Nowadays, around 5% of all new passenger cars are equipped with factory-fitted air suspension and this number is growing. In the beginning, air suspension was offered for high end models only, but in the last few years has worked its way down to mid-range passenger cars as well.

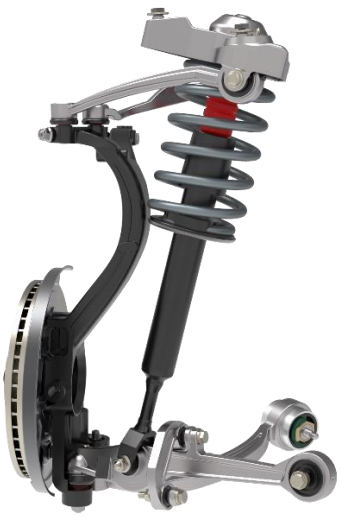
This change has been driven by steadily growing customer demand for safety, stability and above all driving comfort. Combined, these 3 aspects are something that air suspension can provide best.

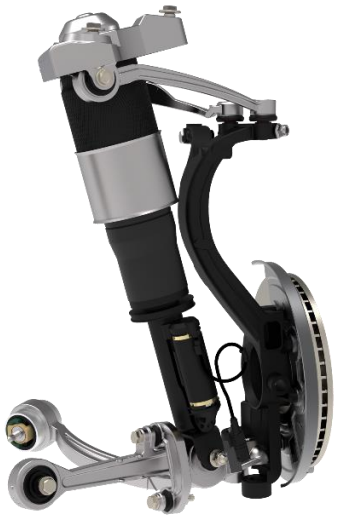
Spring Rate

To understand why air suspension can offer the best combination of safety, stability and driving comfort, you have to dig a bit deeper into suspension technology and the influence of the so-called spring rate on the behavior of the car.

The spring rate is easily defined as the force that is needed to compress a spring. The relation between the spring rate and the vehicle weight defines the tuning of the vehicle – towards comfort or performance, for example. In general, a firm suspension gives more stability but feels rather harsh and uncomfortable, whereas softer suspension gives more comfort, but the stability of the car gets reduced. Conventional coil springs always have to compromise between these two extremes.

The relation between the vehicle weight and spring rate changes when the weight increases. Imagine a car full of passengers and luggage when going on holiday, this extra load will certainly increase the vehicle weight. In this case, an adaptation in the spring rate is necessary to keep the body motions (oscillations) of the vehicle in motion at the same rate. When this happens successfully, a load-independent driving experience is established. In a vehicle with air suspension, the adaptation in the spring rate is provided by the progressive behavior of the air spring and by changing the air pressure inside the air spring. Coil springs do not have the same “flexibility” as an air spring and thus either the comfort or stability would be impaired.





Arnott®
Air Suspension Products

Height Level Control

With a conventional coil spring suspension set up the chassis gets closer to the ground in a heavy loaded condition. This shortens the stroke of the shock absorber and the car is more likely to “bottom-out” on rough roads or uneven surfaces (e.g. potholes). Furthermore, the wheel alignment is affected which has a negative effect on tire wear, road grip and the vehicle might react more heavily on rutted roads (where the road surface is worn or damaged).

An air suspension system is equipped with ride height sensors on the axles that keep the vehicle leveled as well as perform other functions. These level sensors capture the undesired change in the road surface and the system automatically increases the air pressure in the air spring to bring the vehicle back to its original level. The vehicle will no longer bottom out and the tire wear and road holding are more consistent.

Other Advantages

Air suspension systems can also contribute to lower fuel consumption. At highway speeds, the air pressure inside the air spring is reduced, lowering the vehicle body and thus decreasing the drag coefficient on the vehicle and saving fuel.
An inherent benefit of air suspension is that it naturally isolates the passengers from road harshness, resulting in a smooth and comfortable ride. Most car owners describe this as the biggest advantage of driving a vehicle with air suspension.
