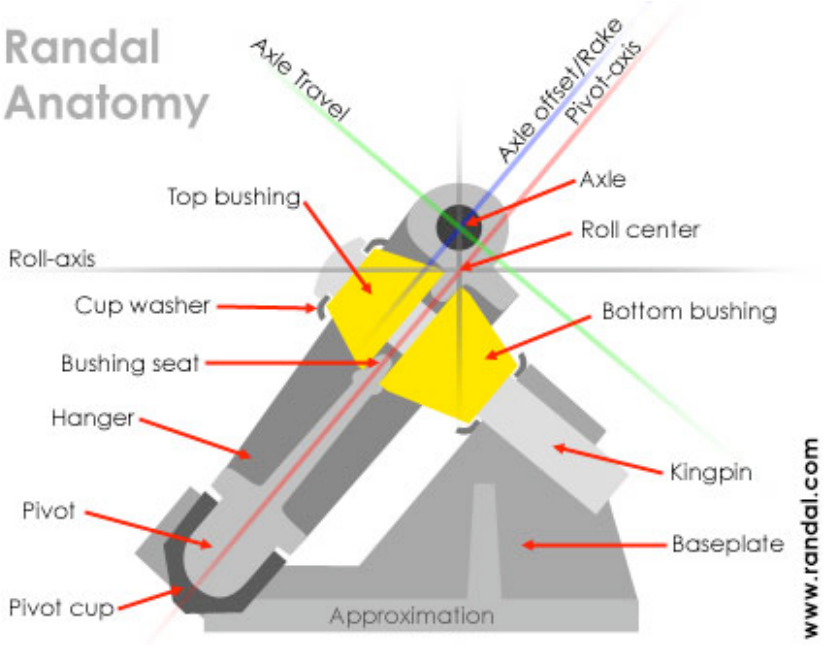
Randal Truck FAQ



Anatomy of a Randal Truck

Axle. This holds the bearings, which hold the wheels.

Axle offset/rake - This describes the axle's position compared to the pivot axis. This is also referred to as the Caster Angle.

Axle travel - This is the path the axle takes when it rotates on the pivot axis.

Baseplate - This bolts to the board, it in turn holds the kingpin and pivot-cup.

Bottom bushing - Made from polyurethane, it helps hold the hanger in place and control turning. The bottom bushing also takes rider weight.

Bushing seat - This part of the hanger is shaped to help the bushings keep the hanger in the right place.
Caster - Positive Caster is the tendency for the truck to stay centered. Negative Caster is the tendency of the truck to stay in a turn. This is determined by the axle offset being either above or below the axle.

Cup washer - These help push the bushings into the hanger's bushing-seat. The cup shape also helps control the shape of the bushing's distortion when the hanger turns.

Hanger - The hanger holds the axle, the bushings and has a pivot. It's width controls the distance between the truck's wheels.

Kingpin - This bolt holds the truck together as one unit. How tight it is affects how the board turns.

Pivot - Part of the hanger, it helps hold the hanger in place, as well as constrain it's motion to the pivot axis.

Pivot-axis. This is what the hanger rotates around when it turns.

Pivot-cup - Made from hard polyurethane, it holds the pivot in the correct position.

Roll-axis. This line is what the board rotates around when it leans.

Roll center - Defined by where a line, square with the board, crosses both the axle's center, and the pivot axis. A line between these points on both trucks defines the roll axis.

Top bushing - Made from polyurethane, it helps hold the hanger in place and control turning.

Which Randal should I use?

The two major differences between Randal models are, pivot angle and hanger width.

To a certain extent, the board and what it's going to be used for decide which width and angle is right for your needs.

Most of this advice works in reverse too, so it can help you pick a board to suit a given truck

Which Width?

The number one question to help you decide which width to pick is: How wide is the board?

You should usually try to match the outside of the bearings with the edge of the board where your front foot is. This will provide you with good leverage over the hanger.

However it's usually better to have a hanger that's a little too wide, than too thin. Significantly too thin can cause the outer wheels to lift when turning.

People often describe a thin hanger as being quicker turning.

This is because the board usually has more leverage over the hanger, the wheels travel a shorter distance to get to an angle, and less board-lean is lost to bushing compression.

It's not uncommon for people to deliberately choose to increase their board's leverage by choosing a thinner hanger than would usually be advised.

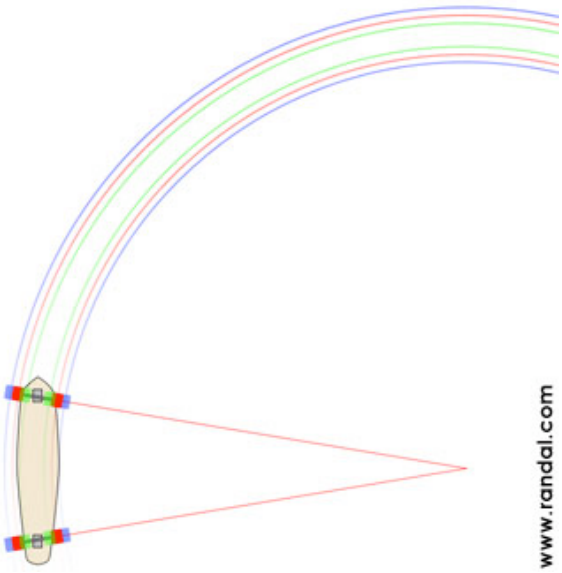
People often describe a wide hanger as being more stable.

This is because the board often has less leverage over the hanger, the wheels travel a longer distance to get to an angle, and more board-lean is lost to bushing compression.

Plus your feet usually have less leverage when compared to the board, and the wheels create less steering when they go over bumps.

It's not uncommon for people to deliberately choose to lower their board's leverage by choosing a wider hanger than would usually be advised.

When the axle angle is the same, the board turns on the same axis, regardless of hanger width.



For street-luge and buttboard wide hangers are always recommended, using a significantly too-thin hanger can actually cause the board/sled to roll when turning.

Notes on width.

As stated above the width of the hanger doesn't affect the turn radius when the hanger is at the same angle.

But if the bushings are the same it takes more force to get a wide hanger to that angle, which is good for stability, but bad for responsiveness.

A wider hanger is often compensated for with a softer bushing, this can lead to some board angle not being converted to axle angle or "lost to squish", and to corner forces shifting the hanger left or right on the kingpin.

A wide hanger can potentially be more prone to wheel-bite, as the wheels get closer to the board at the same lean.

A wide hanger can also sometimes put the wheels far enough clear of the board to make wheel-bite impossible.

A too-thin hanger can be compensated for (to a degree) by soft/loose bushings. There is a limit though.

The shape and core of the wheels can have some effect on what hanger width is optimal.

Which Angle ?

At the same wheelbase, a higher angle pivot-axis will create more steering per board-lean than a lower one.

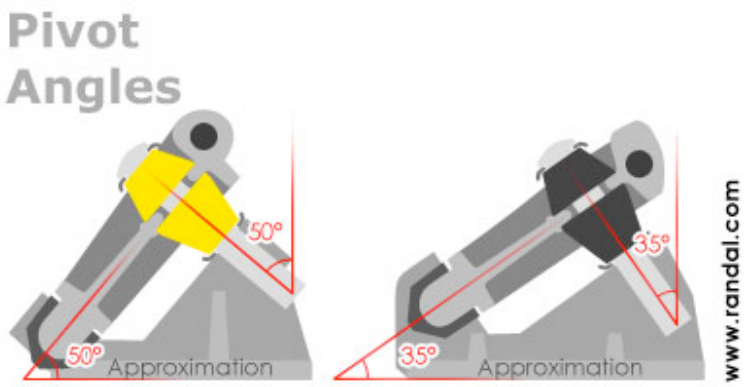
This generally makes the high angles more suited to turning, the low angles more suited to speed.

However high angled Randals are still exceptionally stable for how well they turn.

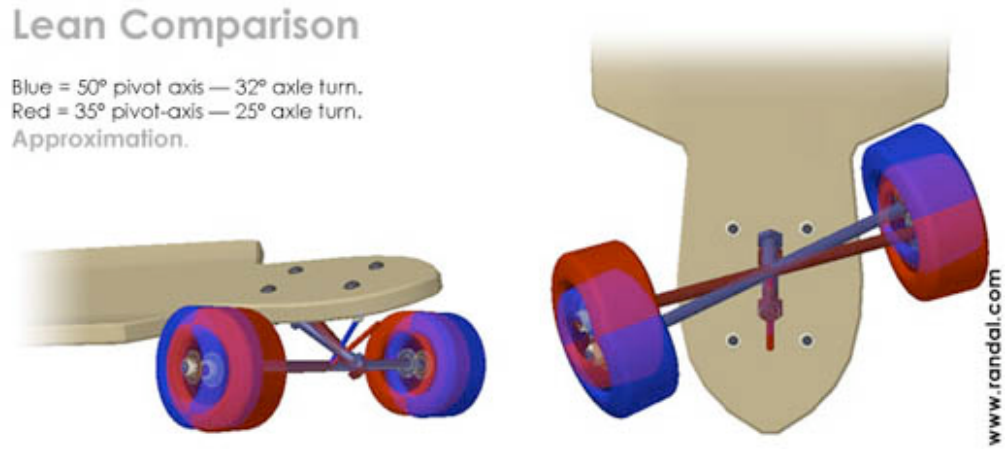
And low angled Randals are a great way to keep board length down, without sacrificing stability.

How is the angle measured?

Randals can be accurately described by either the kingpin angle or the pivot-axis angle, because the pivot-axis and kingpin are at 90° to one-another. You just have to measure them from different places.



The wheels of high angle trucks move in-and-out more than low angle trucks, which have a more up-and-down motion. This difference can affect the correct position of wheel-wells. And along with wheel-size and hanger width affect the size and shape of cutouts.



The above illustration also clearly represents how low angle trucks create much less turn when compared to high angle ones. (When the board lean angle is the same).

Notes on angle.

It should be noted when comparing trucks that not all companies use the same method of measuring their truck angles. For example a 50° truck could be called 40° (90-50=40) if it was measured differently.

The further above 45° the pivot axis is, the more downward force is required to make the hanger turn, to the point where, at 90°, it is impossible to turn the hanger

with the board.

Conversely, the closer to 0° you get, the easier it is to lean.

This is assuming the bushings, tightness and board-width remain constant

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Troubleshooting

Which way around does it go?

Randals are often called 'reverse kingpin' trucks.

This is because the axle is on the other side of the kingpin when compared to most skateboard trucks.

The rule that's true for practically all trucks is: both the pivot cups should face the outside of the board.

My trucks squeak!

This sound usually comes from the pivot rotating in the pivot-cup.

It's fixable by a variety of methods, such as applying wax, soap, graphite powder or cooking oil to the cup.

It's recommended you don't use petroleum-based products as they can degrade the pivot cup and bushings.

My trucks rattle!

This sound usually comes from the top washer.

It's caused by the weight of the rider compressing the bottom bushing.

This can create a gap between the top bushing and the cup washer enabling the washer to rattle against the kingpin.

The easiest fix is tightening the kingpin. However this can change the turn characteristics. Read more about bushings below.

Other rattles can come from the deck-bolts being loose, check that they're snug. Deck-bolts should be checked regularly as part of maintenance.

Another potential source of rattles is bearing spacers, they sometimes rattle

between the bearings. Keep your wheels as tight as you can without the bearings binding or compressing the spacers.

If your wheels still rattle, check if the spacer is the right width, or has been compressed. In either case replace them. Most readily available wheels require either a 0.400” or a 0.300” inch spacer.

Wheel-bite?

This happens when a turn causes a wheel to collide with the board, usually resulting in the board suddenly stopping...

It's something that you should test for, before riding any board.

There are a few ways to prevent this from happening.

The simplest is to keep the kingpin tight enough to prevent the hanger from leaning far enough for it to bite.

Unfortunately this has an adverse effect on responsiveness, and if overdone can even create a board with an unsafe steering capability.

So, the four preferable methods are:

1. Risers, usually plastic, can be put in between the base-plate and the deck, putting the wheels further from the board.

2. Wheel wells can be sanded into the board where the wheels would normally hit. This is not always possible with composite boards.

3. By fitting smaller wheels, the lower radius can give enough room for a full turn potential.

4. By making cutouts, simply removing the section of board that has any chance of hitting the wheel.

Notes on wheel-wells/cutouts.

Not all trucks pivot on the same axis, or have the axle in the same position relative to the deck-bolts. This means that not all wheel-wells are put in the same position by different manufacturers, or even different models by the same maker.

Wheel size also shifts the contact point. Bigger wheels contact closer to the truck than small and can also require larger cutouts.

Cutouts can create a weak-point. It's inadvisable to do this to a less than 9-ply board, without reinforcing it somehow.

Tuning Your Trucks

I want more turn!

This is a pretty common desire. It can be achieved by five methods.

1. Loosen the kingpins. This is easy, but it does have limits.

2. Install softer bushings. This is a small expense with sometimes amazing results. Some people like different hardnesses, top and bottom, too.

3. Insert risers. This increases the board's leverage over the bushings.

4. Insert angled risers/wedges. These change the pivot-axis of the truck. Thin side out results in more turn per board lean, see wedge diagram below.

5. Run a shorter wheelbase. This may involve drilling extra holes. This decreases the turn radius of the board, and often decreases board flex.

6. Run higher angle baseplates. This can be done to both ends, or the nose only.

I want more stability!

This is also a common desire. It too can be achieved a few ways.

1. Tighten the kingpins. Don't over do it though. You still need to be able to steer around sudden obstacles and it can reduce traction.

2. Install harder bushings. Same advice as 1. What is too hard depends on rider weight, hanger width, board-width and pivot-axis.

3. Remove any risers, this lowers the board's leverage over the bushings.

A thin gasket is still advised to help reduce vibration. Check for wheel-bite before riding.

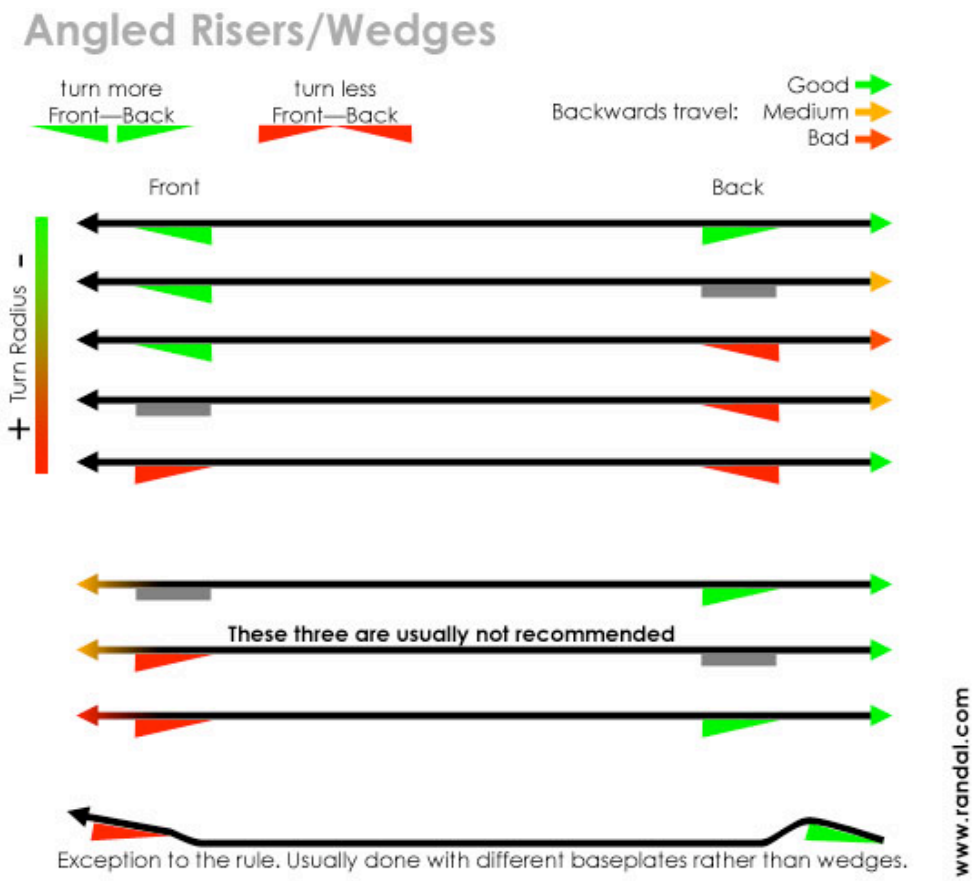
4. Insert angled risers/wedges. These change the pivot-axis of the truck. Thin side in results in less turn per board lean. This option usually also increases the board's leverage over the bushings, using a lower angle baseplate is sometimes preferable for this reason. See wedge diagram below.

5. Flip your hangers (see below).

6. Lengthen the wheelbase. This may involve drilling extra holes. This isn't always a good idea as the boards flex will likely increase.

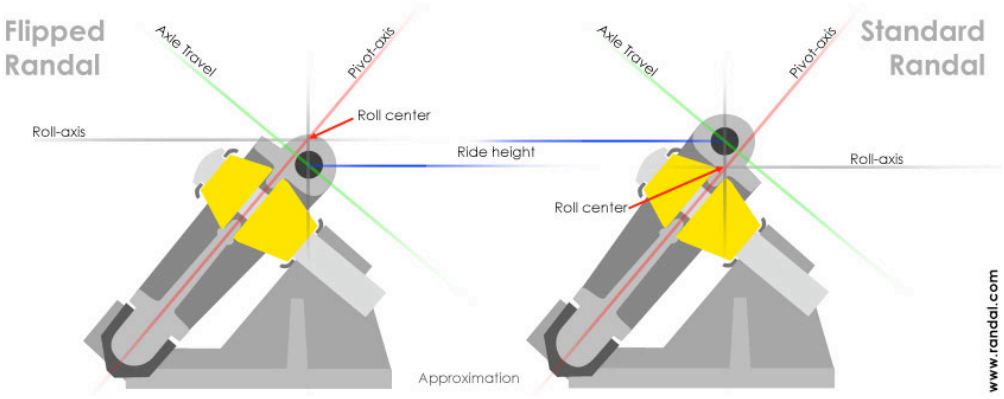
7. Run lower angle baseplates. This can be done to both ends, or the tail only.

8. Lower the board (see below).



Wait! Someone said flip my hanger?

Flipping the hanger involves undoing the kingpin, taking the hanger off the base-plate, turning it over and bolting it back together.



This only works with some hangers, it requires an axle that is offset from the pivot-axis, axle offset is also commonly referred to as rake and caster.

But what does this do?

The short answer is that it lowers the ride height and can help increase stability.

The long answer is that it also does the following.

1. Lowers the ride height. (Check for wheel-bite before riding)

2. Increases the axle's up-down leverage over the bushings.

3. Changes the behavior of the axle's torque leverage over the bushings.

4. Moves the board's centerline, relative to the wheels, when turning.

5. Moves the roll-axis of the board.

6. Moves the axle further from the pivot.

7. Slightly reduces the distance between axles.

It does not change the pivot-axis angle.

It does not directly reduce the board's leverage over the bushings, but it does change the hanger's resistance to lean...

How do I tell what side I'm using?

The width markings can identify the different sides of R2 hangers, 125, 150 or 180 is cast into the front of the hanger. When this marking is easily visible the hanger is in its standard/ un-flipped state.

The F and R markings on Luge hangers identify the different sides.

The R is the regular side (sometimes referred to as response)

The F is the flipped side (sometimes referred to as fast)

The 160mm downhill hanger and the Comp 2 hanger both have no axle offset and are not intended to be flipped.

Mixing Base Plates

Any Randal hanger can be put on any Randal baseplate.

This is possible because the hangers all have essentially the same pivot to bushing seat measurement.

This can allow for a high level of customization, as riders can choose any hanger width and pivot axis combination they want.

Some riders prefer the feel that can be provided by a high angle front truck and a low angle back truck.

It's an effective way of providing stability to the tail without sacrificing too much turn radius. But it does produce a board that rides strangely going backwards.

Doing it with different baseplates rather than wedges keeps board height down.
This is possible because all Randal baseplates and hangers are interchangeable.

Notes on mixing angles

When the bushings are the same, a lower angled truck requires less force to make it lean.

This can lead to the front outside-of-turn wheel lifting, which is bad for traction.

The fix is to run harder/tighter bushings in the tail, and/or softer/looser bushings in the front.

Lowering The Board

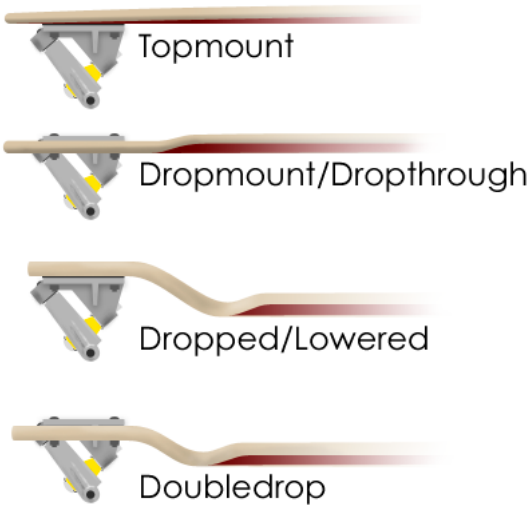
One way to increase stability is to reduce the height of the standing/lying platform relative to the trucks.

There are three main ways of doing this.

1. Dropthrough, this method involves first cutting a slot between the board's bolt holes, and then dropping the baseplate through the top of the board.

2. Lowering, this involves constructing the platform to be lower then the truck's mounting position. This is done by a large variety of methods.

3. Doubledrop, this is a combination of the two above. It can provide more foot-room and a different board-feel as the required bends can be smaller.



But what does it do?

The short answer is that it increases the board's stability, without directly reducing its turn potential.

The long answer is that it also does the following:

Lowers ride height.

Directly reduces the board's leverage over the bushings.

Puts the wheels significantly closer to the board, so if modifying, cutouts may be needed.

Changes the platform's distance from the roll-axis.

Shifts the board's centerline towards the outside of a turn.

Reduces traction.

Increases drift controllability.

Notes on dropping through.

It's advisable to use washers under the deck-bolt nuts, as the weight of the rider is now on a much smaller surface area of the board.

The cutouts that are often required by this can be a weak point. Depending on rider weight, it's perhaps inadvisable to do this to a less than 9-ply board without reinforcing it somehow.

The names of the different mounting styles have changed, and will likely evolve over time.

Bushings

Bottom Randal bushings are taller than most.

For non-Randal bushings this difference should be compensated for. Usually by inserting an additional flat washer on the baseplate side of the bottom bushing.

It's also possible to use what would normally be a bottom bushing on the top, but this sometimes requires a longer kingpin than standard.

It's sometimes the case that non-Randal bushings require different sized cup washers, or flat washers. The top cup-washer can also be used upside-down. Some people advocate using flat washers all-round, even with Randal bushings.

Why would I want different bushings?

Bushings are probably the simplest and most effective way to change the performance of a truck. Fortunately it's often the cheapest too. Unlike wedging, it has the advantage of not changing your ride height.

The behavior of bushings is affected primarily by their hardness as measured by a durometer, their shape, and their rebound.

Different shapes have different 'lean resistance curves'. These are a measure of how much harder they become to compress the further over the board leans. The conical bushings that most Randals ship with offer a relatively flat resistance curve.

It's also worth noting that different bushing seats, washer shapes and sometimes the hanger can also affect this curve.

Higher durometer bushings offer more resistance to lean than soft ones.

Which duro' is right depends primarily on rider weight and the type of riding the

board is intended for. But pivot-axis angle, hanger/board width, and wheelbase also play a part.

Rebound is literally how bouncy the bushing is. It's generally better to have a high amount of rebound. This aspect of a bushing slowly degrades with use.

Using non-Randal Kingpins

It's possible to use most 8"-24tpi bolts of suitable length as a kingpin. Just make sure you use grade 8 bolts, identified by six lines on the head.

Some people advocate using the kingpin with the nut on the hanger-side of the truck. With longer bolts, make sure that this doesn't put the kingpin where it can hit things on the road.

Maintenance

Randals are designed to last. But it's still a good idea to regularly check on the following components.

1. Nuts. Both the kingpin and axle nuts have a nylon locking mechanism to stop them from loosening or tightening during riding. However the nylon's ability to grip the thread slowly degrades, especially when it is taken on and off the thread. This degradation can cause the nylon to no longer do its job, potentially leading to parts falling off.

Check the condition of axle nuts during bearing maintenance, as winding them off to check them will wear them out quicker.

When the nylon is degraded the only answer is new nuts, fortunately they're cheap and readily available. The kingpin is 3/8-24tpi and the axle is 5/16-24tpi.

2. Pivot cups. The hole in the pivot will eventually enlarge, this usually takes quite a long time, but it can cause stability problems when it gets bad.

3. Bushings. The rebound of the bushings will degrade with use, this is unavoidable as the molecular chains slowly break when they get stretched and compressed.

While low rebound isn't necessarily a serious problem, the truck will feel and perform better if the bushings are replaced when they loose rebound.

4. Kingpins. These endure a lot of force and vibration and literally hold the whole truck together. Unfortunately it's practically impossible to assess their condition. It is therefore advisable to replace them every year.