

SUSPENSIONS

Air Suspension

Air suspension is used in place of conventional steel springs in passenger cars, and in heavy vehicle applications such as buses and trucks. It is broadly used on semi trailers, trains primarily passenger trains. One application was on EMD's experimental Aerotrain. The purpose of air suspension is to provide a smooth, constant ride quality, but in some cases is used for sports suspension. Modern electronically controlled systems in automobiles and light trucks almost always feature self-leveling along with raising and lowering functions. Although traditionally called air bags or air bellows, the correct term is air spring (although these terms are also used to describe just the rubber bellows element with its end plates).



Conventional Suspension

Suspension is the system of tires, tire air, springs, shock absorbers and linkages that connects a vehicle to its wheels and allows relative motion between the two.

Suspension systems serve a dual purpose — contributing to the vehicle's roadholding/handling and braking for good active safety and driving pleasure, and keeping vehicle occupants comfortable and a ride quality reasonably well isolated from road noise, bumps, and vibrations, etc. These goals are generally at odds, so the tuning of suspensions involves finding the right compromise. It is important for the suspension to keep the road wheel in contact with the road surface as much as possible, because all the road or ground forces acting on the vehicle do so through the contact patches of the tires. The suspension also protects the vehicle itself and any cargo or luggage from damage and wear. The design of front and rear suspension of a car may be different.

Common Air Suspension Failure

Air bag or air strut failure is usually caused by wet rust, due to old age, or moisture within the air system that damages it from the inside. Air ride suspension parts may fail because rubber dries out. Punctures to the air bag may be caused from debris on the road. With custom applications, improper installation may cause the air bags to rub against the vehicle's frame or other surrounding parts, damaging it. The over-extension of an airspring which is not sufficiently constrained by other suspension components, such as a shock absorber, may also lead to the premature failure of an airspring through the tearing of the flexible layers. Failure of an airspring may also result in complete immobilization of the vehicle, since the vehicle will rub against the ground or be too high to move. However, most modern automotive systems have overcome many of these problems.

Air line failure is a failure of the tubing which connects the air bags or struts to the rest of the air system, and is typically DOT-approved nylon air brake line. This usually occurs when the air lines, which must be routed to the air bags through the chassis of the vehicle, rub against a sharp edge of a chassis member or a moving suspension component, causing a hole to form. This mode of failure will typically take some time to occur after the initial installation of the system, as the integrity of a section of air line is compromised to the point of failure due to the rubbing and resultant abrasion of the material. An air-line failure may also occur if a piece of road debris hits an air line and punctures or tears it, although this is unlikely to occur in normal road use. It does occur in harsh off-road conditions but it still not common if correctly installed.

Air fitting failure usually occurs when they are first fitted or very rarely in use. Cheap low quality components tend to be very unreliable. Air fittings are used to connect components such as bags, valves, and solenoids to the airline that transfers the air. They are screwed into the component and for the most part push-in or push-to-fit DOT line is then inserted into the fitting.

Compressor failure is primarily due to leaking air springs or air struts. The compressor will burn out trying to maintain the correct air pressure in a leaking air system. Compressor burnout may also be caused by moisture from within the air system coming into contact with its electronic parts. This is far more likely to occur with low specification compressors with insufficient duty cycle which are often purchased due to low cost. For redundancy in the system two compressors are often a better option.

In Dryer failure the dryer, which functions to remove moisture from the air system, eventually becomes saturated and unable to perform that function. This causes moisture to build up in the system and can result in damaged air springs and/or a burned out compressor.

