AVL Testbed Automation

**APPROACH**

AVL’s testbed automation system guarantees the highest productivity, quality assurance and efficiency in test operation. Thanks to its many years of successful use by all notable automotive manufacturers and by AVL’s own powertrain engineering competence. The new generation, AVL PUMA Open™, is the only automation system suitable for all testbed types which can be easily extended by modern testing methods. The continuous development of the automation platform is driven by a permanent dialogue with our customers and in direct collaboration with selected pilot customers. Whether destined for use with global OEMs or local SMEs, AVL PUMA Open™ has been verifiably proven to increase efficiency in test operation.

**BENEFITS AT A GLANCE**

- State-of-the-art user interface and unique design
- All testbed configurations and applications on one common platform reduce operational, maintenance and training costs
- Integrated concepts for the frontloading of development tasks minimize total development time and time-to-market
- A high degree of system automation provides optimal basis for unmanned test operation
- AVL ActiveLink™: automatic and fast integration of measurement devices

**TASK**

Our customers want total solutions that provide the most efficient solution to the problems they are confronted with. The generation of “Digital Natives” has a completely new understanding of collaboration, connectivity and the sharing of data, knowledge and results. New demands are placed upon the operability of our products. AVL acknowledges this with intuitive operation, cutting edge design and consistent operational style across a range of software products. The availability of information for smart devices has become a given for users.

Apart from product features, factors that are decisive for the competitiveness within the automotive industry are: costs, time-to-market and product quality. Testbed automation contributes significantly to the generation of test results with the highest possible quality and reproducibility. Powerful search functions enable the rapid location and further processing of data.

The best automation system is of no help, if it cannot be relied upon. Short product life cycles in the IT sector and the need to support numerous testing applications require the ability to simply and regularly update software. Investment security is constantly in focus.
REFERENCES

All Testbed Types, all Applications
What do testbeds for Hardware-in-the-Loop (HiL), engines, fuel cells, electric motors, powertrains and vehicles have in common? What can be found in the R&D testbed, at the certification testbed and end of line? Answer: Modular solutions on the basis of the AVL automation platform.

Certified Quality, Reliable and Stable
AVL PUMA Open is tested intensively in a modern and large-scale test center in a real customer test environment. Source code quality is validated automatically with more than 1,000 test cases.

Holistic Approaches for Increased Efficiency
Many factors have to be right to increase efficiency. Accordingly, AVL automation systems support pallet-compliant IO modules, intelligent pallet handling, workflow support and plausibility checks on results.

Installed Base
AVL PUMA Open™ is the global industry standard for testbed automation with over 4,200 active systems in use at more than 150 customers worldwide.
THE EASE OF AUTOMATION

AVL PUMA Open 2™

VALIDATION IN THE OFFICE
AVL PUMA Open 2™ enables test runs and parameter sets to be prepared in the office, together with the administration of projects, results and operator rights. The acquisition of measurement values, calculation of a range of quantities and the execution of automated test runs is done on the testbed.

PRINCIPLE
The creation of test tasks is done in the office. Modern and intuitive tools are available to the user. A graphical test run editor facilitates and accelerates the creation of test runs. The test run parameter library, with integrated version administration for all parameter types, makes standardisation and effortless distribution possible within the test field. The validation of individual parameters and multiple parameter sets is no longer done on the testbed, as was the convention, but is now done entirely in the office. This saves valuable testbed time.

APPLICATION
Testbed automation on a common platform:
• HiL-testbeds: virtual environment AVL Virtual Testbed™ for validation and preparation of complex test methods
• E-motor testbeds: Coverage of the full four-quadrant operation
• Engine testbeds: From endurance testing to high-end racing applications
• Powertrain testbeds: From transmission durability testing to optimisation of the complete powertrain
• Component testbeds

BENEFITS AT A GLANCE
• Pleasure while working thanks to the new Intellisense (“Auto-complete”) based parameter concept combined with immediate check for correctness
• Increase in productivity by re-use of test parameters through to complete configurations
• Reduction of maintenance effort and training costs through a common operability concept for the AVL Team SUITE™ products

Save valuable testbed time by transferring parametrisation and analysis tasks to the office workplace
EXECUTION ON THE TESTBED
AVL PUMA Open 2™ guarantees the easy interplay of all testing tools and testbed components. It coordinates the data flow, beginning with the testbed control and test definition, through to the acquisition, processing and archiving of the data.

PRINCIPLE
AVL PUMA Open 2™ supports the user with all work processes on the testbed, with the aim of achieving maximum efficiency. Apart from standard functions, such as fully automatic and manual operation, AVL PUMA Open 2™ reliably and accurately controls and monitors measurement devices, test equipment and the unit under test. The new possibility of signal flow analysis permits errors to be recognised immediately and test repetition to be avoided.

TEAMPLAY INTERFACES
Innovative interface technology enables a more efficient and more flexible use of AVL measurement instruments and permits the execution of state-of-the-art calibration methods.

AVL ActiveLink™ enhances with:
• Intelligent measurement instrument recognition
• Complete measurement data availability

Powerful interfaces between AVL CAMEO™ – AVL PUMA Open™ – AVL IndiCOM™ set a new level in xCU calibration work.

BENEFITS AT A GLANCE
• Reduced downtimes on the testbed thanks to intelligent diagnostic functions and AVL ActiveLink™ technology
• Simple upgrades of existing AVL PUMA Open™ testbeds through the use of migration tools
• Reliable results due to test execution, control and simulation fully synchronized and in hard real time
NAVIGATION & SEARCH WITH AVL PUMA Open 2™

The seamless integration of all test field data, from test parameters via global data to result data, is one of the most important new features of AVL PUMA Open 2™. The navigation tool Navigator is the main entry and exit point for all specific activities.

PRINCIPLE

The relevant features of Navigator are the unified approach to the processing of parameters, the clear and concise administration of projects and user rights, and the management of values and files. A powerful search function enables the rapid location and further processing of data.

APPLICATION

The level of support provided by Navigator significantly reduces the workload for test engineers, test field managers and IT administrators. The Navigator: a tool for all activities!

BENEFITS AT A GLANCE

- Cutting edge user experience for new and experienced users
- Task-oriented operator interface
- Maximum flexibility due to centralised parameter management

The Navigator permits access to all parameters, global data and results from a testbed or from a networked test field.
AVL iGEM 2™ responds to the growing demands for flexibility regarding R&D tasks and legal compliance in the field of emission certification of e.g. heavy-duty vehicles and off-road engines. The test procedures, test data evaluation as well as the test conditions for such emission tests are specified by regulations and are subject to strict limits. During engine development for passenger cars, legal test cycles are increasingly being simulated on engine testbeds and often require additional emission devices and evaluation methods. AVL iGEM 2™'s high degree of automation most efficiently utilizes the equipment on emission engine testbeds to produce reliable data, while its powerful toolbox enables a very flexible way of reacting to new test requirements.

**SOLUTION**

Pre-configured and tested legal cycles, intelligent device control and calculation as well as reporting of test results are the core components of AVL iGEM 2™. A unique, easy-to-use parameterization concept allows the creation of project specific test cycles or engineering targets without any need for programming skills. The seamless interaction with its platform products AVL PUMA Open 2™ and AVL CONCERTO 5™ leads to an easy integration of AVL iGEM 2™ into the user's workflow and test environment.

**APPLICATION**

The emission automation software AVL iGEM 2™ is designed for the development and certification of heavy-duty and off-road engines as well as the development testing of light-duty and passenger car engines on dynamic and stationary engine testbeds. Software packages for further applications are currently being devised.

**BENEFITS AT A GLANCE**

- Intuitive user interface based on AVL PUMA Open 2™
- Simple measurement device integration via standardized interfaces
- Easy-to-use development kit to create your own test cycles and result evaluation
- Transparent and extendable test reporting based on AVL CONCERTO 5™
- Visualization of calculations and automated formula documentation
- Efficient testbed utilization by means of innovative parameterization
- Easy extensibility for enhanced R&D requirements with the powerful AVL PUMA Open 2™ testbed automation platform
Continually changing international emission legislation as well as new engine designs and measurement methods create a market demand for innovative solutions in the automation of emission testbeds. AVL iGEM Vehicle is the answer to these challenges. Based on decades’ experience in the automation of emission testbeds, AVL iGEM Vehicle was created with state-of-the-art software. This software features future-oriented design, which makes it a sound investment.

**SOLUTION**

Based on the proven success of AVL PUMA Open™, AVL iGEM Vehicle offers a high degree of scalability. It also allows simple adjustments for different testbed configurations based on individual user needs. This means it offers the highest level of flexibility and independence to the user. This flexibility guarantees the fulfillment of both present and future legal requirements.

**APPLICATION**

The AVL iGEM Vehicle is used for certification, research and development, and also for production compliance purposes. AVL iGEM Vehicle offers the best solution for passenger car, medium duty and heavy duty truck and motorcycle emission automation. It also provides a variety of customized application packages.

**BENEFITS AT A GLANCE**

- Valid emission test certification packages covering all current standards, including electrification and RDE
- Fully-automated procedures in the preparation of common devices for testing, calibration and checks
- Simple and flexible integration of new measurement devices using device abstraction as well as an extensive driver library
- Efficient tools to create custom test cycles and test applications
- AVL iGEM Offline – a powerful data evaluation tool with a central formula database