



# Advanced Vehicle Driving Simulators

## A family of simulators for motorsport application

From a workstation, to static simulators, to the aVDS compact vehicle dynamics grade simulator, the family of aVDS products has a solution to cater for all your motorsport simulation needs.

Both the aVDS and aVDS-M variants of this innovative compact driving simulator combine a high-performance motion platform and high specification audio and visual hardware with industry-leading virtual content from rFpro.

The result is a family of motorsport simulators capable of accurately representing the smallest changes to a vehicle's configuration.



Workstation



Static



aVDS



aVDS-M

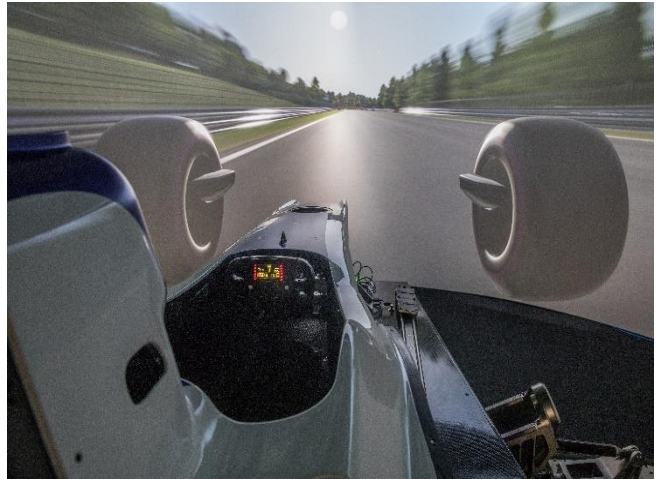
It can prepare your car and driver to a far greater extent than any previous generation of simulator.



## Motion platform

The flexible motion platform base and high payload capacity of up to 500kg, makes the aVDS the best solution for users wanting to test a multitude of motorsport classes. This includes automotive and is not limited to single seater.

The unique 'wedge action' design delivers an unparalleled combination of high stiffness, low weight and inertia, and linearity of motion ratio. This delivers extremely low latency and a high frequency response. Incredibly small parameter changes that are statistically significant to the driver can be made due to the consistent response throughout the travel range. The high level of decoupling between degrees of freedom gives an excellent excursion range.



## Designed for motorsport

Extending on the benefits of the aVDS, the aVDS-M is a purpose-built motorsport version of our well-established aVDS simulator offering additional benefits for 'single seater' motorsport users. The aVDS-M features a lightweight, carbon composite cockpit built into an ultra-light, stiff motion platform arrangement.

The aVDS oversized cockpit can be tailored to the class of single seater race car under test by adding panels. The result is a simulator that weighs significantly less than the aVDS and positions the driver closer to the ground. The results are performance advantages across a host of parameters including reduced mass, centre of gravity and inertia leading to reduced latency and increased response.

## aVDS- Motion Platform Performance

*"The aVDS has a low latency of less than 10ms which is necessary for limit handling and means that extremely small parameter changes can be felt as a result."*  
Felix Scott, Independent expert test driver and tuning engineer

*"High calibre motorsport drivers are able to make statistically significant chassis tuning changes considerably smaller than 0.5%"* Dr. Adrian Simms, Business Director at AB Dynamics

Degree of Freedom	Displacement aVDS-M	Displacement aVDS	aVDS Frequency Response (-3dB)*
Surge (X)	+900mm (braking) - 320mm	±540mm	>15Hz
Sway (Y)	±1350mm	±1250mm	>35Hz
Heave (Z)	±120mm	±120mm	>50Hz
Roll (Alpha)	±8.6°	±8°	>50Hz
Pitch (Beta)	±12°	±9°	>50Hz
Yaw (Gamma)	±30°	±30°	>35Hz



# Motorsport Applications

Track Readiness - The consistent software tool chain and Real Time hardware options mean that SiLs, HiLS and mHiLS testing is possible including connectivity to ECUs. This permits software, hardware and configuration changes to be effectively pre-tested, minimising wasted time at the track.

Tuning - Essential for creating optimum performance and gaining a competitive advantage, simulation is an efficient way to gain the results needed to adjust and modify your vehicle model and test aerodynamic packages.

Formula E - Battery energy use predictions are imperative to gaining a competitive edge in Formula E racing. A key element of this is driver training to match theoretical optimal driving. The aVDS offerings use digital content by leading software supplier rFpro which displays current and accurate circuit models showing bumps, repairs, pot holes and drain covers that could cause loss of control or reduced grip.

Vehicle Drivability Performance - Subjective feedback can be gained from the driver after setup experimentation and tuning before race events. This includes aspects like balance, dialing out understeer and oversteer around the lap, impact of bottoming and ride, controlled repeatable lap time implications of changes.

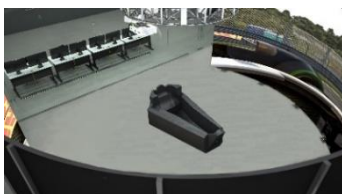
New Driver Development Programs - Exposure and prolonged seat time with full vehicle systems and controls in a safer environment with reduced costs over track testing. Also develops working relationships with trackside engineers.

Vehicle Modelling Development - This allows real-world to virtual model correlation both in data and driver feedback for the accuracy of the virtual vehicle model. This is frequently used outside of the simulator itself for offline performance simulations.

Software Stress Testing – Complex software systems can operate together at a full integrated vehicle systems level, with human drivers exercising the full system, before running in at the track. This reduces risks of software bugs stopping the car running at the track.

Fundamental Design Studies - Vehicle performance specifications which are not physically achievable can be tested in controlled parameter sweeps to understand fundamental trade-offs within key design parameters and their effect on vehicle balance and drivability. This includes aero-balance, weight balance, mechanical balance, total area package performance, lift vs drag, wheelbase, track, centre of gravity and more.

Driver Controls, Steering Wheel and Display Unit Setup – Driver can experiment with hardware and software to find a preference in a controlled environment with design engineers on hand for instant feedback. This includes pedal setup, steering wheel configurations, seat fits, driver display unit personalisation and refinement.



Static



aVDS with single seat tub



aVDS-M



## Haptic Feedback

AB Dynamics is one of the world's most trusted suppliers of automotive test systems having supplied and supported steering robot systems for more than twenty years. This experience has been utilised to design the company's own control loading devices including the motors because this is so critical to simulator performance.

## Motion Cueing

Motion cueing is a vital element of any driving simulator. A wide range of algorithms developed over many years are provided as standard with the aVDS, giving users the ability to choose the best option to meet their own requirements. This includes simple methods such as classical motion cueing, vestibular based methods and additional variants intended to minimise latency for the motorsport application. User written algorithms are also supported.

## Maximise Test Time

The long-established motion platform design making use of linear motors delivers a system that is extremely robust and requires negligible user performed maintenance. There is also no need to schedule in down time for expensive part replacement intervals. Efficient testing through software is a core skill of AB Dynamics.

## Ease of Installation

There are no onerous installation requirements relating to seismic mass for the aVDS family of products. Installation locations are not limited to the ground floor of a building and the system setup allows easy upgrade of static simulators to enable motion.

## Immersion

Immersion is critical to vehicle and driver development for high-performance vehicles. The experience of driving the aVDS-M is so involving and detailed that seasoned drivers can detect incremental parameter changes as if they were in the real car. It is a critical tool for efficiently optimising vehicle setup and development. Thanks to the high road surface fidelity reproduced by the aVDS-M, simulated results and data correlate closely with those attained by physically driving a real vehicle on a specific track or course. It has an active seat and belt, and visual, audio, haptic and vestibular cueing ensures that the driver is fully engaged and that senses are stimulated and tested for unparalleled authenticity.

## Partnership with rFpro

The immersive digital content is provided by leading software supplier rFpro with extensive exposure to the market in Formula 1, Formula E, NASCAR and IndyCar, and top World Endurance Championship categories.

Get in touch with us today to find out more information about this leading motorsport development, including performance data:

Email: [simulatorenquiries@abdynamics.com](mailto:simulatorenquiries@abdynamics.com)

Web: [www.abdynamics.com](http://www.abdynamics.com)

