

CONTINUOUS DAMPING CONTROL

Driving comfort for commercial vehicles

ZF offers a one-axle version of its damping control system for commercial vehicles. It is suitable for vehicle axles with frequently differing load conditions. The system uses information provided on the vehicle CAN network.



The CDC damper (Photo: ZF)

CDC 1XL, AS THE SYSTEM IS CALLED, improves the driving comfort and increases the protection of freight and road surface, especially when the vehicle is only partly loaded. At the same time, the concept leads to lower system costs. CDC (continuous damping control) adapts the damping force to the respective driving condition, thus solving the conflict between comfortable-soft and safety-focused, firm chassis tuning. The electronic control unit (ECU) from ZF controls the CDC dampers. In dangerous situations, the CDC straightens the damping characteristic curve in split seconds and thus improves handling and safety. Especially the body movement generated with vehicles is reduced.

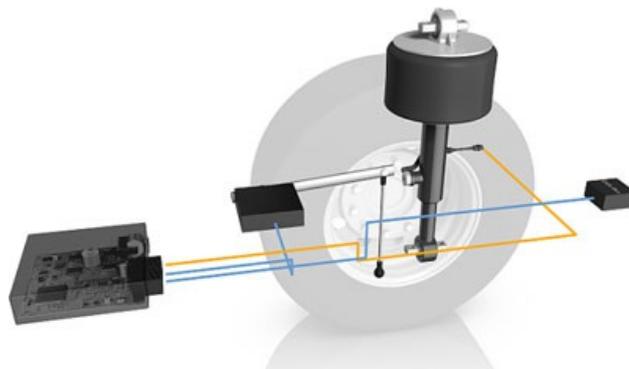
Simplified setup reduces costs

The single-axle solution is a cost-optimized version of the CDC damping system. With the CDC 1XL, ZF offers a complete truck damping system from a single source, consisting of the CDC dampers, integrated sensors, and control unit. Thanks to the sensor cluster integrated into the electronics, external sensors are initially not required with the system. As a result, the wiring and installation effort decreases. At the same time, it is more economical to retrofit the system. The fact that only two CDC dampers are used further decreases the system costs.

For controlling the damping force, the system can also use the information provided on the vehicle CAN network apart from the integrated sensors. Therefore, the system gets a wide range of input data – for instance speed, steering angle, brake force, or load condition.

Advantages compared to non-controlled damping

For trucks, axle load changes especially occur on the rear axle. Here, the forces vary considerably, depending on the load. Since chassis with conventional damping have to be designed for full payload due to safety reasons, the engineers chose a very stiff damping characteristic curve when tuning the shock absorbers. Apart from less comfort for driver and passengers, the stiff suspension also frequently damages the vehicle and sensitive cargo. With articulated buses, the central axes are predestined for the damping control system.



The CDC system (Photo: ZF)

As a result of its simplified control concept, CDC 1XL is an economic alternative: The system reduces the acceleration values of the vehicle superstructure by up to 30 % and thus increases the driving comfort and prevents freight damage when the truck is only partly loaded. The controlled suspension also leads to less wear on the vehicle and above all on the vehicle superstructures. This, in turn, reduces maintenance costs. Furthermore, the load applied on the road is reduced protecting the road surface against damage.



Comparison of avoidance maneuver with and without CDC (Photo: ZF)

Improved energy balance

CDC works based on the principle of "as little damping as possible and as much damping as required". This means that the system opts for a preferably soft characteristic curve, which improves the chassis' energy balance since stiff damping always comes along with an increased conversion of kinetic energy into heat which is then dissipated without using it. However, this lost energy constantly needs to be topped up again via the drive energy. The optimum damping hardness of the CDC 1XL can, for instance, decrease the damper-related energy loss on the rear axle by up to two thirds for delivery trucks, finally resulting in a slight reduction

of fuel consumption.