

Innovative Lightweight Piston Accumulator for Hydraulic Systems in Hybrid Powertrains

Weinheim (Germany), July 4, 2017. Hydraulic energy recuperation with hydraulic accumulators responds to demands for increasingly energy efficient and fuel-conserving solutions. Developers at Freudenberg Sealing Technologies have succeeded at significantly reducing the weight of high-pressure and low-pressure piston accumulators thanks to a special construction design and a new joining technology.

Hydraulic accumulators are used to store braking energy in hybrid vehicles, among other tasks. During braking, the accumulator is initially filled, exerting a force against the gas pressure. This stored energy is then available when needed to accelerate the vehicle. It makes a significant contribution to low fuel consumption, reduces CO₂ emissions, and makes it possible to downsize individual components. Hydraulic accumulators are primarily used in mobile work machines, along with fairly small delivery vehicles and trucks with many start-stop cycles.

Developers at Freudenberg Sealing Technologies have succeeded in significantly reducing the weight of the accumulator system – which consists of high-pressure and low-pressure piston accumulators. This has made them more appealing for mobile use. Hydraulic accumulator systems in smaller vehicles are also an alternative to electric hybrid solutions. Unlike batteries, the accumulators do not wear and operate without difficulty at low temperatures.

The low weight of the new steel high-pressure accumulators has been achieved with special design features. They include an end cap design optimized for the force curve, and an aluminum piston as a media separator, and a partial reduction in material thickness in the pressure vessel area. In a high-pressure steel accumulator with about 20 liters in gas volume, this leads to roughly a 60 percent reduction in weight. The cover's firmly bonded connection with the housing is reliably handled using a electron beaming welding process.

In the newly developed low-pressure accumulators, housings, covers and pistons are made from aluminum. The firmly bonded connection between the cover and the housing is carried out with electromagnetic pulse forming technology. The approach, which guarantees high stability, is being used for firmly bonded joining in aluminum accumulators for the first time. To increase

wear resistance in the interior, a gas-tight anti-friction coating is also applied.

For condition monitoring of the two hydraulic accumulators, combined pressure and temperature sensors are provided. Security is safeguarded in each of the two hydraulic accumulators. In the event of overpressure, the system opens with the help of a rupture disk – and with a fuse in the event of a vehicle fire and the accompanying high temperatures. On the liquid side, a valve is available for filling the entire system. It can also be used to prevent possible air pockets by bleeding.

More information on hydraulic accumulators from Freudenberg Sealing Technologies can be found at: <https://www.fst.com/products/hydraulic-accumulators-and-suspension-systems/hydraulic-accumulators>.

Image: *FST_PP_LightweightPistonAccumulator.jpg*

Caption: *Hydraulic accumulators are primarily used in mobile work machines, along with fairly small delivery vehicles and trucks with many start-stop cycles.*

About Freudenberg Sealing Technologies

As the leading specialist in sealing applications and their markets, Freudenberg Sealing Technologies is a supplier as well as a development and service partner serving customers in a wide variety of sectors including the automotive industry, civil aviation, mechanical engineering, shipbuilding, the food and pharmaceuticals industries, and agricultural and construction machinery. In 2016, Freudenberg Sealing Technologies generated sales of more than €2.3 billion and employed approximately 15,000 people. More information at www.fst.com

The company is part to the global Freudenberg Group which, with its Business Areas Seals and Vibration Control Technology, Nonwovens and Filtration, Household Products as well as Specialties and Others. In 2016, the Group generated sales of more than €8.6 billion in and employed approximately 48,000 associates in around 60 countries. More information is available at www.freudenberg.com.

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