AVL M.O.V.E
On-board data evaluation for maneuver-based engineering
The vehicle of the future is driven by strong market demands for minimum emissions and optimized fuel consumption as well as maximum driving fun within an increasingly dynamic and complex system and user environment. New technologies evolve at an ever faster pace to tackle these changing market needs and meet new legislative emissions targets. The variety of solutions for the new electrified powertrain pose extreme challenges with respect to the best integration of the increasing number of hybrid subsystems. How do the conventional combustion engine, electric motor, battery and hybrid control strategy interact in the diverse situations of real-life vehicle usage? These questions cannot be addressed at the end of the vehicle development process, but ideally at very early stages to develop each subsystem with its later integrated real-life usage in mind. Therefore, anticipating real-life driving conditions and their immediate impacts on overall vehicle performance is one of the key factors of success in the development of future drive systems. The need to pursue developments in all the test environments in a realistic fashion coupled with the increasing need to cut cost-intensive development times require capturing and mapping of the real environment-system-user interaction and making it continuously available throughout the entire development process.

The fulfillment of market requirements calls for the use of seamless development environments. In order to close the loop for mobile application, AVL developed a new vehicle measurement platform. AVL M.O.V.E provides support for recording measurement values using measurement systems and an integrated parameterization concept. This overall solution is rounded off by seamless equipment assembly and power supply.

- Integrated overall solution: for parallel recording of different measurement channels (e.g. emissions, consumption, combustion and drivability)
- Continuous process chain: collected or sampled real-life data are used on the testbed and improve the simulation models
- Modular plug-in solution: fast commissioning, flexible system expansion
Of the different test environments, the testbed as the interface between the real and virtual environments plays an essential role in the development process. Simulation data are integrated on the testbed, testbed results are verified on the road, and real-world results returned to the testbeds. In order to seamlessly integrate the varied reality of everyday driving operation into the testbed from the earliest possible phase of the development process, different paths can be taken. On the one hand, AVL real-life simulation tools enable the representation of complex environmental influences, driving characteristics, and individual consumer behavior patterns. The other option for gaining relevant data is real-life testing with AVL M.O.V.E. Used complementarily, both approaches offer the best results in maneuver-based testing.
AVL M.O.V.E

An integrated system approach

AVL M.O.V.E is a comprehensive mobile testing system for on-board vehicle application that provides access to the most accurate empirical real-life driving profiles and performance data for integrated performance and emission calibration. By integrating the real-life test data verified in real driving operation into the different test environments of the development process, a further upgrade of the simulation tools used is made possible. Thus, AVL M.O.V.E complements maneuver-based testing and simulation throughout the entire development process and contributes to further improvements in development quality, process efficiency and time to market.
AVL M.O.V.E OFFER PACKAGE

AVL M.O.V.E – an integrated system approach
Comprehensive real-life performance data to optimize overall vehicle calibration with respect to emissions, fuel consumption and driving fun.

System Control
Device control, data integration and processing
- AVL M.O.V.E SYSTEM CONTROL
- AVL M.O.V.E DRICON
- AVL M.O.V.E SMART- FEM
- AVL CONCERTO PEMS

Mounting and Power Supply
- Platform for secure mounting of the devices
- Flexible Power supply and emergency concept

Emissions Testing
Real-life testing of gas and particulate emissions
- AVL M.O.V.E PM PEMS
- AVL M.O.V.E GAS PEMS

Driveability
Objective Driveability Rating
- AVL-DRIVE

Combustion Measurement
Real-life combustion results for engine optimization
- AVL M.O.V.E IndiMicro

Fuel Consumption
Real-life consumption data to optimize fuel efficiency
- AVL KMA Mobile
AVL M.O.V.E PM PEMS

AVL M.O.V.E PM PEMS, which is approved by the U.S. EPA for field testing, is a combination of time-resolved soot and integral particulate mass measurement via a PM filter. The compact system consists of two enclosures: the Micro Soot Sensor with the photo-acoustic measurement cell and a Gravimetric Filter Module including a 47 mm PM filter also providing the dilution. The emission calculations are easily executed after the test with AVL Concerto PEMS.

Benefits at a glance
- Proven measurement principle adapted for mobile needs
- Short installation time and low maintenance requirements
- Compact dimensions, low weight, low power consumption
- Robustness proven in many on-board projects and official test campaigns
- Integrated diagnosis features to ensure reliable results

AVL M.O.V.E GAS PEMS

AVL M.O.V.E GAS PEMS is a portable emissions analyzer for measuring the THC, NO/NO₂ and CO/CO₂ concentrations in the exhaust gas of diesel and gasoline vehicles and engines and will complete the AVL PEMS portfolio in 2011. The compact system is characterized by its robust design, wide operating temperature range and high measurement accuracy particularly with regard to the low measurement range.

Benefits at a glance
- Wide temperature range, e.g. for cold test application
- Robust against vibrations with special design features like internal and external damping elements
- Compact dimensions, low weight, low power consumption
- High measuring accuracy even in the low measurement range
- Analyzers from the test cell optimized for on-board application
AVL M.O.V.E SMART-FEM

AVL M.O.V.E Smart-FEM is a compact and modular data acquisition system dedicated to mobile use in vehicles and designed for highly accurate measurements under harsh environmental conditions like ambient temperatures from -40°C to +80°C. It is vibration resistant according to EN 60068 and fulfills protection class IP65. The smart box can be equipped with up to four smart devices and outputs the measured data via CAN bus, for example.

Benefits at a glance
- Modular concept: the smart box can be equipped with different smart measurement devices
- Designed for future demands: additional smart devices (e.g. for HIL applications in the vehicle)
- Measurement of different signal types in one smart device
- Designed for flexible measurement tasks

AVL M.O.V.E INDIMICRO

AVL M.O.V.E IndiMicro is a solution for mobile combustion analysis. Because of its extremely compact design, built-in functions, multiple integration possibilities and proven software, it is flexible and easy to handle and install. Therefore, it is very suited to the use under changing conditions and demanding test runs. It can also operate in stand-alone mode as an intelligent sensor providing combustion characteristics via real-time CAN output.

Benefits at a glance
- Very small size, also facilitating unconventional mounting positions
- Wide operating temperature range and very low power consumption, therefore also ideally suited for cold start measurements
- Direct integration into application systems (e.g. INCA)
- Connection of a Hall sensor and current clamps by one small common interface box with a single cable to AVL IndiMicro
AVL M.O.V.E SYSTEM CONTROL

AVL M.O.V.E System Control is the central unit for controlling the measurement devices, the data acquisition process, calculation and visualization. Its simple operation and high flexibility are groundbreaking for mobile application. For automated and reproducible testing, a special extended device derivative is offered that can collect and output the control signals for the accelerator pedal and transmission to the vehicle directly “by wire”.

Benefits at a glance
- Simple and flexible device integration
- Uniform measurement data format and synchronous data acquisition
- Unique combination of data acquisition and reproducible testing
- Robust design, connection plugs and high IP protection (IP65)

AVL KMA MOBILE

AVL KMA mobile sets the standard with its flexibility in respect of dynamism and precision in mobile fuel consumption measurement in vehicles. Due to the wide measuring range, consumption measurements can be performed for small and large engines with a single system. With quick response times (100 ms) and very short measurement times, dynamic load changes can be measured in high quality.

Benefits at a glance
- Universally applicable for any common injection system
- Reduction of test times due to high measuring accuracy and reproducibility
- Adjustable system pressure – no impact on the fuel system
- Simple handling due to modular setup and self-sealing quick-disconnect couplings
Getting the relevant information out of the mass of acquired data is one of the main tasks of the data post-processing tool AVL CONCERTO. The software effectively supports the user by evaluating, correlating and validating the measured data after the tests. Predefined layouts, for example for legislative PEMS evaluations, reduce the work for complete test validation and report generation to a few mouse clicks.

Benefits at a glance
- Generic and/or application-specific calculation and visualization libraries
- Full script support for automated data validation and reporting
- Open interfaces to automation, simulation and measurement data files
- Common user interface to compare testbed and in-vehicle measurement results offline

The AVL-DRIVE measurement system captures various driveability related sensor and CAN bus signals. These input quantities are collected by the DMU (DRIVE Main Unit) and passed on to the AVL-DRIVE software for further processing and analysis. About 100 different driving modes (e.g. part load acceleration, tip in after closed pedal and downshift after kickdown) are detected automatically and more than 450 drivability related criteria are rated in real time.

Benefits at a glance
- Specification of target drivability (branding)
- Frontloading of drivability assessment in conjunction with VSM (vehicle simulation model)
- Closed loop process for automatic optimization of drivability
- Reduction of after-market costs caused by drivability quality issues
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