the testbed

Jérémie Efflame, data acquisition product manager, D2T

For many years, 100Hz was the typical control frequency required by testbed automation systems. The increasing complexity of modern IC engine mapping has led the standard towards 1kHz, and often more. D2T's MORPHEE 2 advanced automation system (a unique real-time system for automation, simulation and calibration) offers a solution that can reach up to 10kHz (depending on the PC and acquisition system performance), using the unmatchable performance of the Ethercat field bus. Ethercat is considered to be the future standard for communication between testbed equipment. Many peripherals with an Ethercat link are already available on the market, such as controllers, I/O systems and CAN modules. As an Ethercat master, MORPHEE 2 is fully compatible with all Ethercat slave devices, and many acquisition systems are already interfaced with D2T's solution: Gantner, HBM, Beckoff, etc. Moreover, the Ethercat D2T solution provides the fast ECU access function required for rapid measurement purposes or transient engine calibration tasks. In addition to the fast speed communication, the D2T solution has many other advantages compared with other field buses: an Ethercat network is easy to implement and the commissioning cost is being reduced; I/O conditioners can be kept as close as possible from the unit under test; Ethercat works with Ethernet, a standard for PC hardware and wiring. Due to the Ethercat redundancy system, the reliability of the control and acquisition system is improving: even if there is a connection breakdown in the network, the system remains secured and goes on running. MORPHEE 2 Ethercat is now a fully proven solution that has been running on many test benches of a major OEM.

13:10 ORION goes XCP

Don Nutter, product manager, A & D Technology

One of the main limitations in the automated calibration of ECUs in the test cell is the latency induced by the calibration tool. While all commercial calibration systems include one or more versions of ASAM-3MC interfaces for easy connection of the automated calibration tool like ORION, there remains the fact that these systems are separate software running on a separate PC. This architecture will always induce latency in the system – from 10ms to 500ms typically. When you multiply this by the many reads and writes of calibrations necessary for a long-running automated calibration procedure, this can add up to hours of test cell time per test. To address this problem, ORION is introducing a direct ECU access option for XCP and CCP capable ECUs. This will reduce the latency inherent in a separate calibration system in the test cell and also reduce the complexity by reducing the number of systems needed for an automated calibration test by deleting the need for a separate calibration tool.

13:35 Test data analysis and presentation

Burkhard Schranz, Additive Soft- und Hardware für Technik und Wissenschaft GmbH

Best practice in analysis and presentation of test data from ODS servers with FAMOS.

FREE TO ATTEND!

DAY 2 AFTERNOON SESSION

VEHICLE DIAGNOSTICS IN DEVELOPMENT, PRODUCTION AND SERVICE

14:00 Test automation for model-based development of embedded software

Thomas Weyrath, IT Systems & Function Development, ESG

In this presentation we would like to focus on a new process model for automated testing of embedded software, developed on the basis of modelling tools such as SIMULINK/TARGETLINK, ASCET, etc. The concept of test automation comprises two aspects: the automatic generation of test data and the automation of fault localisation. Fault localisation is applied in the case of conflicts between the behaviour specified and the actual behaviour of the function as revealed in the execution of test cases. Fault localisation is understood in this context as the identification of the least replaceable software unit that causes the detected fault. The starting point is a generic testing strategy developed by the ESG. The testing strategy is defined by (i) a set of test goals; (ii) a mapping of the test aims on test objects. A test object can be understood as the working product of a software development activity on the left branch of the V-model (e.g. model, c-code, object code). The set of test goals identified is to be understood as the least common denominator between the norms ISO CD 26262 and DO 178 B. The test goals are systematically classified in a classification tree. The interior nodes of the classification tree are classes of test goals. The test goals that can be covered by methods in automated test case generation are identified. In a further step these test goals are mapped to the V-model of the software development process. Finally a process chain combining formal verification methods for automated test case generation, automated test case execution and automated fault localisation is presented. The output of the fault localisation component uses the ODX format for representation. The process chain is illustrated by the example of the Adaptive Cruise Control system.

14:25 Comparison of OBD scan-tool diagnostics for vehicles and heavy-duty trucks

Peter Stoss, director automotive, RA Consulting GmbH

With the new OBD regulations for heavy duty trucks from 2010 there will be a new standard. In addition to SAE J1979 there will be SAE J1939 established for OBD application. This presentation will compare the concepts of the vehicle-related standard SAE J1979 and the truck-related standard SAE J1939 for CANbus-based communication. There will also be a comparison of the communication interface standards SAE J2534 (vehicle) and RP1210 (truck). There will be a lineup of OBD requirements for SAE J1979 and SAE J1939. Finally we discuss the newest regulations for the conformance testing of trucks based on SAE J1699 on the base of the SAE J1939 standard.

14:50 Vehicle diagnostics in development, production and service

Dieter Schaller, general manager, samtec GmbH

Quick overview of WLAN in comparison with Bluetooth and GPRS Security. 1) Advantages and disadvantages; 2) General aspects of using WLAN: getting and staying connected, backup strategies when WLAN fails; 3) Diagnostic examples of applications in the development process, stationary WLAN and moving vehicle, dynamic driving and connecting cars on the road, fast re-establishing of lost connection; 4) Example of full WLAN usage in EOL production using diagnostic lines, placing of device, advantage of cableless connection, shutting down and starting production Identification of WLAN-connected vehicles at production, process security and availability, dynamic production process, power down and wakeup features, backup strategies, galvanic separation, cable length; 5) Diagnostic applications in service field, automatic plug-in solutions, identification, security and encoding; 6) Special features of hardware devices, placing of device-antenna, casing and placing of the device, clear and visible indication of device status, additional remote control and reset to factory DHCP identification; 7) Latest diagnostic standards regarding development, production and service ODX to be used as an ASAM standard from development to production to service. PDU-API handling several connectivities (serial, USB, Ethernet and WLAN) MCD3-Server make it working ????

15:15 Volkswagen uses an ODX conformant test system for diagnostics

Peter Biermann, sales director, Softing AG

15:40 Standards to products: reviewing a year of productive use of PRODIS.MCD and PRODIS.OET

Dr Ansgar Schleicher, director R&D Diagnostic Solutions, DSA GmbH

Solutions and products for the ASAM automotive electronics standards ASAM MCD-3D and ASAM MCD-2D (ODX) were well received in the market in 2008. The presentation will be about available products by DSA, their key features and their employment in our customers' process chains in the full diagnostic vehicle lifecycle.

16:05 Open Diagnostic Framework – the quick and easy way to create applications based on the current standards

Tobias Widmer, managing director, emotive GmbH

The emotive Open Diagnostic Framework is a new platform that enables the user to quickly develop reliable and process-safe diagnostic applications. The framework is independent of the underlying diagnostic runtime system, due to its flexible and open software design. Even though the user may implement and use his own runtime system, the Open Diagnostic Framework is specially designed to work in conjunction with the current standards of car diagnostics. By a most simple drag-and-drop scenario the user creates a diagnostic sequence within the integrated workflow designer using functionalities of a comprehensive diagnostic activity library. The designer generates an XML database which is, in turn, being interpreted and executed by the built-in workflow engine – without the need to programme a single line of code. The database-driven design of the Open Diagnostic Framework allows the user to access and select the appropriate diagnostic data easily – without needing to know tedious details of complex runtime systems and their databases. Having created the diagnostic workflow, the user proceeds to create a graphical user interface that interacts with his previously designed diagnostic sequence. This is done by powerful GUI designers and toolboxes known to every Windows developer. An intuitive way of binding together workflow and GUI establishes a fast data exchange between diagnostic communication data and the graphical user interface. Having finished creating both workflow and GUI, a simple click on the toolbar's build button combines both components: the integrated compiler builds a single executable – and your diagnostic application is finished. It is now ready to be installed and run on any supported target system as a standalone, royalty-free application.

16:30 Panoramic noise source mapping inside vehicles

Kevin Bernard Ginn, product manager, Brüel & Kjær

For many years engineers in the automotive market have struggled to find ways to accurately and efficiently map the noise sources found inside a vehicle. Many techniques, both theoretical and measurement based, have been proposed and used, but there has always been a trade-off between accuracy and efficiency. Techniques such as sound intensity mapping and statistical energy analysis have proved to be accurate when mapping noise sources in vehicle, but they require a large investment in time and money to create a simple, easy-to-interpret picture showing where dominant noise sources come from. In this paper the authors will introduce and demonstrate a novel technique – spherical beamforming – which can overcome the issue of test time and produce fast, accurate noise maps from the interior of a vehicle. Other novel array applications will also be mentioned including panel contribution analysis in a vehicle cabin cabin using a dual-layer hand-held array with integrated position measurement, and the measurement of absorption coefficient, surface admittance, radiated intensity and absorbed intensity on the panels of a vehicle.

DAY 3 MORNING SESSION

TEST DATA MANAGEMENT, CALIBRATION DATA MANAGEMENT

10:00 Scheduling of resources in measurement data management

Guido Schneider, product manager, Peak Solution GmbH

As the complexity of the ASAM ODS standard is remarkable, an own framework for the MDM (measurement data management) has been developed and published by Audi AG as a referential implementation. This framework shrinks down the complexity through predefined reusable patterns for almost all possible measuring data management use cases, and gives huge benefits to the developing community.

While focused on the definition and execution of tests, it is still leaking functionality to support the scheduling of resources and tests. Therefore Mr Dipl.-Math. Schneider will present how a new component will abandon this leak of functionality. The new component provides lots of functionalities in the area of: determination of required resources for conducting the test; definition of test time, duration and location; conduction of availability checks for the required resources; definition and automatic conduction of validations for the compatibility and operability of all participating test resources and test parts. While providing all that helpful auxiliary functionality, the scheduling component is still based on MDM and its generic data model. This guarantees its ASASM ODS compliance.

10:25 FlexPro – data analysis in an ASAM ODS environment

Michael Piazza, sales, Weisang GmbH

For years FlexPro has been the data analysis and presentation software of choice for engineers, scientists and anyone who works with technical data sets. FlexPro manages all analyses and presentations as a dynamic object network, so each analysis can be used on any number of data sets – without the need for programming. Now with the newly released ASAM ODS Import Option, FlexPro provides easy access to ASAM ODS servers for a wide range of users. FlexPro's integrated ASAM ODS data browser grants easy, visual access to ASAM ODS server or ATF/ATFX file data. A clear hierarchy view displays either all information or elements preselected using the search function. Measurement data and related meta information such as physical units can be copied or linked via drag and drop into FlexPro's project database. Imported data can be analysed visually using cursors or analysed mathematically with ready-to-use analyses covering statistics, spectral analysis, digital filters, order tracking, human body vibrations and more. Results can be presented in 2D and 3D graphs as well as tables. FlexPro Professional allows users to automate the whole process from import data to preparing reports using the integrated MS Visual Basic. The implementation of the ASAM ODS standard in FlexPro offers a flexible and comfortable way to analyse ASAM ODS data as well as productivity from day one.

10:50 ASAM ODS and web services for acoustic data analysis in Airbus France

Nicolas Verbeke, development engineer, Orme

Not only is ASAM-ODS a well-known standard in data management in the automotive industry, it is also starting to be used in aeronautics. Airbus France has chosen this solution for its acoustic test and simulation data management, using an Oracle database. To meet the Airbus IT high-level security requirements, Orme has developed a new package for TrackReport/ASAM-ODS architectures, using a very common standard interface based on web services. These web services ensure the communication between the client side and the server side, translating classical CORBA or RPC messages of ASAM-ODS servers into SOAP-format messages, and handling transfer of data. Furthermore, SOAP format is such a standard that the use of this package appears very easy to handle by third-party tools, and most efficient on a network. The whole project thus includes specific software for acoustic data analysis, TrackReport software – with a new acoustic calculation library – for data analysis and automatic test reporting, and the HighQsoft ASAM-ODS server, all these components communicating due to web services.

11:15 Mastering the flood of NVH data through ASAM ODS and MDM

Dr Dietmar Rapf, senior manager, CAT, science + computing AG

NVH data has grown significantly in the last few years due to better resolutions of the measuring systems and the ability to simultaneously measure more channels. The challenge is not only to store the data in an infinitely large, secure data store but also to be able to find the data when they are needed. Therefore data need to be enriched with metadata describing the unit under test, the test rig, the measurement, date, people, etc. In an NVH environment, the unit under test can be anything, from components to complex systems such as motors and cars. The disciplines and the questions that are examined are manifold, as are the sampled data. To store all these data in a single database, one needs to find a data model that is very flexible. The MDM framework, developed and published by Audi, is a software package based on a rich client platform that can be used in the automobile industry for free. It is designed to store data that vary in a huge range and therefore is predetermined for storing the manifold NVH data. The MDM framework includes modules for searching and browsing data, managing security,

managing orders and other daily tasks. For one of our customers, we implemented an ASAM ODS database based on the MDM data model to store all NVH measurement data in car development. The data are stored on a storage system with an attached tape library onto which data are swapped out to provide an 'endless' amount of storage space. We developed an application based on the MDM framework for the engineers to find their data on the basis of metadata in the ASAM ODS database and to recall their data from the tape store. Due to the use of the MDM framework, additional features can be added.

11:40 Workflow modelling and storage based on ASAM ODS
Verena Dittrich, software engineer, Peak Solution GmbH

The focus of MDM is planning tests and storing their results in a standardised way. The MDM framework simplifies the interchange of test data. It is standardised and can be customised for various process chains. We have profound experience using and adjusting this framework, for example to adopt older test data and to bind external systems and applications to this framework. Based on this know-how and on the discussion in the ASAM ODS Workflow Group, Audi entrusted us with a project, the intention of which is to define a mapping of MDM workflows in the ASAM ODS data model and thus the persistence of this workflow in MDM. The definition of the workflow and the description of its processes have to be stored. The storage of the workflow is based on the ASAM ODS data model and reflects the actual state of the workflow and the artefacts located in the workflow at the time. As a formal description for the workflow on the underlying data model is chosen (sense?), it is possible to analyse process properties and processes afterwards. Because the primary purpose is to specify a standard methodology and not to model the detailed behaviour, the Working Group for workflows of ASAM ODS determined Petri Nets as a base for the persistence of workflows. Finally this project opens the way for a full model-driven application field that is based on ASAM ODS. The presentation provides an overview of the basic facts and strategies. It highlights the achievements of the workflow storage, such as an abstract view of the processes and the passing data, tracking of data and the possibility of analysing the workflow items.

12:05 Time and cost savings with test facility management tools
Dr Gerald Sammer, global product manager, AVL List GmbH

DAY 3 AFTERNOON SESSION

EVALUATION AND ANALYSIS OF TEST DATA

12:30 NI LabVIEW: the platform for data acquisition, analysis and presentation
Andreas Scholz, team leader - technical marketing, National Instruments Germany GmbH

Today's user requirements for a data acquisition software are ease of use, reliability and achieving results quickly. In addition to that, it should be open to any third-party products and different bus architectures, adaptable to new technologies such as Multicore and FPGA, various operating systems such as Vista, Linux, MAC OS, RTOS, etc. Moreover it should have thousands of data processing functions from various fields of engineering including design, simulation, signal processing, filtering and many more. Finally, the data need to be presented and saved in a convenient way for further processing or presentation. You think this is not possible? It is. NI LabVIEW is the de facto software standard platform, which combines all these requirements. NI LabVIEW accomplishes these tasks in an intuitive way without losing its focus on ease of use, performance and reliability. This presentation enlarges on the above requirements and demonstrates NI LabVIEW's abilities from a very practical standpoint.

12:55 High-intensity lighting for high-speed image capture
David Pringle, chairman, Luminys Systems Corp

Luminys Systems designs and produces custom light bulbs, fixtures and power supplies to illuminate crash testing events. Lights respond within one millisecond to go from off to full power with full colour characteristics and colour temperature. This ability to respond with no delays for warm up or cool down allows fast and efficient work schedules. Extremely high wattages are achieved with relatively small light bulbs. This is significant because the more light you can put on a crash event, the better the image will be. Only more light will give you a broader range of focus. Only

with more light can you achieve a faster camera shutter speed to freeze action and eliminate blurred images. Daylight spectrum light is needed to take advantage of the characteristics of modern video camera sensors.

13:20 Speed-up decision-making processes by using off-the-shelf test data processing software NI DIAdem

Thomas Schönitz, business development manager - technical data management, National Instruments Germany GmbH

It is not uncommon to find engineering departments with large volumes of valuable measurement data stored in a variety of formats at numerous locations. Managing, importing, analysing and reporting that data by means of common spreadsheet software often involves a lot of time-consuming manual work. Using off-the-shelf software that is tailored to the needs of test engineers can lead to a boost of productivity right away. An easy-to-use interactive user interface, flexible data import and the possibility to easily automate repetitive tasks make NI DIAdem the tool of choice for test data evaluation in automotive companies around the world. This presentation will highlight most recent enhancements and up-to-date news for users and interested parties.

13:45 ROTRANS: high-performance rotary transmitters 42,000rpm and more

Jean-Luc Mouret, general manager, Jordil-Technic Rotary-Transmitters

ROTRANS: 42,000rpm, high-performance rotary transmitters. ROTRANS is a continuous analogue one-to-one signal transmitter that unique metal liquid technology to enable a high quality of transmission. This permits the discovery of unknown phenomena and is easy to use and reliable, just like a cable. ROTRANS rotate from 0 to 42,000rpm, special version up to 70,000rpm (turbocharger). We are pleased to present a new version for vacuum conditions, which has been specially developed to meet our customers' expectations. The ROTRANS durability is strongly appreciated. It offers high dynamic measurement of torque, by vibration measurement and by resonance frequencies analyses of crankshaft, camshaft, blades of turbine or turbocharger and other, only using strain gauges and ROTRANS, without pre-amplification or supplementary electronics. In the last year Jordil Technic has developed a complete range from 4, 8, 12, 18, 24, 30 channels (contacts), as well as a wheel-mounting version and an integrated encoder version. The smart solution to replace slip ring and telemetry, ROTRANS can transmit extremely low and short signals not only in automotive testing systems and Formula 1, but also in a wide range of mechanical applications.

14:05 Benefits and use of vibration analysis at combustion engines and transmissions

Michael Ruthrof, red-ant measurement technologies and services

The field of vibration analysis is very wide.This lecture is focused on two areas: 1) Vibration analysis for early detection of damage in durability testing at combustion engines and transmissions in research and development; 2) Practical use of vibration analysis in objective NVH end-of-line testing in manufacturing. The aim of vibration analysis for early detection of damage is to recognise damage during a durability testing in time. By stopping it purposefully, you can avoid bigger damage at the test item. Through this you are able to detect damage within transmissions, such as pitting at tooth flanks, pitting in bearing surfaces at rolling bearings or cracks at bodies. At combustion engines during durability testing it is possible to diagnose damage such as cracks at the piston, damage at the piston ring, the cylinder, the train shaft and piston rod or the cam box.

More and more transmissions and motors are also being proved in an end-of-line acoustic test before being shipped to the customer. Using methods of vibration analysis (NVH tests) in a 100% testing procedure is an appropriate solution for this intention. During the presentation these methods will be discussed and explained on the basis of examples from the manufacturing of combustion engines and transmissions. red-ant measurement technologies and services has already successfully introduced several methods for vibration analysis in the form of two products: MIG16 SFE and MIG16 AQS. Since 2005 red-ant has won every technical benchmark of measurement systems for objective NVH end-of-line production testing and, since 2006, every benchmark for early detection of damage in motors and transmissions in the German automotive industry.

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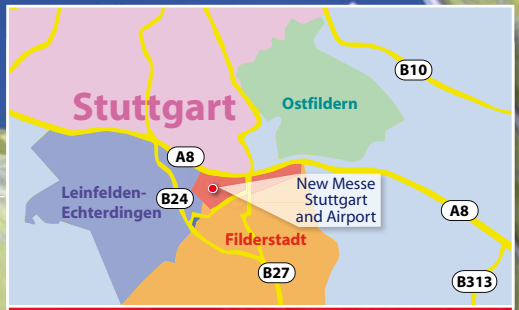
Herman Kress, **truck product engineering manager,** Daimler AG

NEW TRADE FAIR CENTRE, **STUTTGART**

Our 2009 event will once again run at the new exhibition halls located just a few minutes' walk from Stuttgart International Airport. If you are flying in for the day this will be a real bonus in terms of time. By road you will find the journey to the Messe is well signed. If you follow the signs to Stuttgart Airport you'll be heading in the right direction. The new state-of-the-art exhibition centre will provide you with a much better visitor experience whatever the weather, and a range of catering facilities will ensure that you are never far from a refreshment point and a place to relax.



OPENING TIMES

Tuesday 16 June 2009	10.00hrs-17.00hrs
Wednesday 17 June 2009	10.00hrs-17.00hrs
Thursday 18 June 2009	10.00hrs-15.00hrs

For further details please contact: Dominic Cundy, UKIP Media & Events, Abinger House, Church Street, Dorking, Surrey, RH4 1DF, UK
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