Brake Tech #02

Correct bedding-in of new brake discs and pads

Far too many people make the mistake of fitting upgrade brake parts and then going out immediately and driving hard in order to test the performance their newly fitted brakes. DO NOT MAKE THIS MISTAKE! Using your brakes hard immediately after fitting new discs and pads can result in permanent damage to the discs, poor brake performance, brake judder, shortened disc life and even complete brake failure. You have spent good money upgrading your brakes. Take a little time to bed them in correctly and you will enjoy maximum brake performance and product life.

1. To avoid disc distortion and cracking.

During the disc casting process molten iron is poured into sand moulds at temperatures in excess of 1350˚C and allowed to cool rapidly into solid form. This rapid cooling causes internal stresses to be 'stored' within the disc casting. Gradual and moderate thermal cycling (as is experienced when bedding-in discs properly after fitment) can effectively relieve these stresses but sudden, dramatic temperature changes can lead to distortion or cracking of the disc. If you've ever watched a block of ice in a glass crack suddenly when a warmer liquid is poured into the glass, then you have witnessed a perfect demonstration of stored internal stresses being relieved suddenly through cracking. The stresses in the ice are formed as a result of the rapid cooling of the water, in a freezer, into solid form. If the ice block were warmed slowly it would not crack. It's the SUDDEN change of temperature (or thermal shock), caused by the ice coming into contact with the warmer liquid, that causes the internal stresses to relieve themselves by cracking.

Following a moderate and progressive bed-in process is an effective way to stress-relieve new brake discs and avoid 'thermal shock' that leads to disc distortion and/or cracking. Although Powerbrake™ discs undergo proprietary 'weathering' processes that stress-relieve the castings and increase their resistance to distortion and cracking, they will still benefit substantially from correct bedding-in.

2. To achieve maximum contact area between friction material and disc surface.

The friction surface of a new set of brake pads is far from being perfectly flat. To a lesser extent the braking surface of a new disc also has minute 'peaks and valleys' left by machining or grinding during manufacture. The result is that a new set of discs and pads start off by braking on only a percentage of the maximum surface area that is intended to do the work. The parts of the friction material that are initially in contact with the disc will overheat very quickly. Similarly, the areas of the disc surface that are initially making contact will heat quickly while the non-contact areas remain cooler. This differential heating of the disc surface can result in disc distortion. Proper bed-in allows the new disc and pads to achieve maximum contact before being subjected to intense heat.

3. To allow a layer of friction material to be evenly transferred to the disc surface.

Correct transfer of pad friction material to the disc surface is essential in order to avoid brake judder and maximize brake performance. Following the correct bed-in procedure allows a thin layer of pad friction

material to be EVENLY transferred to the disc surface. Running the brakes too hot before this layer has been established will result in random, uneven 'spot' transferring of fiction material to the disc. This results in DTV, which in turn causes a downward spiral in which the brake discs can be permanently damaged. (To learn more about DTV and brake judder click here).

4. To 'burnish' the brake pads.

Many pad compounds use organic resins in conjunction with binding fibres to bind the friction material together. At high temperatures these resins start to evaporate. The gases that are formed as a result of the evaporating resins can form a film or 'cushion' between the pad and disc surface causing 'pad lift' and reducing friction. This phenomenon is called "outgassing" and is one of the causes of brake fade. Outgassing is far more prevalent with newly installed pads in which case it is often referred to as "green fade". Bedding-in a new set of pads correctly will burn off the resins near to the contact surface of the friction material resulting in stable friction co-efficient. The above process is referred to as "pad burnishing".

Bedding-in procedure for new discs and pads

IMPORTANT: Brake function and performance will ALWAYS be reduced during the period between the fitting of new brake discs and/or pads and the completion of the manufacturers recommended bed-in procedure. CAUTION should be exercised during this period until the brakes are operating at full efficiency. If at all possible cycle 1 and 2 (below) should be conducted in a quiet area, away from traffic and other obstacles. Allow plenty of safe run-off space in case of the onset of severe "green fade". The amount of "green fade" experienced will differ from one friction material to another.

Pre Bed-in Cycle:

- Drive slowly for 1 week (at least 300km's) after fitting new discs and pads. Use moderate brake applications during this time and try to avoid long brake applications from speeds in excess of 100 kph. Normal urban commuting, using your brakes from moderate speeds about once per kilometre is ideal. Long stretches of open road driving do not count, as the brakes are not being used. Increase following distances during this time making provision for "green fade" in an emergency stop. Never left foot brake or drag the brakes! None of the MTR temperature recording paints should have changed during this period.

- At the end of the first week it should be clearly visible that the pad friction material has achieved maximum contact area with the disc surface. The 'pad track area' of the disc should have none of the silver disc coating left on it and should be an even light-grey colour.

Bed-in Cycle:

1. Drive slowly for a few kilometres, using the brakes gently to bring them up to a moderate operating temperature.

2. Perform 6 consecutive brake applications of increasing intensity from 100 km/h down to 30 km/h. If wheel lock-up (or ABS activation) is referred to as a 100% brake effort then you should be aiming to build up to a 60 - 70% brake effort for the last 2 applications. The applications should be performed consecutively, accelerating normally back up to 100 km/h after each application, before braking again.

3. If possible, do NOT come to a complete stop throughout the 6 brake applications described above. Doing so canl result in 'pad etching' during which friction material is unevenly deposited onto the

brake disc causing DTV and brake judder. The will be visible as the outline of a brake pad on the disc surface. (To learn more about pad etching and DTV click here)

4. It is normal to experience a strong smell and even see a small amount of smoke rising from the brakes from the 4th application onwards. This is not a problem. Be prepared to experience "green fade" from the 4th application onwards.

5. Drive on, using the brake as little as possible, for a number of kilometres allowing the brakes to cool substantially in the air-stream before parking the vehicle and allowing the brakes to cool completely. This cooling cycle is important.

6. Gradually build up your driving style over the next 500 - 700 km's while keeping an eye on the MTR temperature measuring paints on the discs. If the red paint turns white, you are running your discs over 610 deg C and disc life will be reduced as a result.

NOTE: In some cases, particularly when using high-performance road or race pads, it may be necessary to repeat the above bedding-cycle once after long periods of very gentle brake use. Pads transfer material to the disc surface optimally when operating within their recommended temperature range. Operating the pads below this temperature range my lead to a scrubbing off of the friction material layer on the disc surface. Repeating the bedding cycle will re-establish the friction transfer layer and re-burnish the pads resulting in optimum performance.

POWERBRAKE

Email:	sales@powerbrake.co.za	Phone:	+27 12 998-0214
Mobile:	+27 84 374-6296	Fax:	+27 12 993-1221
Address:	P O Box 38205, Garsfontein East, 0060 Pretoria, South Africa		