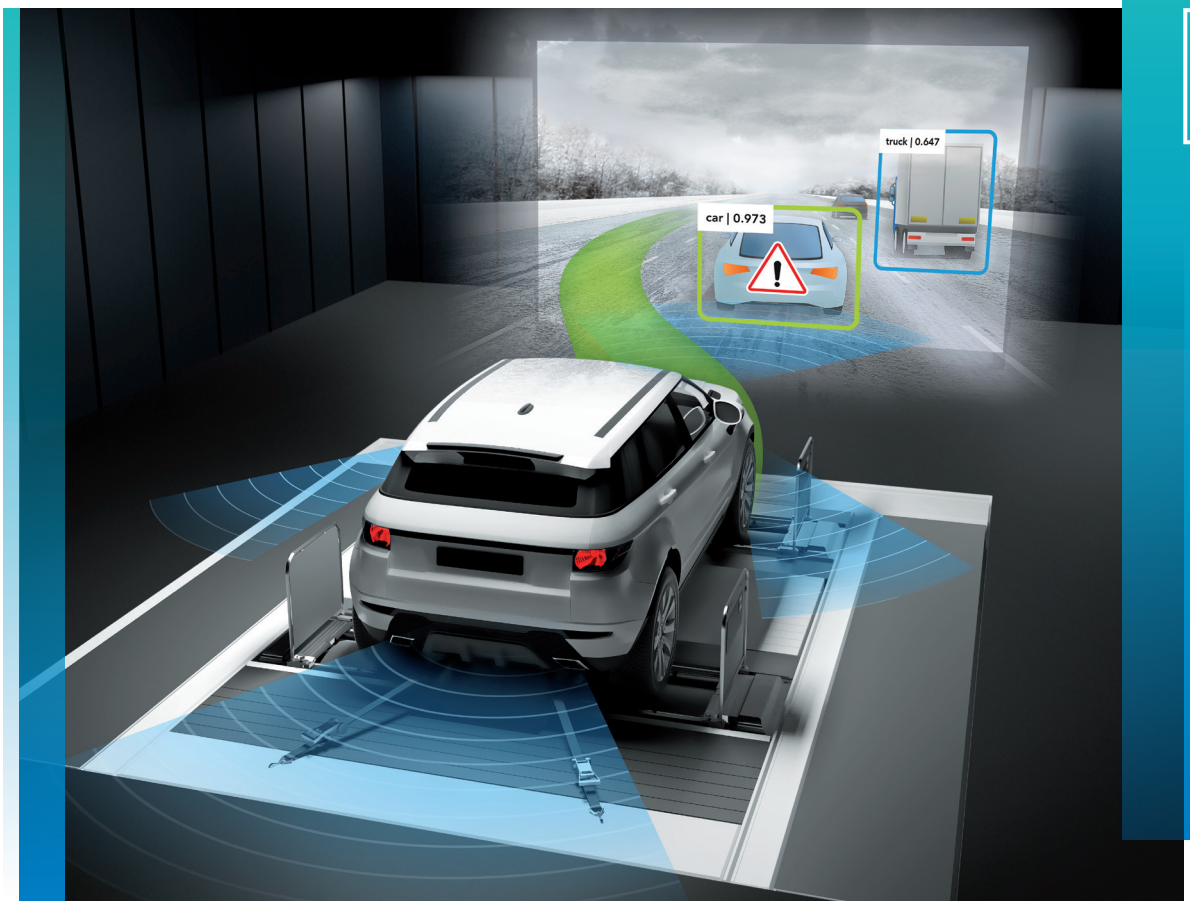


AVL DRIVINGCUBE™

The road doesn't end here

THE CHALLENGE

The validation of complex Advanced Driver Assistant Systems (ADAS) and Automated Driving (AD) functions in all possible conditions and variations poses a significant challenge in the field of automotive development. Functions like Autonomous Emergency Braking, Adaptive Cruise Control or even fully automated functions such as highway chauffeur require a huge amount of functional and non-functional validation and optimization within the integrated vehicle, especially when testing a multitude of environment situations and vehicle configurations. Not all of these tasks can be conducted in pure simulation, Hardware-in-the-Loop (HiL) or on the proving ground in an efficient way.

THE AVL SOLUTION

For the reliable and efficient validation and optimization of ADAS and AD functions and their functionality on a vehicle level, AVL provides a new testing environment for different use cases. The AVL DRIVINGCUBE™ combines both simulation and a ready-to-drive vehicle on a chassis dynamometer or powertrain testbed. Physical or behavioral sensor models connect the control units under test with the simulated environment. With holistic sensor stimulation and full range steering ability the DRIVINGCUBE bridges the gap between simulation and proving ground. This paves a new way to efficiently speed up the validation and approval process of ADAS and AD functions since the execution is more reproducible than those on the real road. Furthermore, the access to the vehicle during operation is simplified and critical scenarios can be validated in a safe way, which is not the case on the real road.

THE ADDED VALUE

- Increased ADAS and AD test coverage with reduced test effort
- Test execution on vehicle level under highly reproducible conditions
- Efficient repetition and variations of different driving maneuvers
- Safe operation conditions especially during critical driving maneuvers
- Easy upgrade of existing chassis dynamometers and powertrain testbeds

SOLUTION OVERVIEW AND DETAILS

Nowadays ADAS and AD functions are tested and calibrated either on a HiL - testbed or on the real road respectively on a proving ground. With the DRIVINGCUBE, these tasks can be performed reproducible, and with reduced effort.

For Lane Keeping Assist functions, different velocities and different curve radii can be applied easier than searching for adequate highway sections on the real road. Advanced Cruise Assist functions are often operated on highways with a speed above 100 kph. Executing scenarios at such speeds require a long test tracks which also have to fulfill special requirements.

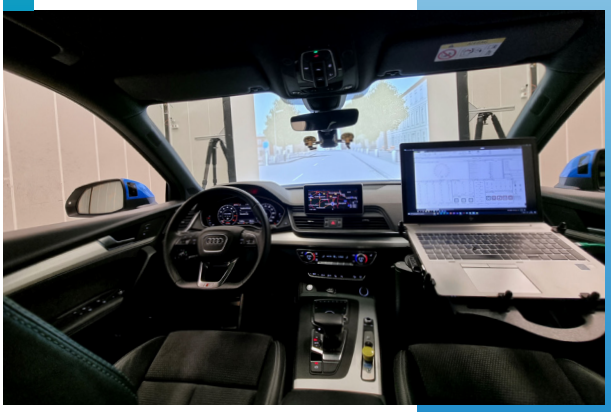
On the ViL, ADAS and AD functions for longitudinal and lateral vehicle guidance can be tested on real ECUs and in complete vehicles without relying on complex rest-bus simulation. All signal delays and the driving function behavior remain comparable to the real road test.

WHAT WOULD AN UPGRADE OF AN EXISTING TESTING INFRASTRUCTURE LOOK LIKE?

Based on the use cases, the existing testing infrastructure and established methods, a solution concept will be worked out. An existing chassis dynamometer or a powertrain testbed is required. This testbed will be upgraded with the DRIVINGCUBE technology consisting of Testbed.CONNECT™ and Model.CONNECT™ to interface with the testbed, the control unit and the environment simulation. The scenarios can be provided or generated from existing road tracks. Different environment simulations are supported. In addition, the AVL Dynamic Steering Force Emulator can be added, to allow realistic force feedback from the simulation to the steering system, while driving on the testbed. The setup can be completed with various sensor stimulations or injections, such as camera stimulation or radar stimulation.

IS MY TESTBED SUITABLE?

YES! The DRIVINGCUBE uses standard interfaces. The achievable dynamics of the driving maneuvers are highly dependent on the performance of the existing dynamometers. It is a modular add-on solution, which can be connected and disconnected easily.



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