

## ADAS BENCHMARKING, TESTING AND VEHICLE VALIDATION

Comprehensive benchmarking and analysis of automated functions. Objective and automated assessment of driving quality and perceived safety on road, test rig and in virtual environments with proven tools.

- Testing and analysis of ADAS/AD features including competitor comparisons
- Calibration targets definition
- Gateway documentation during series development
- Identification of quality gaps and issue resolution
- Testing and validation of driving quality and perceived safety
- Delivery of AVL-DRIVE™ for ADAS

### APPLICATION RANGE

- Longitudinal control topics (speed assist)
- Lateral control topics (lane keeping assist)
- Lane change maneuvers (lane change assist)

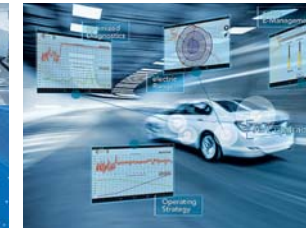


AVL-DRIVE™ for assessment of Automated Driving features

Benchmarking database for high number of vehicles with newest ADAS



OpEneR driving strategies for electrical efficiency, range and safety



Rapid prototyping package „AVL upgrade E“

## NEW PREDICTIVE AND CONNECTED FUNCTIONS

Concept development and demonstration of new features improving fuel efficiency, energy efficiency, electrical driving range, emissions and other driving attributes e.g. dynamic response, sound, ride comfort, performance.

- Concept specification and simulation
- Concept SW/HW development including build-up of demonstrator vehicles
- Proof-of-concept testing
- Concept development and selection including cost benefit analysis
- Series development support at calibration of control algorithm

### APPLICATION RANGE

- Passenger cars and commercial vehicles with conventional internal combustion, hybrid or electrical powertrains
- Predictive control units e.g. for engine, transmission, thermal management, hybrid and chassis systems benefiting from off-board information e.g. road, traffic, infrastructure and environmental conditions



# ADAS & Automated Driving Features

Development. Optimization. Testing



PEFC zertifiziert  
Dieses Produkt stammt aus nachhaltig bewirtschafteten Wäldern und kontrollierten Quellen  
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AVL combines methods and tools with automated assessment of driver feelings from virtual testing environment to real world driving to ensure timely development of high quality ADAS/AD features

### MARKET DEMAND

The demand for advanced driver assistance systems (ADAS) and automated driving (AD) features significantly increase development complexity. Consequently, time to market and cost of the new products are challenging. Furthermore, fail safe operation with the highest perceived driving quality is mandatory for end consumers to reach the required market volumes. Efficient and quality compliant development processes including tools are required.

### AVL APPROACH

AVL provides innovative engineering solutions for driving comfort, security, safety and energy efficiency from concept to SOP. ADAS development tools for road, testbed & virtual testing environments being suitable for both current & future requirements. Together with best in class benchmarking and objective assessment tools this approach efficiently supports the timely development of high quality ADAS/AD features.

### ADDED VALUE FOR AVL CUSTOMERS

- Best in class driving quality and perceived safety ensures highest end customer satisfaction
- Experienced engineering partner able to support OEM development, from concept to SOP, of ADAS/AD on time schedule and in budget
- Significant fuel savings and electric driving range extension with predictive and connected control functions
- Better resource management of core in-house competences in the complex ADAS/AD matters by outsourcing selected function development projects

### SYSTEMS ENGINEERING AND APPLICATION

Full engineering support for a multitude of current and future ADAS/AD features e.g. blind spot assist, lane departure warning, predictive adaptive cruise control, speed limiter etc. from concept to SOP.

- Automated and Connected driving system design
- Delivery plans for vehicle applications and model year changes
- System and component level requirements definition and management
- Functional safety and risk management
- Quality management
- Feature integration including development and quality improvement
- Support interface to end customers including e.g. owner manuals, training material, user trials
- Feature sign off specifications and sign off authority for all test cases
- Issue resolution and quality/feature improvement
- Testing, bug fixing and senior management approval for feature usage and operation
- Full sign off testing from concept through preproduction to production levels



Calibration testing of automated functions on road

Calibration and testing of automated functions on chassis dynamometer

### SOFTWARE & FUNCTION DEVELOPMENT WITH CALIBRATION SERVICES

Based on the proven record of powertrain SOP - software projects AVL fully supports new ADAS & AD projects with:

- Development and review of hard- and software architectures
- Autonomous driving function development:
  - Vehicle state estimation & controls
  - Sensor fusion
  - Localization
  - Decision making
  - Trajectory planning
- Extension of current safety methods and processes for ADAS applications
- Concept, implementation and testing of security mechanisms
- XiL environment for SW/HW function development, integration and testing for all kind of ADAS system
- Calibration of ADAS features at all development levels on road, testbed and virtual environments



Reference list of AVL contributions at various car manufactures

Automated driving level zero to two features e.g. lane departure warning

