

HANDLING **EXPLAINED**



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What is handling and how do individual suspension components affect the behaviour of your car?

What is meant by car handling? Ask this question ten times and you're likely to get ten different answers. The way a car corners! Its performance under acceleration and braking!

Handling can be described as a driver's confidence in the way a vehicle responds to his or her commands. The technical definition is the amount and percentage of traction each tyre and wheel has, versus the feel to the driver of the car.

It should help to state that the bottom line on handling is how well the tyres hold the road.

The role of the suspension system in handling is to maximise each tyre's grip on the road surface at all times. Different suspension components affect handling in different ways. Some components perform a single function, while others perform a number of functions. However, it must be understood that all suspension components must be carefully integrated for optimum handling.

It should also be noted that optimum handling and ride comfort are often at odds with each other. Good handling can require firm suspension settings, while good ride comfort demands softer and more compliant settings. The greatest challenge to suspension component manufacturers is to achieve both goals and thanks to increasingly sophisticated component and system design, today's suspensions can provide good handling with only a slight compromise in ride comfort. The opposite is also true.

Here we will look at the roles of a number of major components and how they work together to control handling.

SPRINGS

The primary function of springs, whether they be Leaf, Coil or Torsion Bars, is to absorb the shocks that are created when driving across irregular road surfaces and to maintain the tyres' contact with the road.

The spring rate, or stiffness, must be matched to the weight of the car resting on it and the weight of the other suspension components and the wheel. Spring rate also controls roll stiffness, or body roll. By reducing the amount of body roll, we reduce the amount of wheel camber change. Large camber change can drastically reduce the tyre's contact with the road surface, severely detracting from handling potential during cornering.

The handling of most vehicles is substantially improved by increasing the original spring rate to an optimum rate which maximises tyre adhesion and reduces body roll for better handling. Increasing the spring rate beyond the optimum rate detracts from handling as the tyres begin to skip over bumps, reducing traction.

SHOCK ABSORBERS

A shock absorber is a device that resists movement - with little at all to do with absorbing shocks. A shock absorber's function is to control the unwanted movement of the vehicle and the suspension.

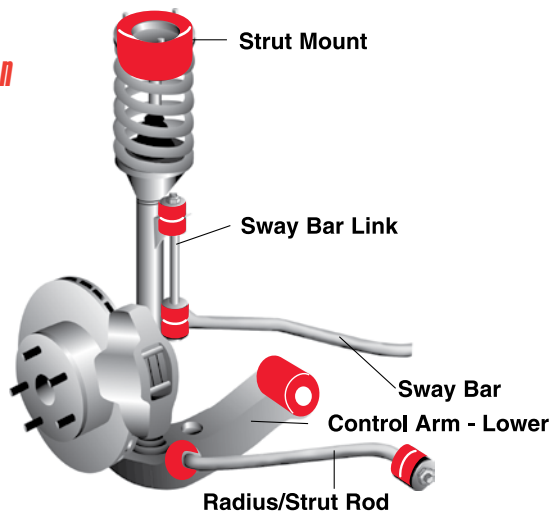
When a tyre hits a bump in the road surface, the wheel and suspension moves upwards, causing the spring to compress. In compressing, the spring absorbs the energy of the impact and then releases this energy by expanding.

This movement of the suspension is necessary to allow the tyre to pass over the bump without causing the body of the car to rise the same distance. However, if the spring were allowed to continue to expand and compress after the initial impact, this would cause the tyre to lose traction on the road. This unwanted bouncing or 'oscillation' of the spring is stopped by the shock absorber which is mounted between the axle and the car body.

The shock is in fact a damper and in controlling the spring's movement, the shock absorbs the spring's energy and then dissipates this energy as heat into the air.

In addition to controlling the springs, shock absorbers also reduce body roll and pitch for improved handling. To work effectively, the shock absorber must be matched to the spring rate and vehicle weight. The design and tuning of the valving inside the shock absorbers is the critical component in shock manufacture as this controls the rate and operation of the shock. For more information on the benefits of different types of shock absorbers, see our title, "Shocks - The Facts" brochure.

Front MacPherson Strut Suspension



CHASSIS DYNAMICS

With vehicles becoming lighter and suspensions more sophisticated, manufacturers are putting more effort into achieving a "plush" ride while maintaining reasonable handling. Consequently, Original Equipment stabilisers are the primary handling component of most vehicles while spring and shock rates are focused on providing a soft ride.

With this in mind, correct tuning of spring and shock rates is a much more affordable means of improving control and handling with minimal detriment to ride quality, especially when compared to fitting oversize stabilisers.

Tower Bars

Because performance suspension components are typically firmer in action than original equipment, they exert greater forces upon the vehicle body, particularly at the front end. At extremes of handling and road conditions, they can cause body deflection (as can be the case with standard suspension) which in turn can cause unwanted changes in wheel alignment resulting in reduced handling and increased tyre wear. But by installing Pedders Tower Bars these hassles can be avoided. A Tower Bar connects the two strut towers, giving the added rigidity needed to maintain dynamic alignment. With a Tower Bar in place, the strut towers no longer lean inwards during hard cornering that can result in wheel camber change. As in every Pedders product, only the finest quality materials have been used in the manufacture of Pedders Tower Bars. Sports Ryder Tower Bars come with steel mounting plates and a polished aluminium brace with adjustable ends. Each bar is made under strict quality control and is designed to fit individual or specified applications.

Bushes

As the components which secure sway bars, panhard rods, radius rods and various other suspension parts, suspension bushes play a crucial role in allowing flexibility of movement of the entire suspension, while maintaining correct mounting and alignment of individual parts. Worn and faulty bushes are one of the major causes of loose suspension control, vague steering and body and steering vibrations - all of which adversely affect handling. Pedders range of conventional rubber and urethane bushes cover all uses and applications.

Sway Bars

Sway Bars can be a major tuning element in reducing excessive understeer or oversteer. Used incorrectly they can also cause it.

The anti-roll bar reduces body roll to keep the suspension geometry, and ultimately the tire, parallel with the road. Stiffer bars reduce body roll more, but too stiff a bar can deteriorate independent suspension performance, and ultimately cause an inside tire to lift off the ground during hard cornering.

Talk to your Pedders Suspension specialist about fine tuning the handling of your vehicle with sway bars.

WHEEL ALIGNMENT

Of vital importance to good vehicle handling is precise wheel alignment. The primary role of alignment products is to obtain the desired angle of the tyre on the road - while all other suspension components work to maintain the tyre's contact with the road.

Poor wheel alignment results in reduced traction, rapid tyre wear, wandering or imprecise steering, steering wheel pull and poor fuel economy. Pedders is Australia's undisputed leader in alignment technology, products and expertise, offering a special 'Performance Wheel Alignment Service' which optimises your car's full handling capabilities.

We set all adjustable alignment settings, not just toe - and where no provision for adjustment exists, we have the technology to provide adjustment for most cars. Pedders is able to adjust the alignment of your car to suit your driving style and the most common driving conditions - not merely the manufacturer's specified angles.

For more information on wheel alignment, see our title, "Wheel Alignment & Balancing".

IN CONCLUSION...

Good handling is the result of all the above elements working as a precisely integrated system. For more information on handling or advice on how to improve the overall handling capabilities of your car, inquire at any of Pedders outlets Australia-wide. Pedders is Australia's leading suspension and steering specialist.

For over forty years Pedders has been devoted to developing quality integrated products that improve ride, handling and overall safety.

