

A gear-pump-type suspension spring adjuster for large vehicles is built into the front forks

- Highly frequent and high-speed operation is realized by using a hydraulic gear pump and a motor. HEIGHTFLEX®, which is a vehicle height adjustment function, has evolved to new levels.
- In a world first*, a downsized gear pump unit, hydraulic jack, and stroke sensor are mounted inside the outer tube of the inverted-type front fork. On-vehicle mountability is improved by eliminating the external hydraulic piping of the front fork and sensors.
- The benefits of the HEIGHTFLEX® function are maximized by combining it with a rear suspension equipped with the same function.

*According to our survey



The function of a “gear pump-driven suspension spring adjuster for large vehicles” for rear suspensions, which was presented at EICMA 2023 last year, is now also adopted on front forks. “HEIGHTFLEX®,” which is an additional function to Astemo’s proprietary electronically controlled suspension system “SHOWA EERA® (Electronically Equipped Ride Adjustment)” already mounted on many vehicles on the market, has evolved to new heights. Highly frequent and high-speed operation has been realized, and the vehicle height adjustment function for improving footing performance, which uses a spring adjuster, has been further sophisticated.

The “gear pump-driven suspension spring adjuster” for rear suspensions announced at EICMA 2023 last year significantly evolved the HEIGHTFLEX® function, which automatically adjusts the vehicle height as the vehicle stops or starts.

The automatic vehicle height adjustment mechanism “SHOWA EERA® HEIGHTFLEX®” improves footing performance by detecting the vehicle height when moving by means of the stroke sensor placed in the suspension and automatically lowering the vehicle height when it is at a stop while maintaining the optimum vehicle height when moving.

The “gear pump-driven suspension spring adjuster” for rear suspensions inherits the functions of HEIGHTFLEX®, and integrates the hydraulic pump unit into the rear suspension unit. The operation time of raising the vehicle height after the vehicle starts to move is set to approximately 6 seconds, which is half of the operation time of the system diverted from the hydraulic pump for the ABS modulator announced at EICMA 2022 held two years ago.

This year, the “gear pump-driven suspension spring adjuster” is built into a front fork. You can satisfactorily feel the effect of HEIGHTFLEX® even when it is mounted only in the rear suspension, but the benefits of the HEIGHTFLEX® function can be maximized by equipping the front and rear suspensions with a fast-acting vehicle height adjustment function.

The system can be mounted on an inverted-type SFF (Separate Function Front fork) with an inner tube diameter of 43 mm or larger. It can also be mounted in combination with the front fork unit of the electronic control technology for motorcycles “SHOWA EERA® Gen2 (Electronically Equipped Ride Adjustment)” announced on the same day.

In addition to this gear pump type, the new lineup also includes the self-level pump type, which has been adopted on vehicles on the market, and the previously announced ABS modulator type, and users can select HEIGHTFLEX® functions and performance according to the characteristics of the vehicle equipped with HEIGHTFLEX®.

The greatest benefit of the gear pump-driven suspension spring adjuster is the ability to realize highly frequent and high-speed operation. If you want to try to improve footing performance, it is necessary to force the suspension to move up and down each time you stop at a traffic light. In town, where the distance between traffic lights is short, the operation time needs to be faster. Needless to say, it was necessary to increase durability in order to achieve highly frequent and high-speed operation.

This mechanism applies the oil pump technology that has been adopted for lifting mechanisms/power tilt trims for large outboard marine motors we deal with. The mechanism was modified to the optimal size for hydraulic spring adjusters for motorcycle suspensions while maintaining high efficiency, and the materials and shapes of seals were reviewed to improve durability. The durability of the pump itself has been increased.

Unlike rear suspensions that could be equipped with a sensor or gear pump unit on the outside of the shock absorber unit, mounting on the front fork required all items to be coaxially placed inside the outer tube, and in order to achieve it, all items had to be packaged in a compact manner. In addition, there were many constraints due to, for example, the need to clamp the upper end face to the top bridge because of the structure of the front fork, and because there is accessibility to the inside only from the upper end face.

At EICMA 2024, we will exhibit a vehicle equipped with the “gear pump-driven suspension spring adjusters” on the front and rear suspensions. We will hold a demonstration that will let visitors experience both the operation speed and benefits of the vehicle height adjustment mechanism by raising and lowering the height of the vehicle they are riding. Visitors will be able to experience the improved functions of “HEIGHTFLEX®,” namely the natural rising/lowering movement of the suspensions equipped with the vehicle height adjustment function, the operation speed during vehicle height raising, which is one of the features of the gear-pump-type vehicle height adjustment mechanism, and footing performance, by operating the suspensions according to the running situation while experiencing simulated travel. Visitors can also experience the differences in movement and benefits resulting from an auto-load compensation function, which automatically adjusts changes in the vehicle posture in two-passenger riding or due to carried loading, as well as different mounting patterns of the vehicle height adjustment mechanism; for example, mounting only on the rear suspensions and mounting on both of the front and rear suspensions.

HEIGHTFLEX® has been achieved thanks to the accumulation of numerous proprietary technologies. We feel that it will generate needs for footing improvement mechanisms and our idea is gaining traction in the market. This “gear pump-driven suspension spring adjuster” is a technology that can further evolve HEIGHTFLEX® and provide additional benefits for manufacturers of completed vehicles and users.

*Information contained in this Technical Information is current as of November 5, 2024 but may be subject to change without prior notice.