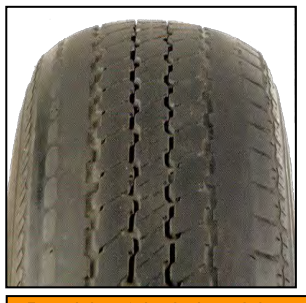
Tyre Damage: Common Causes and Avoidance

Damage from the effects of under-inflation

Under inflation damage can be avoided with regular tyre pressure checks and not overloading or exceeding the tyre load capacity. Maintain the tyres at the vehicle manufacturers recommended inflation pressures as per the vehicle tyre placard.

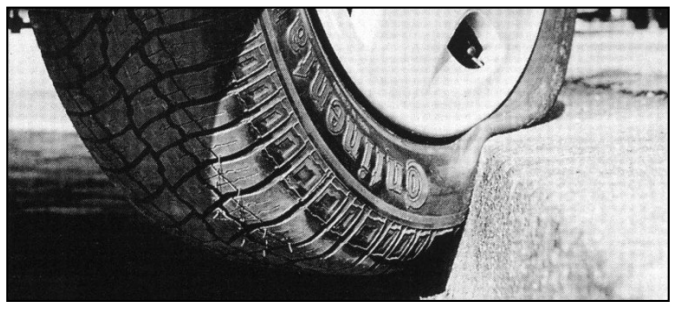
Deep or wide indentations or chafing in the bead area are caused by rubbing against the rim flange and may indicate poor pressure maintenance or overloading.



Double sided shoulder wear due to under inflation. The lack of air pressure results in higher contact pressure and thus increased wear rates in the shoulder region.

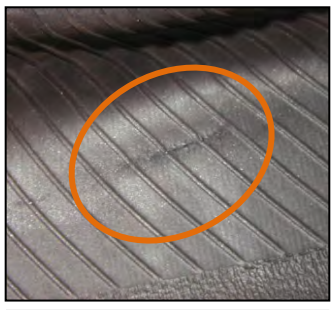
In some cases, this can lead to uneven tread wear that may indicate belt separation that can also result in partial tread separations.

Damage due to external factors - Sidewall impact damage



Impact fractures are commonly caused by impacts with obstacles resulting in the tyre side wall being crushed against the rim. These obstacles can be curbs, pothole edges or road debris.

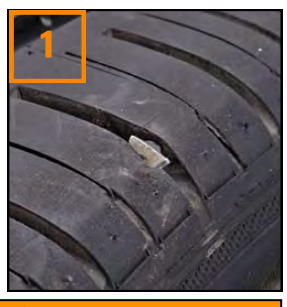
Usually a visible external bulge on the sidewall of the tyre indicates the radial cords have been damaged.



In severe cases, the impact break such as shown above can be observed on the tyre inner liner.

'Impact fractures' are a common cause of concern for drivers.
The thinnest part of the tyre is the sidewall & is therefore the most susceptible to damage. Tyres damaged in this manner are not fit for service. If driving over curbs and similar obstacles can not be avoided then they should only be driven over at an obtuse angle & at an appropriately slow speed. Impact breaks are normally soft to the touch.

Cuts



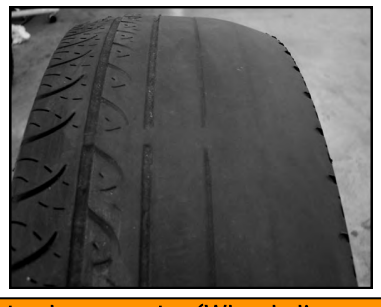
Cuts are caused by foreign objects on the road that are driven over or even vehicle panels that come into contact with the tyre.

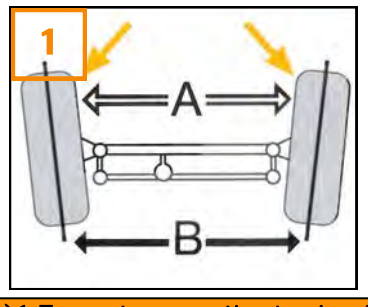
1. This example shows a foreign blade like object in the shoulder of the tread. Damage in this area of the tyre can not be repaired.

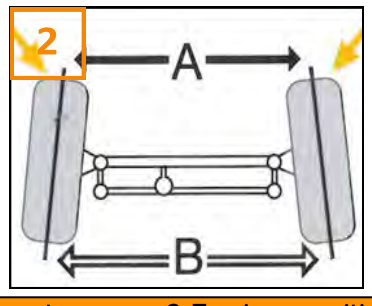
Damage from being driven on flat

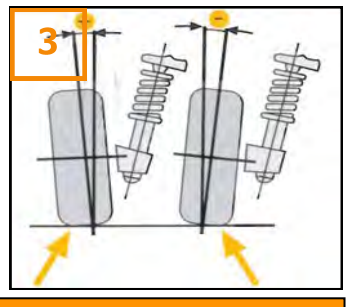
1. Circumferential scuffing on the inner and outer sidewall is a telltale sign of a tyre being run on underinflated. **2.** Internal damage from being driven on flat can be observed as rubber crumbs from the crushed inner liner and sidewall. This is due to excessive flexing causing excessive heat. **3.** Tyre has been destroyed by being driven on flat. Avoid with regular inspections and tyre pressure checks.

Misalignment







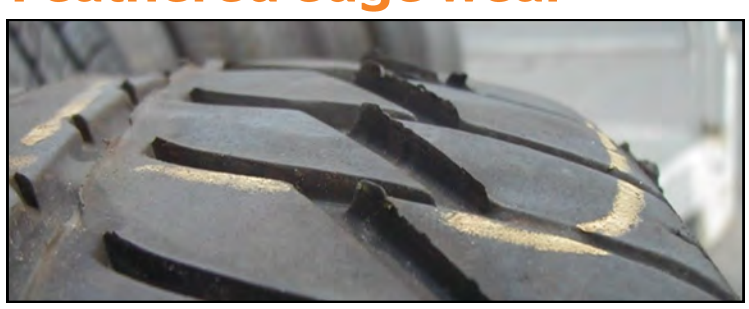


One-sided wear caused by incorrect axle geometry (Wheel alignment.) 1. Toe-out or negative toe-in = inner tyre wear. 2. Toe-in or positive toe-in = outer tyre wear. 3. Wear on the tyre shoulders is also caused by high camber values. Avoid premature tyre wear damage by checking the vehicle wheel alignment regularly as part of the vehicles tyre maintenance routine. *Note: Rapid wear can also occur evenly across the tread face due to misaligned steering geometry.*

Diagonal wear

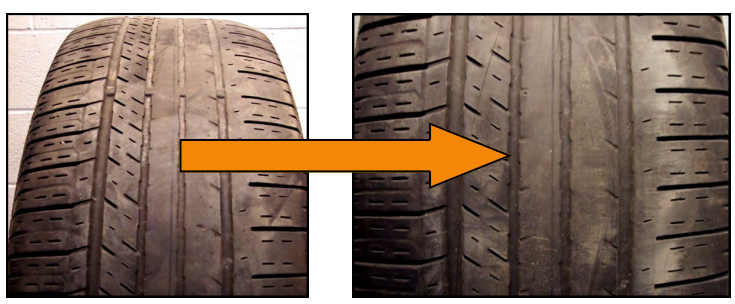
Caused by incorrect toe angle and aggravated by under inflation. Avoid with regular maintenance to pressure and alignment.

Feathered edge wear



Caused by incorrect vehicle toe settings leading to very high side forces and slip. These incorrect toe settings can be recognised by feathering of the block or rib edges. This condition can be avoided by regular tyre maintenance and wheel alignments.

Over inflation



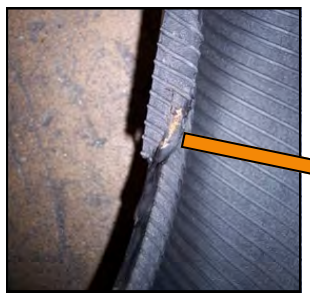
Over inflation will cause the centre of the tyre to wear faster than the shoulders. Avoid by inflating to the correct inflation pressure, regular visual inspections and tyre rotations.

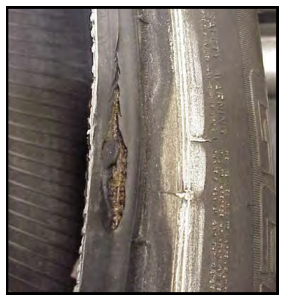
Tyre Damage: Other Causes and Avoidance

Fitting damage—Bead break

1. Caused by the opposing bead section not being completely inserted in the drop centre of the rim. Can also be caused by the mounting head in the machine not being properly adjusted or having a worn mounting shoe or the edge of the mounting roller rolls off the base of the bead. To avoid this type of damage, use sufficient and correct fitting lube. Correctly maintain the fitting machine.
2. Bead core breakage caused by the bead being caught on hump during inflation or fitting, expanding it and breaking the bead. To avoid this type of damage use sufficient correct fitting lube. The pressure exerted to get he bead over the hump must not exceed 40 psi.

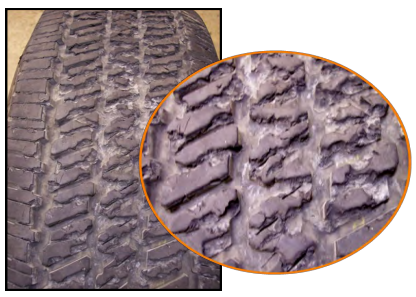
Fitting damage—Bead cut





Bead cuts as demonstrated here are caused by not using sufficient lubrication and / or improper mounting procedures or damaged mounting equipment.
Avoid by ensuring tyre mounting and demounting is performed only by specially trained personnel using proper tools and procedures.
Lubricate both tyre beads and the shoulder edges of the rim with correct tyre mounting lubricant. Check the mounting head for proper adjustment. Check for sharp edges on the mounting head and guide rollers.
If unaddressed, can lead to a tread/belt separation and/or detachment.

Tread torn and ripped



Tearing and chipping of tread is usually a sign that the tyre has been used in the wrong application or by spinning wheels on a stone surface.
Review operating conditions and recommend correct tyre for the application.

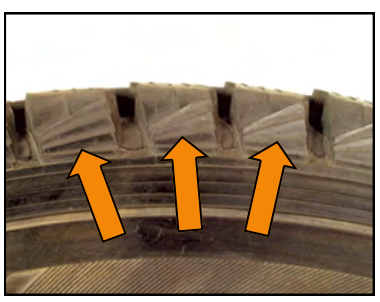
Puncture / Penetration

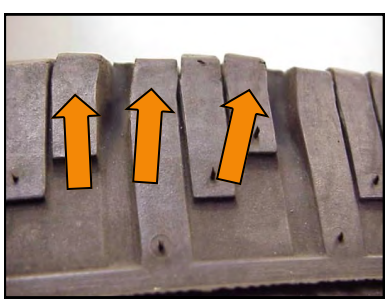
Punctures are caused by foreign objects on the roadway entering into the tyre body. Depending on the location and size of the penetration, many punctures can be repaired. Any tyre damage presented for repair must first be thoroughly inspected and assessed for repair suitability by a trained tyre technician.

Brake lock tread damage

Caused by heavy brake application resulting in locked wheels. A patch is effectively scrubbed as the tyre skids across the road surface. Even ABS can lock briefly and cause flat spotting. This can only be avoided by avoiding sudden hard braking especially during a tyre disablement such as a flat tyre.

‘Saw tooth’ or heel and toe wear





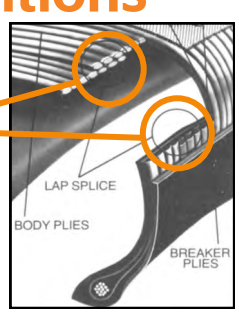
Caused by lack of tyre maintenance with attention to tyre pressures, tyre rotation and wheel alignment. Some heel and toe wear is regarded as normal however inspecting, rotating tyres regularly, maintaining the correct tyre pressures and alignment geometry will reduce the incidence. This condition is also a common cause of tyre noise.

Damage in transit

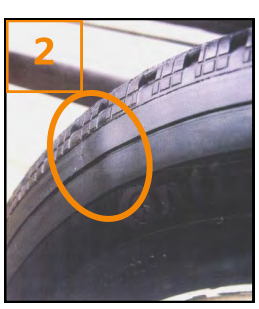
Damage can occur to one or both beads, depending upon severity.

Cuts, tears and scrapes can be caused by accidental or careless handling during transport. Foreign objects may also enter the tyre carcass during handling.

Normal Conditions



1. Sidewall indentations/undulations are caused by an overlap in the casing material or ‘lap splice’. It may be more noticeable in tyres with taller sidewalls such as light truck tyres that operate at higher inflation pressures.
Sidewall indentations are a cosmetic condition that does not affect the performance of the tyres. Tyres with this purely cosmetic condition are safe to use —the overlaps are actually twice as strong!



2. Relatively uncommon is the Minor Sidewall Bulge. The bulge will feel firm to the touch. The cause is an overlap of the side rubber joint. This cosmetic condition does not affect the performance of the tyres and are safe to use. In all cases, it is important to have the tyre inspected by a professional tyre technician.