

REVOLUTIONARY VEHICLE ACTIVE RIDE HEIGHT SYSTEM FOR NEW WORLD-CLASS WIND TUNNEL ENVIRONMENT AT U.S. HONDA FACILITY

Aerodynamic vehicle testing of production vehicles and race cars

MARKET	OTHER APPLICATIONS	CAPABILITY
 Motorsport	 Automotive	 Niche Automation
	 Test	 Global Focus
	 Support	 Expertise
		 Modelling & Simulation
		 Training
		 Field Service

In March 2022 Honda opened its \$124 million state-of-the-art wind tunnel facility, ushering in a new era of development testing capabilities for Honda and Acura products, as well as the development of racing cars from pinnacle racing in IndyCar and next generation LMDh sports cars to commercial racing programs.

The new Honda Automotive Laboratories of Ohio (HALO) facility, located at the independent Transportation Research Center Inc. (TRC) in Central Ohio, is one of the world’s most advanced wind tunnels, with three separate state-of-the-art testing functions — aerodynamics, aeroacoustics, and racing — in one location.

Honda created the multifunctional HALO facility to reinforce its commitment to developing fuel-efficient and fun-to-drive vehicles. One of the most advanced of its kind anywhere, the wind tunnel uses a unique interchangeable modular ground plane system capable of aerodynamic vehicle testing of production vehicles and race cars. The tunnel can generate wind speeds of more than 190 miles (306 km/h).

THE CHALLENGE

Moog in the UK was approached by Honda in December 2019 to provide an active ride height system incorporating a revolutionary stability control function.

The system needed to provide actuation and control of the ride height of a test vehicle undergoing aerodynamic testing in the new wind tunnel environment, as well as a separate vehicle in the setup area. Moog’s system replaces the conventional on-car suspension, which presents a new challenge in that a vehicle suspended purely on its tyres can experience pitch oscillations during high-downforce test conditions. These oscillations generate unrepresentative test results and preclude running the vehicle at very low ride heights because of the danger of contacting the moving belt.

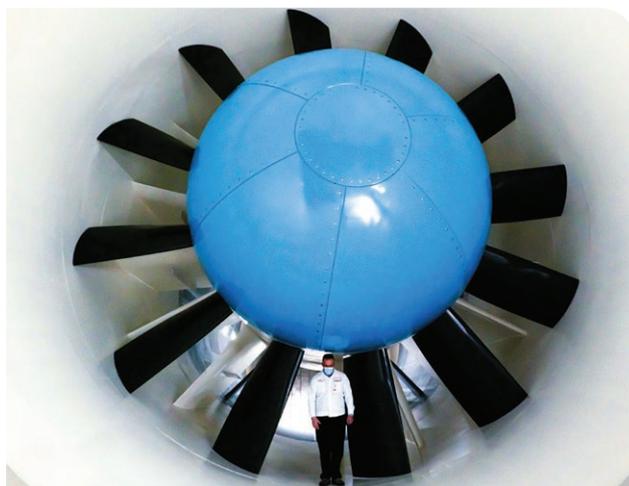
Moog was chosen due to its extensive experience in active suspension in motorsport – developed initially for Team Lotus and Williams GP Engineering during the 1980s.



THE SOLUTION

The Moog team supplied a turn-key servo-hydraulic control system which can be installed in a variety of vehicles. Moog's bespoke software is designed to control the ride height, pitch, and roll demands and incorporate a high-speed damping system, preventing the car from oscillating at high downforce levels – enabling precise control of ride height, pitch and roll of the vehicle during aerodynamic testing. The scope of delivery included:

1. Hydraulic actuators that incorporate a fail-safe system locking the vehicle in a safe position in the event of power loss, or when the system is switched off. These are operated by miniature servo valves replacing the conventional mechanical suspension.
2. Electronic controller and custom software developed for vehicle positioning, active damping, failsafe guarding, kinematic transformation, and datalogging.
3. System incorporating a Moog brushless electric motor for precise control of the steering position to realistically simulate tyre slip angle.
4. Simulation and modelling expertise to create, analyse and predict the suitability of the system.
5. Collaboration with project technical partner Cosworth – a name synonymous with technological prowess and high performance – to integrate the ride height system control with the Wind Tunnel Supervisory control system.



THE RESULT

The entire project was worked on during the Covid-19 pandemic lending itself to increased pressures. Factory acceptance testing, normally carried out in person, was undertaken over the internet by Moog, Honda and Cosworth whilst the US border was shut. Full commissioning was undertaken when the border was opened for essential business travel. The Active Ride Height System is now fully operational in the wind tunnel environment, with continued support should Honda require it.

THE BENEFIT

Honda's new wind tunnel can help to optimise the aerodynamic performance of race cars competing in various motorsport disciplines, especially Indy 500. The ride height system provides a means to achieve representative test conditions at varying ride height, pitch and roll without the need to make time consuming modifications to the suspension.

BACKGROUND TO HONDA RESEARCH & DEVELOPMENT IN AMERICA

Honda began establishing research and development operations in America in 1975, today conducting R&D activities at 21 facilities across the country responsible for creating advanced products and technologies that provide new value to Honda and Acura customers. Honda conducts all phases of product development in the U.S., from market and technology research and styling through engineering design to prototype fabrication and testing, local parts procurement and support for mass production preparation. With major R&D facilities in California, Ohio, and North Carolina, Honda's U.S. associates are engaged in the development and testing of Honda and Acura automobiles, Honda powersports and power equipment products, and also play a lead role in the development of leading-edge safety, driver-assistive and environmental technologies.

Learn more at www.hondaresearch.com

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