RICOR
INERTIA ACTIVE SUSPENSION

WHITE PAPER

REVOLUTIONIZING SHOCK SUSPENSION

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Contents

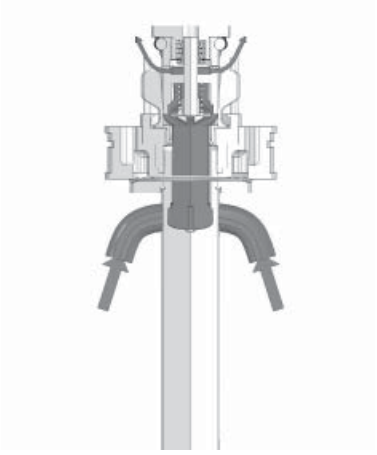
CAN SHOCK SYSTEMS BE IMPROVED?

Yes, if both the chassis and the wheel response are taken in to account during the design phase. Shock absorbers perform two important functions and, unfortunately, they are in direct conflict with each other. We rely on shocks to stabilize our vehicles during changes in direction and while accelerating or braking (chassis motion). We also depend on shocks to provide us with a comfortable ride and to allow the suspension to respond to changes in terrain so the tires can maintain traction (wheel motion). This paper will discuss the challenges with today's shock systems and how this issue is solved using RICOR's Inertia Active Suspension technology.

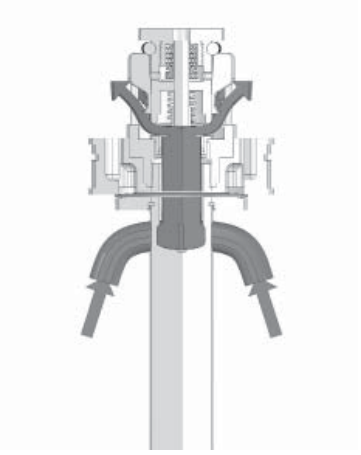
TECHNICAL OVERVIEW

The problem with traditional shock absorbers is that they cannot distinguish between chassis motion or wheel motion They can only provide resistance based on relative motion between the chassis and the wheel. The resulting compromise is that traditional shocks must be tuned with a bias toward control and handling OR compliance and traction. It seems to be universally accepted that 'stiff' shocks equate to vehicle stability and handling performance while 'soft' shocks provide better ride quality and superior traction over irregular road surfaces. As polar opposites (stiff vs. soft), the benefits of one come at the direct expense of the desirable characteristics of the other. This is a universal problem and all traditional velocity-sensitive shock absorbers fall somewhere within the spectrum between these two extremes.

The solution employs a motion-sensing valve to determine whether movement is coming from the chassis or the wheel, as opposed to merely reacting to the relative movements between the two, like traditional shock absorbers. The second part is to use the position of the motion-sensing valve to open and close different fluid circuits that could each be tuned independently to provide exactly the right amount of resistance to chassis motion AND wheel motion.



chassis input
(less flow)



wheel input
(more flow)

In a sense, the design must put two different shocks with completely different characteristics into one package. The primary circuit is tuned to control chassis motion and the secondary circuit is tuned to control wheel motion.

The only suspension system on the market capable of delivering these results is RICOR's Inertia Active Suspension. It is able to recognize the difference between these two types of input and select the appropriate response instantaneously and automatically. As a result, RICOR's Inertia Active Suspension is able to provide the optimum response to chassis motion AND wheel motion without any of the compromises typically associated with traditional shock absorbers.

RICOR's design ensures that the Inertia Active technology is 'smart enough' and that it cannot be 'tricked' into selecting the wrong circuit at the wrong time before the system can be considered viable. RICOR's Inertia Active Suspension also is able to transition seamlessly between the chassis and wheel circuits because any benefits that variable-rate damping may provide would be totally negated if the transitions between those damping rates upset the handling characteristics of the vehicle.

These prove to be very difficult problems to solve, but hydraulically manipulating RICOR's Inertia Active technology is the key to making shock absorbers work reliably, instantaneously and automatically. RICOR's Inertia Active Suspension is hydraulically biased to select the chassis circuit over the wheel circuit if it detects wheel and chassis motion occurring simultaneously. This makes RICOR's Inertia Active Suspension system virtually infallible - even in the unlikely event of any type of malfunction within the inertia active piston assembly - while also dramatically improving performance.

IN CONCLUSION

Shock absorber design and performance can be greatly improved by using RICOR's hydraulically manipulating Inertia Active Suspension technology and allowing the shock absorber to recognize whether the wheel or the chassis is in motion.

The results of this type of suspension design allow the vehicle:

- Increased stability in turns
- Increased cornering ability
- Reduced brake dive
- Smoother riding over the bumps
- Faster braking
- Less wallowing in turns
- Reduced softness at slow speed
- Less harshness over bumps
- Reduced bottoming out
- Better bike control

ABOUT RICOR SHOCKS

RICOR is the original inventor of the only commercially-viable Inertia Active Suspension.

Our patented technology is the only system in the world that allows a vehicle to detect if the chassis is trying to move or if the wheel is trying to move - and then react accordingly to greatly improve a vehicle's ability to absorb unstable ground.

We apply our inertia active technology in every product we offer as it has proven to stabilize the vehicle's chassis and allow for a faster wheel response over bumps - greatly increasing a vehicle's performance, safety, and speed.

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