

# ANVH 250™

Accelerating suspension  
development. Improving  
NVH performance.



# Introducing the ANVH 250™

The ANVH 250 is a sophisticated test machine that enables accurate measurement of noise, vibration, and harshness (NVH) transmission through a suspension system into vehicle body mounting points - long before prototype vehicles are available.

As one of the main sources of vehicle interior noise, minimising road noise is a key focus, and also a major challenge. NVH issues can often remain undetected until late in a vehicle development program, when reliable and sufficiently representative prototype vehicles become available. This can lead to costly and compromised corrective measures, with additional weight or sub-optimal designs being carried into production.

The changing automotive landscape is making it more important than ever to get NVH right. Electrification typically reduces background noise levels, and traction motors mounted within the axle assembly create new sources of NVH. Autonomous vehicles, by removing the driver, inherently lead to a greater focus on occupant comfort, necessitating a major rebalancing of traditional suspension system design.

Testing complete prototype suspension systems for NVH transmission characteristics from early in the development process is the key to optimising performance and identifying and cost-effectively addressing issues before they become problems. Now the ANVH 250 makes this possible, providing the objective, high-quality data needed for more efficient, streamlined suspension system development.

The ANVH 250 revolutionises the development process by enabling a holistic approach to suspension system development right from the outset. It provides complete system data from your physical prototype, so you can validate your simulation model, measure and refine NVH characteristics and identify and resolve issues long before they make their way into production.

# The ANVH 250™ Solution

The ANVH 250 is a purpose-built test system designed and manufactured by the same team that developed the world's leading K&C test machine - the SPM. At its heart lies the same philosophy of using only the finest quality components to provide the most faithful possible simulation of on-road behaviour, coupled with easy-to-use software and an extensive range of options that allow you to tailor the solution to your specific requirements.

The ANVH 250 solution includes the following components:



**High natural frequency frame in excess of 250Hz**



**Up to six highly dynamic electromagnetic linear actuators**



**Range of sensor options including lasers and accelerometers**



**K&C testing option**



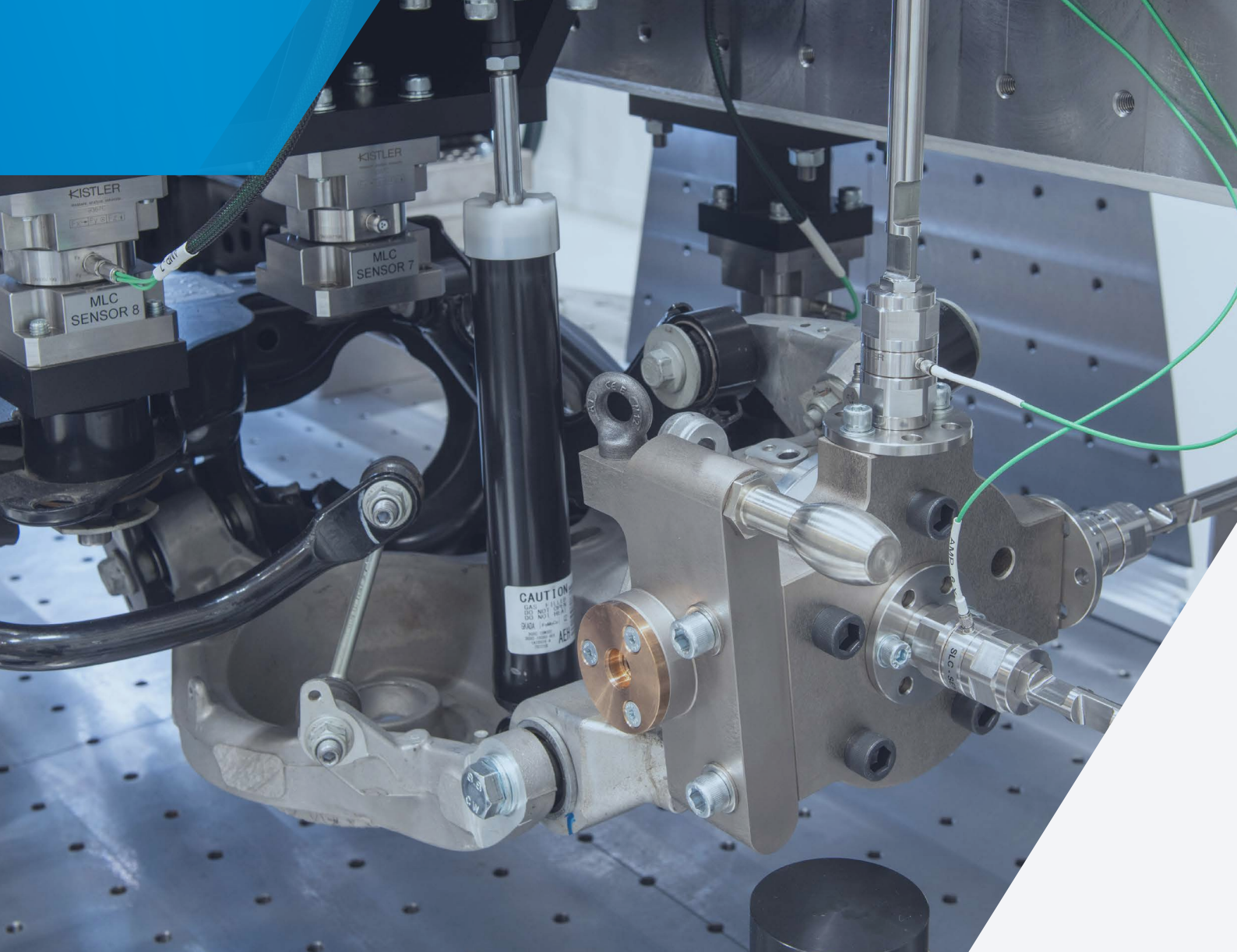
**Comprehensive library of tests including frequency sweeps and stepped inputs**



**First year of email, phone and online support included**

The ANVH 250 is ideal if you need to:

- Improve NVH performance
- Reduce reliance on prototype vehicles
- Eliminate production vehicle NVH fixes
- Develop systems using high quality objective data
- Improve the correlation between vehicle models and physical systems



## How it works

The ANVH 250 simulates the structural propagation of vibrations from the tyre contact patch through the suspension system to the vehicle body by injecting high-frequency test signals into the axle spindles.

Up to six bespoke electro-magnetic actuators apply precisely controlled motion at frequencies from 0-250Hz and displacements from  $\pm 0.01$  to  $\pm 50$ mm, while tri-axial load cells measure the forces transmitted to each vehicle body mounting point.



The ANVH 250 can apply sinusoidal, random input and road load data displacements to the suspension system. Displacements can be applied to the wheel hubs in the vertical (Z), longitudinal (X) or lateral (Y) directions. The paired displacements at the hubs can be in-phase, anti-phase or single-sided.

By analysing the resultant forces, accelerations and displacements, sources of structural resonance can be identified, isolated and optimised.

# Unique features

## High natural frequency mounting frame

The ANVH 250's innovative frame design is exceptionally stiff, ensuring its own resonance frequency does not interfere with tests. With the test object installed the lowest resonance peak is above 250hz, which is in excess of the maximum test input frequency. Its flexible mounting system accommodates a wide range of suspension sub-assembly types and sizes and the removable front closure simplifies the load and unload process.

## Class-leading electric linear actuators

AB Dynamics uses its unique high-frequency actuators to deliver a working frequency range of over 250hz. As standard, they can apply up to 10kN of load, have a bandwidth in excess of 250hz and a maximum stroke of  $\pm 50$  mm. The integral pneumatic pre-load system is used by the vertical actuators to support the static laden weight of the axle, allowing accurate ride heights to be replicated.

The actuators deliver motion over a frequency, displacement and load range not achievable with any available hydraulic actuator. The technology is also inherently safer, cleaner, quieter and more energy-efficient than hydraulic alternatives.





### **Kinematics and compliance measurement**

The ANVH 250 can be supplied with the Dynamic Arm system from AB Dynamics' SPMM test machine for basic K&C measurement. This provides accurate measurement of the wheel hub motion in all six degrees of freedom - enabling you to closely monitor the influence that NVH optimisation has on the dynamic characteristics of the suspension system.

### **Powerful software**

The ANVH's software interface is common to our other test machines and allows the operator to easily navigate to manage the machine, configure test procedures, view results and export for post-processing. The ANVH 250 software features an on-screen plotting program that enables results to be viewed as soon as a test is completed so that you can check it executed successfully and produced meaningful data.

### **Support and training**

All ANVH 250s come with a one-year Silver support package, which includes software upgrades and remote technical support via email, phone and online. We also offer a range of comprehensive upgrade and training packages that enable you to choose the technical support that best matches your requirements.



## Benefits

### Data-driven decision-making from concept to production

In the absence of comprehensive system data, individual component specifications are commonly used to set and measure vehicle chassis targets. By providing data at a system level, the ANVH 250 enables a holistic approach to setting and achieving targets, resulting in a final product that is better optimised for lower NVH levels.



### Virtual validation of complete suspension systems

The ANVH 250 provides a complete and accurate dataset for a suspension system without the need for a mule or prototype vehicle. This means the physical system can be correlated with simulations and virtually validated in the laboratory, so you can be confident your model is a true and accurate representation of reality from early in the development process.



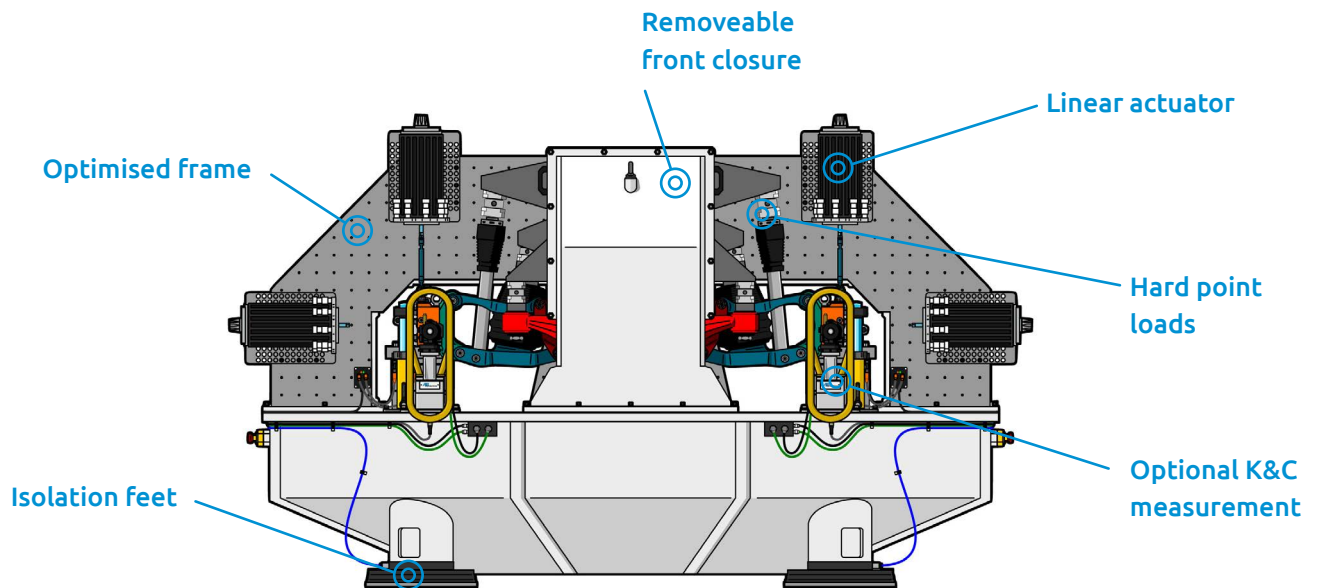
### **Accelerated time to market**

By making better use of simulation and reducing the requirement for vehicle prototypes, engineers can accelerate the development of chassis systems. This is particularly useful for advanced active technologies where there is significant control software and hardware development required.

### **Reduced risk of cost overruns**

In typical vehicle development programs, full analysis of in-vehicle NVH characteristics is only possible when the final body structure or a reliably running prototype vehicle is available. Using the ANVH 250 to optimise suspension system design from the outset reduces the risk of having to implement inherently expensive fixes to NVH issues late in the development process.

# Overview



## Options

| Option                                      | Description                                                                                                                      |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Base system                                 | Frame, primary electrical cabinet, control and data software suite, one pair of vertical 10kN actuators and one pair of stingers |
| Base sensor kit (Option 1A)                 | Four pairs of hardpoint force transducers with charge amplifiers                                                                 |
| Advanced sensor kit (Option 1B)             | A user-selectable package of accelerometer and laser displacement sensors                                                        |
| Horizontal actuators (Option 2A)            | One pair of 10kN horizontal actuators with X and Y motor mounts, one pair of stingers and horizontal control module              |
| Additional horizontal actuators (Option 2B) | One pair of 10kN horizontal actuators with a pair of stingers. Pre-requisite: Option 2A                                          |
| Multi-axis control (Option 2C)*             | Includes secondary electrical cabinets and the multi-axis control module. Pre-requisites: Options 2A and 2B                      |
| Impact testing (Option 3)*                  | One pair of high force and displacement vertical actuators and the impact test control module                                    |
| Vertical K&C (Option 4A)                    | One pair of dynamic arm spindle centre position measurement systems and the vertical K&C control module                          |
| Horizontal K&C (Option 4B)*                 | The horizontal axle K&C control module. Pre-requisites: Options 2A and 4A                                                        |

\*Under development

# About AB Dynamics

When you choose a solution engineered by AB Dynamics, you're benefitting from proven hardware, trusted software, 40 years of knowledge and experience, plus unrivalled service and support. Our range of automotive testing, verification and validation solutions encompass dynamics, suspension and steering characterisation, durability, advanced driver assistance systems and autonomy.

We pride ourselves on delivering solutions that enable the development of safer, more enjoyable, efficient, and eco-friendly vehicles. As a key partner to the global automotive industry, our customers include the top 25 vehicle manufacturers, Tier 1 suppliers, test facilities and autonomous vehicle developers.

As part of the AB Dynamics Group of companies, we offer a wide range of vehicle autonomy, simulation, and testing solutions. As a group, we enable customers to develop and test vehicles in laboratory and virtual environments, validate on the track before finally evaluating vehicles in the real world on public roads.





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