



THE EFFECT OF WEIGHT ON A VEHICLE

SHOCK ABSORBER, SUSPENSION, BRAKES, TOWBARS
AND WHEEL ALIGNMENT SPECIALISTS

INTRODUCTION

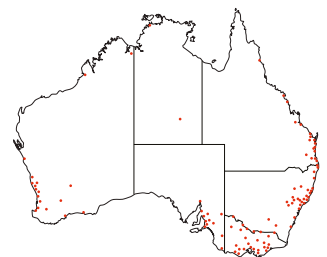
Welcome to the world of Pedders Suspension Techstop presentations.

This multi-part series of technical publications will discuss and explain, in simple terms, the complex topic of the impact of weight on motorvehicle dynamics, performance and safety.

Since 1950, Pedders has been Australia's trusted underbody specialist. With 130 stores Australia wide, Pedders is still the only company worldwide, to design, manufacture, wholesale, and retail its brand, of products, throughout its own network of stores.

This expertise focuses on five key areas of critical automotive importance - shock absorbers, suspension, steering, brakes and wheel alignment.

Vehicle and accessory manufacturers generally design their products to cater for the broadest market, not, for every eventuality.



Location of stores: 25 Company
44 Licensee
61 Authorised Dealers
Total = 130 Stores

Pedders retail chain of outlets commenced back in in 1974 in Adelaide. Pictured here from the early '80s is one of our first retail outlets in Melbourne, Victoria which was located in Brunswick.

Pedders caters for a wider window, from standard replacement parts, to highly specialised components and solutions, for virtually every requirement - past & present.

That's Pedders' enduring reputation...
Specialist advice, customised solutions and **NO BULL.**



Straight advice, specialists you understand and... No Bull

New, old, performance, or workhorse, in the final analysis, all vehicles rely on a relatively small contact patch with the road surface.

The size of the tyre foot print of the average car is much the same area as a size ten shoe which equates to half the size of an A4 sheet of paper (25cm²). Multiply this figure x 4 gives you 100cm².

Believe it or not, the size of the foot print does not vary a great deal with the replacement of wider tyres. What does affect it, is the tyre pressure and the amount of load the car is carrying.

To maximise the handling and total dynamic performance of the car, tyre pressures, load distribution and wheel alignment must be in tune with the car. You and your family's safety depends on it.

To maximise safety, there is a need to keep all four of the tyres in contact with the road. If one wheel leaves the road surface, the vehicle has potentially lost 25% of its available traction. Springs and shocks play a huge role in the handling characteristics of the car when extra load is being applied, i.e. loading the car up for the big road trip.

So here's the key equation:

- Take speed, (velocity)
- Then multiply by weight (mass)
- Equals, the vehicle's dynamics capability.

We're fortunate as drivers - we can control speed as one of the variables. It's as simple as looking at the speedometer and modifying a throttle position...

The weight variable is much harder to envisage and measure - and this topic is our primary focus in this series of Techstops.

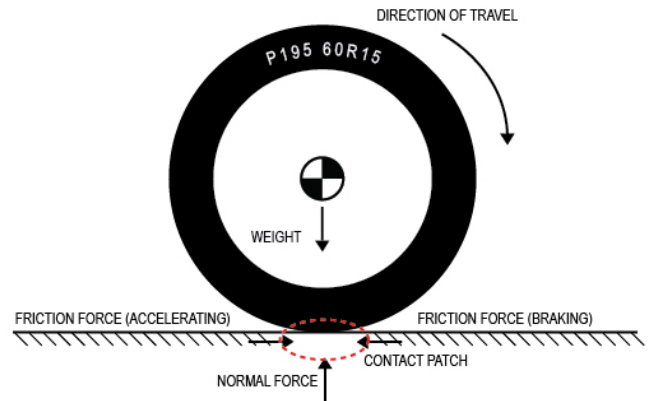
Unknowingly overloading a vehicle can break the law, significantly degrade vehicle performance, interfere with safety systems and threaten the insurance compliance.

Let's add some weight to the discussion:

Here's a typical SUV, now accessorise it, with all your favourite bits and pieces and add ons.

Up front - lets hang a bull bar, driving lights, electric winch. Along the side, sidesteps for ease of entry and departure. On the top roof racks or a hefty carry pod. At the rear - an additional spare wheel plus 200kg of gear for that camping trip.

Then, there's a tow bar. So let's tow a trailer, or boat or a caravan. Now, the key ingredient, you're carrying people too. 1, 2, 4, or more!



All the following will be affected:

- Brake Efficiency & Stopping Distance.
- Suspension Travel & Wheel Alignment.
- Underbody Wear & Tear.
- Fuel Economy.
- Vehicle Dynamics.
- Safety Enhancing Technology.



To reinforce a simple understanding of weight in dynamics terms, consider the impact of weight and these numbers...

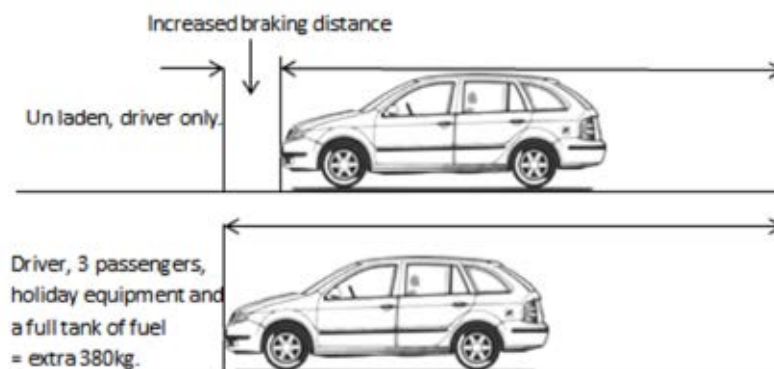
- A typical SUV, empty, with a single driver and some fuel = 1800 kg.
- Add a 380 kg load.

This is what happens...

We are well aware of variables, such as:

- Road surface, dirt, gravel or bitumen.
- How much tread is on the tyre?
- How good is the brake friction material?
- What is the reaction time of the driver?

All this put aside, if the weight of the vehicle is increased, the braking distance will increase by 1, 2 or 3 metres if nothing is done to service or update the braking and suspension system.



What affects the brake efficiency when loaded:

The major effect on brakes when a vehicle is loaded whether it is through towing or carrying weight is heat.

When brakes are heated outside operating temperatures it leads to unfavourable braking and longer stopping distances.

Loaded vehicles through towing and load carrying reach operating temperatures of the brakes at a faster rate and will rise above the parameters of operating temperatures.

How do Pedders brakes remove the heat from brakes to maintain braking efficiency?

Through heat dissipation.

Pedders Slotted Brake Rotors

With our curved slot design, cool air is pulled through on the 180 degrees forward motion of the rotor and hot air and gases are discharged/dissipated on the remaining 180 degrees circular motion of the rotor. The design pulls cool air in and pushes heat out.

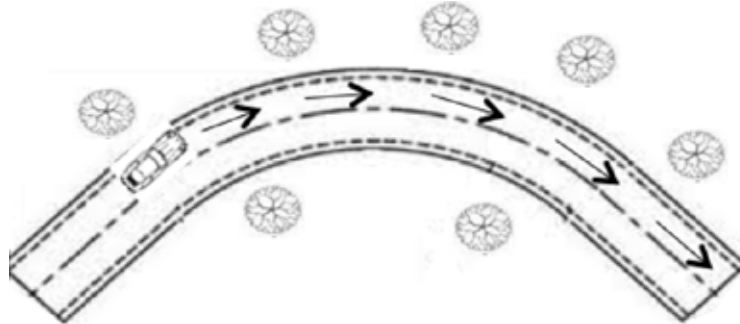


Brake Pads – Ceramic

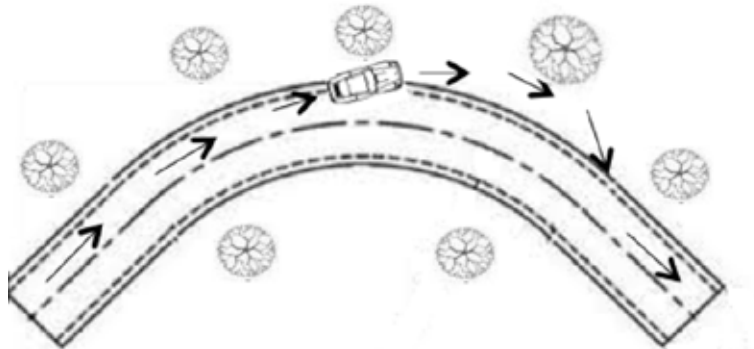
Our ceramic brake pads as opposed to a semi metallic brake pad have less metal content. Metal is substituted with copper (more heat tolerant) and ceramic fibre. The combination of copper and ceramic fibre using Kevlar resin is the ultimate combination to not retaining heat. Our slotted rotor design and ceramic brake pads combined will maintain a safe braking distance.



Braking Under Load



This indicates the car negotiating a bend in the road as per normal as the driver expects. He has driven this road many times and knows the speed he can safely travel.



In this case, the car has an amount of extra weight (380kg), but the driver does not take this into account, same brakes, same shocks, same springs and the same speed. The car, because of the extra mass, does not negotiate the bend as the driver expects.

When 1 second, 1 metre, or 1 moment really counts, you'll be glad you trusted the experts at Pedders to help craft the right customized solution for your individual needs.

Please take advantage of the series of Pedders TechStops. They offer enormous amounts of technical data that will enhance your knowledge and give you the ability to improve your business.