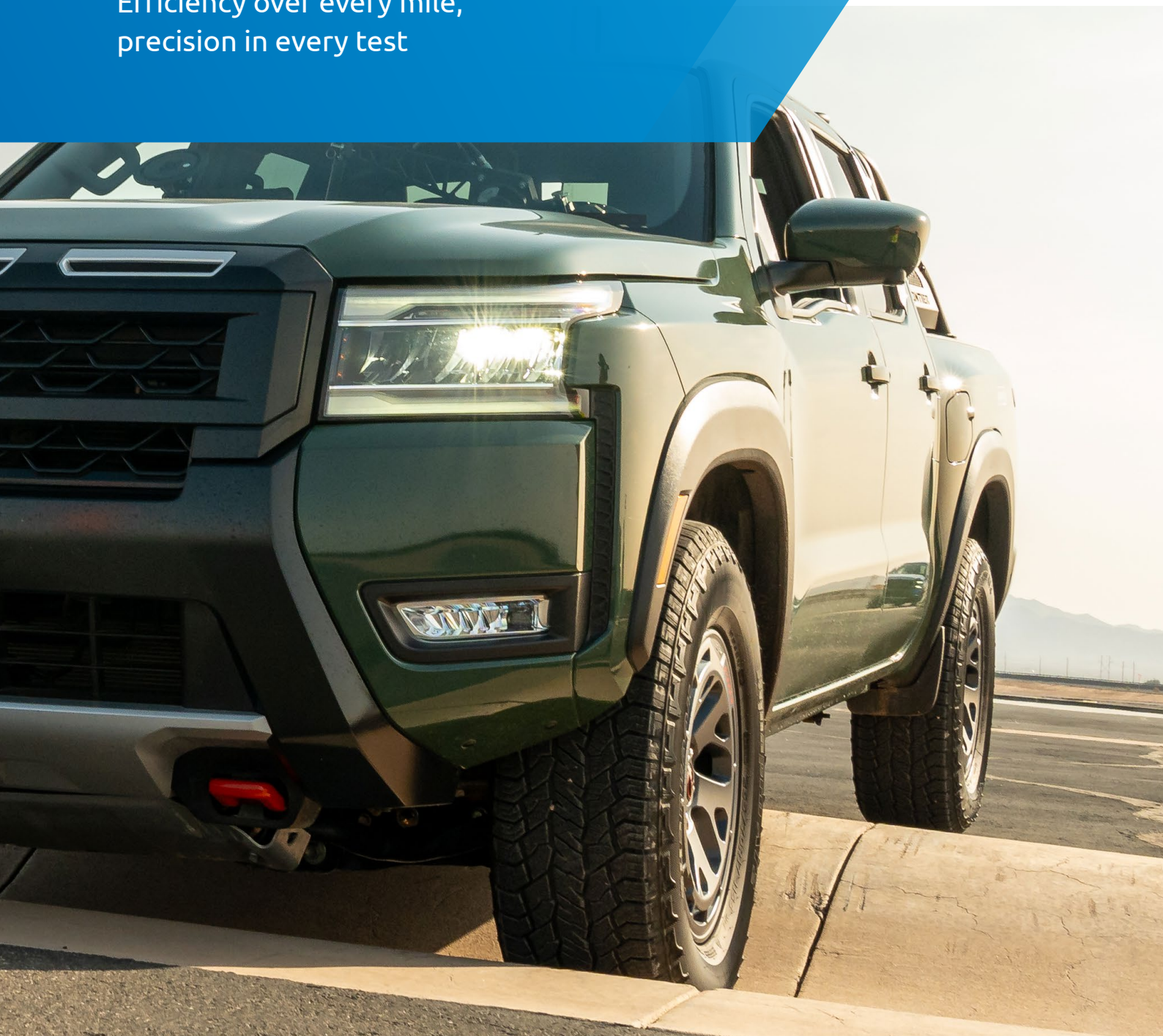
AB DYNAMICS™

Solution Brochure

# Automated Driverless Testing Solution

Efficiency over every mile,
precision in every test



# Introducing Automated Driverless Testing

## Transform your test operations with precision, safety and scalability

Automated Driverless Testing from AB Dynamics is changing how automotive manufacturers, Tier 1 suppliers and test houses approach vehicle testing. By removing the need for a human driver, our solution delivers new levels of efficiency, safety and repeatability – helping you maximise track time, reduce costs and accelerate time-to-market.

Automated Driverless Testing is perfect for:

/ **Mileage accumulation** – Run extended, uninterrupted test cycles across multiple vehicles simultaneously
/ **Durability testing** – Efficiently and repeatably accelerate system and component wear over rough surfaces
/ **Misuse testing** – Safely explore edge cases beyond normal driving parameters with precision

We will work with you to understand your requirements, develop a solution tailored to your needs and support the planning, delivery and commissioning of your solution. Our global team of experts are ready to ensure continued success providing expert training and ongoing support.

Proven technology integrates driving robots, advanced controllers, telemetry, positioning technology and a powerful software architecture to deliver fully automated, multi-vehicle testing. With the ability to manage up to 20 vehicles in parallel, you can scale your testing like never before.

Key benefits include:

/ Eliminate driver fatigue and injury risk
/ Increase throughput with continuous, sequential testing
/ Improve data quality by removing human variability
/ Adapt to a wide range of test scenarios with confidence

Driving robots and software deliver accurate, precise and repeatable testing, with over 2,000 systems in service worldwide. Our Automated Driverless Testing solution takes testing efficiency to the next level and is relied on by a diverse range of OEMs, test houses and autonomous vehicle developers.

> **“It is a truly innovative way to test the safety of vehicles in motorsport. The data we obtained from the test was extremely important and was not possible to get from any other crash test facilities.”**
>
> John Patalak, Vice President, Safety Engineering, NASCAR

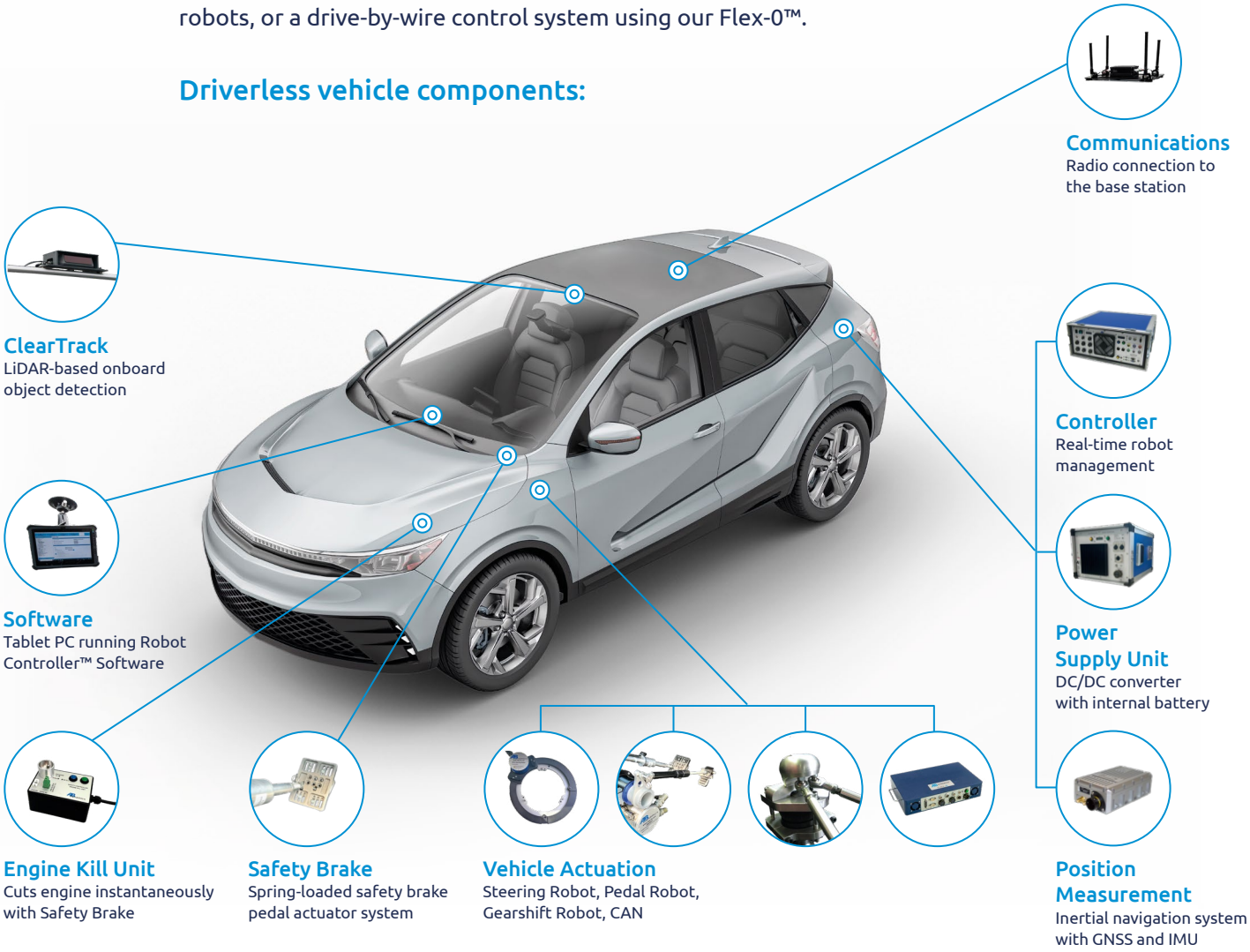
# How it works

AB Dynamics’ Automated Driverless Testing solution is built around a powerful software architecture that seamlessly integrates with three core components: the driverless vehicle, the base station, and the communications network. The system can be further enhanced with ClearTrack™, a LiDAR-based onboard detection system that adds an additional layer of safety and operational resilience.

## Driverless vehicle

Vehicles are transformed using pedal, steering and gearchange robots, or a drive-by-wire control system using our Flex-0™.

### Driverless vehicle components:



**ClearTrack**
LiDAR-based onboard object detection

**Software**
Tablet PC running Robot Controller™ Software

**Engine Kill Unit**
Cuts engine instantaneously with Safety Brake

**Safety Brake**
Spring-loaded safety brake pedal actuator system

**Vehicle Actuation**
Steering Robot, Pedal Robot, Gearshift Robot, CAN

**Communications**
Radio connection to the base station

**Controller**
Real-time robot management

**Power Supply Unit**
DC/DC converter with internal battery

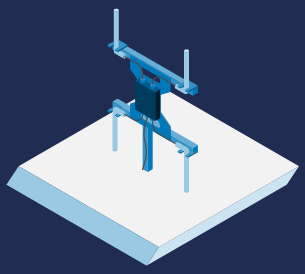
**Position Measurement**
Inertial navigation system with GNSS and IMU

## Base station

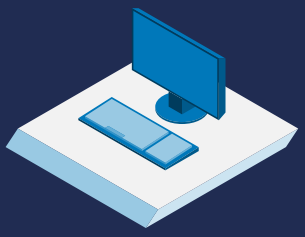
Our scalable GTC™ (Ground Traffic Control™) Pro software allows operators to monitor and control multiple vehicles easily.

### Base station components:

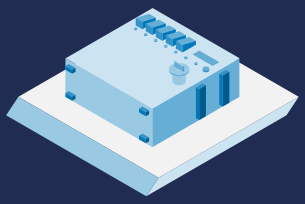
**GTC Pro Server**
Real-time link with vehicles and track infrastructure



**Radio Base Station**
Secure, high-volume data transfer

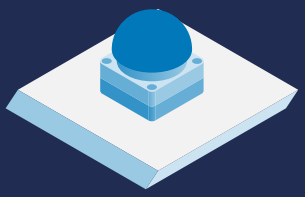


**GTC Pro Software**
Vehicle monitoring and control with GNSS collision detection



**Safety Controller**
Safety brake and engine kill system management

**Vehicle Control**
Remote manual vehicle control



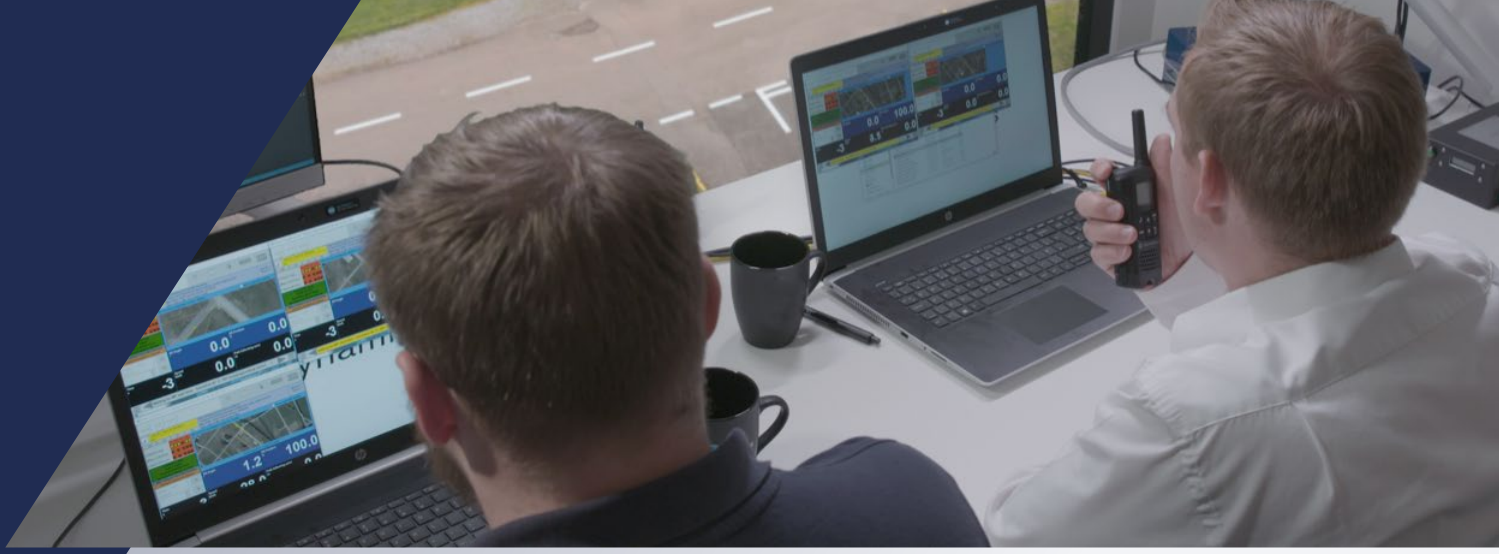
**Global Abort**
Remote stopping of all managed vehicles

## Communication network

A high-performance mesh radio network provides reliable, secure data transfer. The network can be set up with fixed infrastructure or mobile nodes.

## Software

Automated Driverless Testing is powered by our advanced track test software. Each application plays a distinct yet complementary role in enabling safer, scalable and repeatable vehicle testing. Together, these applications form a robust and flexible ecosystem that transforms complex test requirements into automated, streamlined workflows.



## Software applications:

PLAN

### Scenario Generator™

Allows users to plan routes and courses across their test tracks, and to define events, triggers and actions

SETUP

### Robot Controller™ (RC)

Handles the detailed configuration and execution of test cases, ensuring precise coordination between vehicle systems and test parameters

OPERATE

### GTC™ Pro

Serves as the central command hub, allowing the execution and monitoring of tests

REPORT

### AB Grapher™

Allows users to visualise and analyse post-test data

## ClearTrack™

ClearTrack is a LiDAR-based object detection system that seamlessly integrates with the Automated Driverless Testing solution. It adds an extra layer of protection for valuable vehicle prototypes by detecting and automatically braking to avoid obstacles, such as animals or debris. This reduces downtime by protecting your assets.

### Use case: Mileage accumulation testing

Mileage accumulation is essential for validating long-term vehicle performance but it's traditionally resource-intensive, requiring a large team of drivers and long hours behind the wheel.

With AB Dynamics' Automated Driverless Testing, you can scale effortlessly to meet growing demands. Up to 20 vehicles can run simultaneously, 24/7, with just one or two operators managing the entire fleet from a central base station.

Eliminating the effect of driver fatigue, our system ensures consistent vehicle control and delivers highly repeatable results – all while dramatically increasing throughput and reducing operational costs.

The outcome? Faster mileage accumulation, fewer resources needed, and more reliable data to support your development goals.

# Key features

## Vehicle agnostic

Our driverless system can be retrofitted to almost any vehicle and supports all types of gear change systems. Proven applications include passenger cars, motorsport, defence and heavy-duty vehicles.

## Quick and simple installation

Installation and set-up of driving robots, power packs, controllers and positioning equipment is fast and straightforward.

/ A robot system can be operational in under two hours
/ The Flex-0 drive-by-wire system can be fitted in as little as 30 minutes
/ No permanent modifications to the vehicle are required

## Efficient programme management

Test scenarios are simple to set up and can be trialled in simulation before heading to the track. Users can develop libraries of scenarios, and a new test can be deployed to vehicles in bulk at the proving ground.

Once a new schedule has been built, day-to-day operations don't require specialist skills – a typical user can be trained to safely operate the robots in a few days. Test execution is also fully automated. Operators simply select a schedule, and the robots or Flex-0 system manage the rest – even parking the vehicle once testing is complete.

Lastly, the system ensures safe vehicle spacing using pre-set limits. Vehicles on intersecting paths can yield to one another automatically, without operator input.

# Benefits

Our automated driverless solution is setting new standards for vehicle testing accuracy and efficiency.

## Protect the safety of your drivers

Durability, misuse and mileage accumulation testing can be physically demanding and even hazardous for human drivers. In some cases, drivers can only operate for 30 minutes before needing a break - leading to frequent swaps, increased costs, and inconsistent results.

By removing the driver, our solution protects your team's wellbeing while enabling longer, more intense test cycles. It also allows for testing at higher speeds and on more aggressive test surfaces without compromising on safety.

### Use case: Misuse testing

Misuse testing pushes vehicles to their limits – simulating extreme scenarios like airborne launches over ramps or impacts into sandbanks. These tests are essential for understanding vehicle behaviour in the most demanding conditions, but they pose serious risks to human drivers.

With Automated Driverless Testing, you can safely execute these high-risk scenarios with unmatched precision and repeatability. Removing the driver not only eliminates safety concerns but also enables more aggressive and consistent testing, providing insights that would be impossible to gather manually.

The result? Safer testing, more extreme manoeuvres, and higher-quality data. This all contributes to faster development and more robust vehicle validation.

## Better quality data through robot precision

Robots are far more accurate, precise and repeatable than any human driver. Shift to shift, day to day, vehicle to vehicle, robot performance will always be consistent. This makes the data collected more valuable, providing the confidence that variation between results is not down to variable conditions but to the vehicle itself.

The driverless solution can typically control the vehicle to an accuracy of 2 cm, the speed to within 0.5 km/h and steering angle to within 0.5 degrees under normal driving conditions. Due to this level of precision, robots get the test right, first time.

Driving robots also enable extreme vehicle manoeuvres to be programmed that can't be reliably achieved through human control. For example, sliding the rear of a vehicle into a target.

## Increased efficiency

Automated Driverless Testing has the ability to transform your facility into a high-throughput powerhouse. Imagine a proving ground where up to 20 vehicles run continuously, day and night – the only time the vehicle needs to exit is to refuel – executing complex test cycles with no driver changes, no downtime, and no compromise on precision. This is all possible with just one or two operators overseeing operations from a base station.

Our intuitive software makes it easy to create, save and manage a comprehensive library of test scenarios, which can be deployed across your entire vehicle model range. Once configured, powerful sequencing tools take over: vehicles autonomously perform tests, respond to events like low fuel or charge, and return to pit bays when needed – all without human input.

### Use case: Durability testing

Durability testing is designed to simulate years of wear and tear in a reduced timeframe. Tests often involving repeated exposure to rough surfaces and harsh conditions. Traditionally, this requires large teams, and frequent driver changes due to the physical toll on human operators.

With Automated Driverless Testing, you can run these demanding tests continuously, without compromising safety or consistency. Vehicles operate around the clock, executing aggressive test cycles with precision and repeatability – all while reducing labour requirements and eliminating driver fatigue.

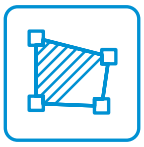
The benefit? Faster validation, lower operational costs and more robust insights into long-term vehicle performance.

# Enhanced safety

**Our automated driverless solution has been designed from the ground-up with safety as the priority, featuring multiple layers of protection.**

### Emergency stop and redundancy

Multiple fail-safes within GTC Pro software and hardware (e.g. brake actuators, watchdog circuits, power systems) ensure vehicles can be stopped instantly and safely



### Operational boundaries and control

Geofencing and rule zones define safe operating areas and speed limits

### System integrity and monitoring

On-board real-time diagnostics checks (for path following and speed control), and motion pack accuracy monitoring ensure safe operation

### Communication and cybersecurity

Encrypted communication system prevents third parties from accessing the network

### Obstacle detection and collision avoidance

Real-time collision checking based on vehicle position and planned path, plus the option of LiDAR-based object detection and avoidance

# Training and support

We know testing requirements are becoming more complex and unique. So, we can work with your team to develop and implement a solution that works for your specific needs and maximises efficiency savings.

Support can continue throughout the lifecycle of the equipment. This high service level is made possible by our local teams in Europe, Asia and the Americas.

# Find out more

Visit our solutions homepage to find out more about this ground-breaking technology at abdynamics.com/solutions.

# About AB Dynamics

## We pride ourselves on delivering solutions that enable the development of safer, more enjoyable, efficient and sustainable vehicles.

When you choose a solution engineered by AB Dynamics, you're benefiting from 40 years of industry knowledge and experience.

Our automotive testing and verification solutions are used by the top 25 vehicle manufacturers, Tier 1 suppliers, test facilities and autonomous vehicle developers.

As a key partner to the global automotive industry, we provide proven hardware and software that's backed up by unrivalled service and support.

As part of the AB Dynamics Group of companies, we offer a wide range of solutions for vehicle autonomy, simulation and testing. This includes vehicle dynamics, suspension and steering characterisation, durability, advanced driver assistance systems and autonomy.

As a group, we enable customers to develop and test vehicles in laboratory and virtual environments, and validate on the track, before finally evaluating vehicles in the real world on public roads.

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