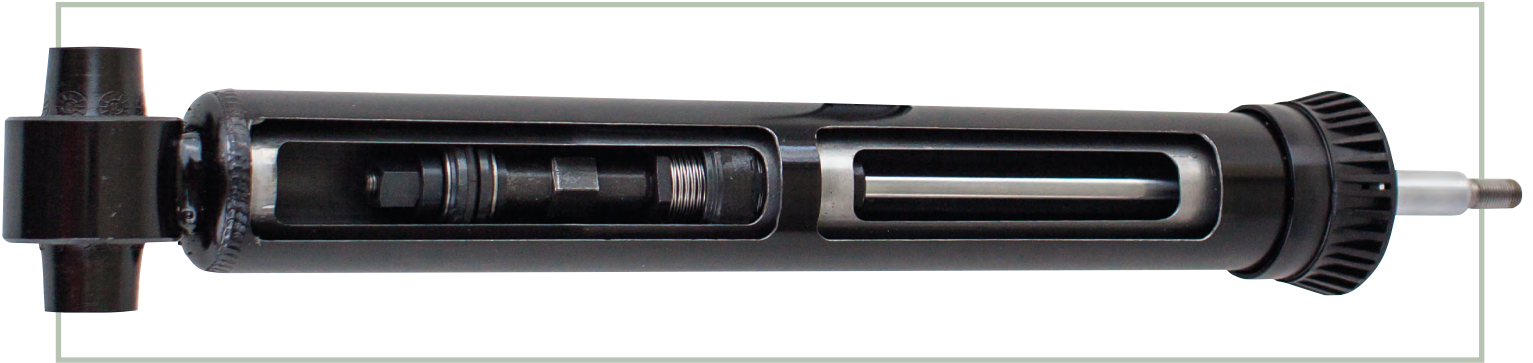


# Innovative dampers

New functionalities have been developed for passive dampers at **BWI**, delivering benefits for vehicle engineering and passenger comfort



Standard passive dampers are becoming more sophisticated, with additional features becoming the norm rather than the exception. Two new passive damping systems from BWI Group – the Hydraulic Rebound Stop (HRS) system and the Hydraulic Compression Stop (HCS) system – have been engineered to provide additional functionalities and benefits.

These new features enable efficient handling of forces transmitted from the suspension into the vehicle's body at the end of the damper stroke. Typically, these forces can create noise and a harsh ride. Energy management at the end of the damper stroke is about developing additional damping forces at a given threshold position (the distance from vehicle design position) at both movement directions of the wheel: compression and rebound.

Additional damping developed at the end of the stroke allows efficient dissipation of the energy, thereby improving ride quality and NVH, without affecting the primary tuning delivered by the standard valving of the suspension damper.

The HRS rebound energy management system is a well-established BWI design that has proven its efficiency in several applications. To complement the HRS rebound energy management system, an HCS compression energy management system has also been developed.

For now, two schools of thought exist as to how this technology should

be used: one offers refined tuning of the additional gain in compression damping to complement the standard compression valving. This perspective will sometimes also be used to 'balance out' increased rebound damping used to stabilize the vehicle body when driving over obstacles.

The other perspective aims to significantly increase compression damping, with the goal of reducing the use of spring aids. Both variants of the HCS system have been successfully tested in various vehicle applications, from large SUVs to sedans and sport coupes, and they have been well received by ride engineers.

So what will happen when the HRS is paired with HCS? The answer is that vehicle tuning engineers are given an opportunity to deliver handling and comfort without compromising one or the other. The new tuning opportunities can also help to address pitch and heave motions in vehicles.

The hydraulic end-of-stroke limiters not only reduce the noise transmitted from the suspension into the passenger compartment, but also improve the feeling of luxury in the car. Due to the dissipation of end-of-stroke energy and the resulting lower impulsive forces transmitted into the body of the vehicle, it is thought that the system could be used in lightweight vehicles.

Features like BWI Group's 'intelligent' HRS system and HCS system are tools that may be employed to further expand the tuning range of passive

**ABOVE:** The Hydraulic Compression Stop (HCS) damper complements the Hydraulic Rebound Stop (HRS) system

damping systems, while also providing functionality and benefits comparable to active damping systems. Who knows how much further this may go?

## About BWI Group

BWI Group acquired Delphi Chassis Systems on November 1, 2009. The Group's product portfolio is split into two complementary groups: ride and handling technologies, and braking technologies. In both areas, the offering ranges from high-value items such as twin-tube dampers and brake system components, through to highly sophisticated active systems and the expertise required to integrate them with premium vehicle programs.

The Group's engineering philosophy can be summarized as 'innovation with design simplicity', a strategy that is clearly demonstrated in world-class technologies such as electronically controlled braking and stability systems, the MagneRide controlled damping system, and the MR powertrain mount.

BWI Group's product portfolio is supported by technical centers in North America, China, Japan, France and Poland, and by applications support centers in Germany, Italy, Taiwan and the UK, complemented by hot- and cold-weather test centers in North America and China. 

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