TECHNICAL INFORMATION ABOUT CHOOSING AND FITTING ALLOYS / MAGS / RIMS

BENEFITS OF FITTING ALLOY WHEELS

1. A set of alloy wheels will improve the appearance of your vehicle and in so doing will make your vehicle stand out from the crowd.

2. Alloy wheels will reduce the unsprung weight of a vehicle fitted with standard steel wheels. The benefit of reduced unsprung weight is more precise steering as well as a nominal reduction in fuel consumption.

3. Alloy is an excellent conductor of heat, improving heat dissipation from the brakes, reducing the risk of brake failure under demanding driving conditions.

4. When selling alloy wheels applying the "inch up principle", there is an improvement in the steering response and road holding, especially when cornering.

CHOOSING THE CORRECT WHEEL

1. Firstly, the wheel must appeal to the customer.

2. In order for the wheel to offer the benefits expected from it, it must be manufactured to fit properly. There are four aspects that are critical for precise fitment namely:

P.C.D. (Pitch Circle Diameter)
Offset
Centre Bore
Diameter

P.C.D. (Pitch Circle Diameter)

This is the diameter of an imaginary circle drawn through the centre of the bolt holes. The P.C.D. of the wheel should match that of the vehicle exactly.
P.C.D. is measured in mm. E.g. 100/4 means the wheel has 4 bolt holes and the diameter of the imaginary circle through the bolt holes is 100mm.
A P.C.D. gauge is used to measure the P.C.D. of a wheel accurately.

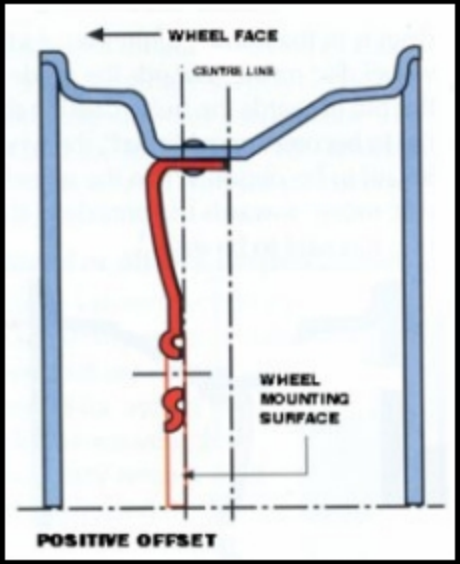
OFFSET

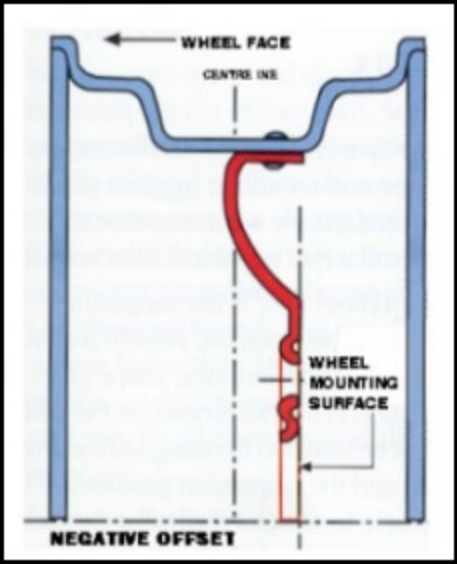
If one was to draw a line down the centre of the width of a wheel, the offset would be the distance between the back face (mounting face) of the wheel and the centre line.

It is vital not to deviate to far from the offset of the wheel originally fitted to the vehicle. A wheel of radically different offset can cause serious clearance and handling problems along with accelerated tyre and bearing wear.

The offset of the wheel can normally be found either at the back of the wheel or in the front of the wheel. "ET" precedes the offset and is therefor also referred to as the ET number e.g. ET35.

A positive offset wheel would mean the back face of the wheel is in front of the centre line of the wheel. The more positively a wheel is offset the more it will sit inside of the wheel well. A negative offset wheel will mean that the back face of the wheel is behind the centre line of the wheel. The more negatively offset a wheel is the more it will fill the fender.





CENTRE BORE

This is the diameter of the centre hole of the wheel. It is crucial that the wheel spigot locates properly on the hub of the vehicle. Most rims work on a spigot ring locating system. This means the wheel has a large centre bore and the spigot ring, with the correct inner diameter for the vehicle's hub assembly, is inserted for the wheel to fit tightly onto the vehicle.

There are wheels that are hub centric i.e. the wheel is manufactured with a centre bore to fit precisely onto a specific vehicle.

If the wheel does not locate onto the vehicle's hub assembly correctly it will cause a vibration on the steering wheel and can lead to bad wear on the tyres and bearings.

RIM DIAMETER AND WIDTH

The rim size is represented as follows: Rim width x rim diameter e.g. 7j x 15

The width is the section between the tyre mounting flanges on the wheel. The diameter is the height of the wheel.

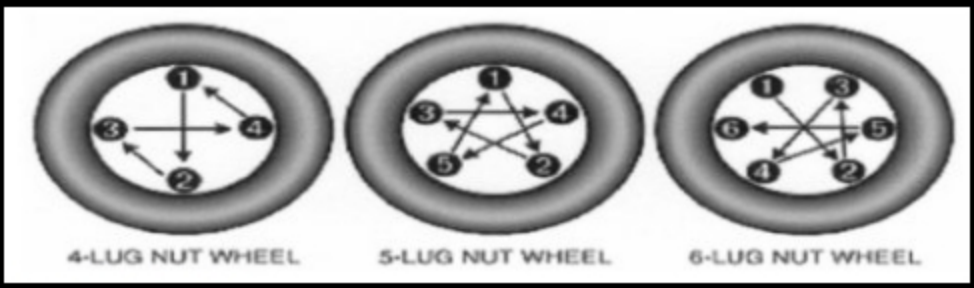
FITMENT AND SAFETY TIPS

1. Before fitting tyres to the rim always check the wheel on the vehicle first. Make sure the P.C.D. lines up, that the wheel spigot locates on the hub and that there is fender, strut and caliper clearance.

2. Once you have mounted the wheel and tyre, before lowering the vehicle, spin the wheel and tyre to ensure that it is not touching on the body, suspension or caliper. This will also make sure that if you have fitted bolts that they are not too long.

3. The wheel bolts or nuts must be tightened to the manufacturer's specified torque. The bolts and nuts need to be retorqued 100km after being fitted.

4. Tightening of bolts or nuts must be done in the correct sequence and progressively i.e. tightening each nut or bolt a little at a time in the correct sequence.



TIGHTENING SEQUENCE

5. If the customer has kept his original spare make sure you have put the correct number of the original bolts or nuts with it.

6. Ensure the customer has a wheel spanner that will fit both the original nuts and bolts as well as the original nuts or bolts of the spare wheel.

WHEEL NUTS AND BOLTS

1. If the vehicle has studs coming out of the hub, you will use a nut to fasten the wheel to the vehicle. Vehicles without studs will use a bolt to fasten the wheel to the hub of the vehicle.

2. Bolts and nuts have various diameters, threads and seating.

3. The thread diameter refers to the diameter of the stud, measured across the shank at the outer edges of the thread e.g. 12mm

4. The thread pitch is the number derived at when dividing the number of threads in 10mm into 10 e.g. 8 threads along 10mm has a pitch of 1.25.

5. It is extremely important that the nut or bolt seat properly in the wheel bolt hole. Most wheels use a tapered nut or bolt (usually with a 60 taper). Some wheels, especially Mercede's wheels use a radius taper bolt.

PREPARE FOR IMPACT

This isn't a race, so tighten properly

I cannot over-emphasize this enough: Never use an impact gun to install any alloy wheels. Why? There are two reasons for this.

1. There is an increased chance of marring a wheel with the use of a fast moving and possibly misaligned air tool.
2. The value and consistency of any threaded fastener clamping load can be achieved only by hand-installation using a quality, calibrated torque wrench.

Ignore what you see during tire changes at a racing event. Pneumatic guns are used in those situations as a necessity in order to save time only. Don't make belive that you're in the pits at an endurance race when installing a customer's set of pricey custom wheels. Take the time to do it right. Yes, it takes more time to hand tighten as opposed to zipping the fasteners on with a gun, but it's worth i tin terms of customer satisfaction.

Pay attention to torque value accuracy. When you do use a torque wrench, make the final pulls in a slow and careful manner, creeping up onto the final valve for "click". By abruptly "slamming" the torque wrench, especially when using a ratcheting "click" type wrench, you easily can tighten beyond the target value. Is this being nitpicky? Yes, but what's wrong with that?

By avoiding the use of an air wrench and following correct tightening procedures, you will avoid damage to the wheel and greatly minimize the chance of a comeback "vibration" complaint. Over-tightening or uneven tightening easily can cause hub/rotor distortion, which will result in brake rotor distortion.

After the initial installation, it's advisable to check and re-torque all wheel fasteners after the vehicle has been driven about 25 to 50 miles. If the technician does not have the opportunity to perform this initial drive, make a point of instructing the customer to bring the vehicle back to the shop after 25 to 50 miles for a re-torque.

CHECK FASTENER SIZE AND STYLE

Also, always verify that you have the correct wheel fasteners for the job at hand. Whether using nuts or wheel bolts, make sure that the thread size is correct (shank diameter and thread pitch), and make absolutely sure that the fastener's seat style matches that of the wheels.

Using an incorrect seat style will prevent secure clamping of the wheel to the hub and will result in loosening during operation. Never assume that the fasteners match the wheels. Again, packing/shipping mistakes are possible, so never blindly assume that what you have is correct.

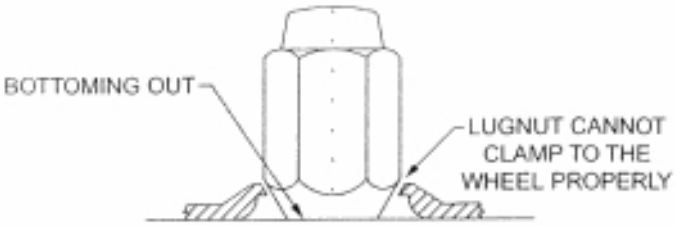
When fastener seat styles include 60-degree taper/conical seats, radius/spherical/ball seats or magstyle straight shank with washers.

Never mismatch by using a mag/shank type fastener on a wheel intended for a conical seat, or any other mismatch. Only the correct matching type seat will provide the required wheel clamping. This cannot be over-emphasized. The use of incorrect seat styles not only can result in wheel damage, but also can lead to a tragic accident if the wheel either loosens or leaves the vehicle.

Also make sure that the fastener does not bottom-out internally. This will prevent full clamping force, resulting in wheel wobble and almost certain failure of the threaded studs.

DON'T DO'S

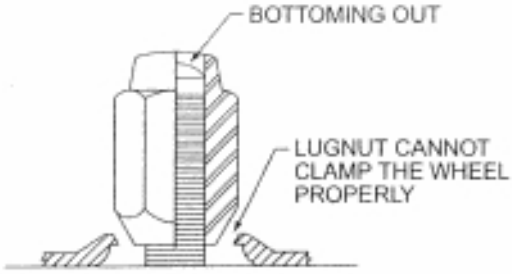
THIS CHART SHOWS DANGEROUS LUGNUT INSTALLATIONS THAT COULD RESULT IN DAMAGE, INJURY AND DEATH



TIP TOO SMALL

When the diameter of the nut at the tip is too small or the lughole in the wheel is too large it can cause the nut to bottom out against the base of the rotor or brake drum before actually seating against the wheel.

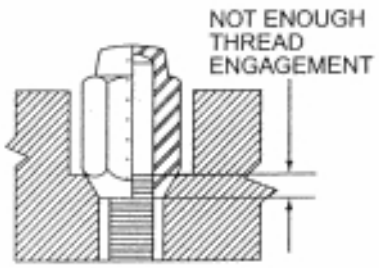
This will prevent the wheel from being properly secured.



LUGNUT TOO SHORT

If the lug is not tall enough or not threaded deep enough the stud will bottom out before the nut makes proper contact with the clamping surface.

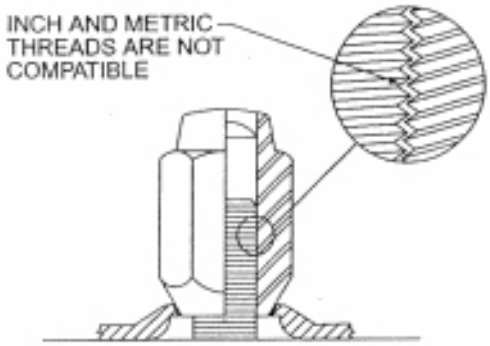
This will prevent the wheel from being properly secured.



STUD TOO SHORT

When the stud is not long enough to allow for 10 full turns of thread engagement.

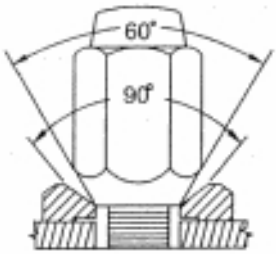
This often occurs when the center pad area of the wheel is extra thick and/or spacers have been used.



WRONG THREAD TYPE

Never try to use a metric thread nut on a US standard thread stud or vice versa.

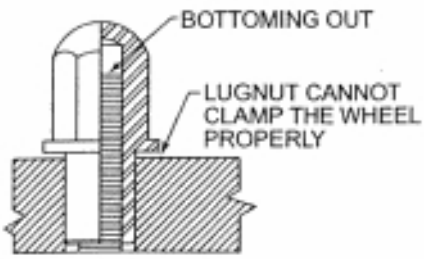
While close 3/8 in and 10mm are not compatible
1/2 in and 12mm are not compatible
9/16 in and 14mm are not compatible



WRONG SEAT ANGLE

Never use a 60 conical seat nut on a wheel with a 90 conical seat lughole or vice versa.

There will not be enough contact surface to properly secure the wheel.

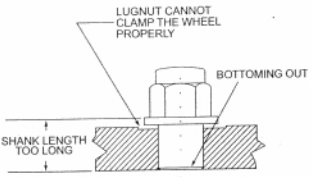


NOT ENOUGH THREAD IN THE NUT

Sometimes the nut appears tall enough but it may not be threaded deep enough.

This will cause the stud to bottom out in the top of the nut before the nut clamping surface properly mates to the clamping surface of the wheel.

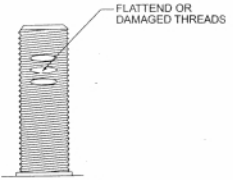
DON'T DO'S



SHANK TOO LONG

The shank length of the nut is too long.

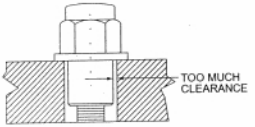
The end of the nut bottoms out against the rotor or drum surface before the nut clamping surface properly mates to the clamping surface of the wheel.



DAMAGED STUD

Damaged or flattened threads will cause the nut to seize up before proper contact of the clamping surfaces occur.

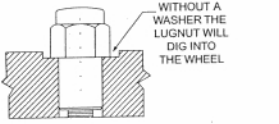
Any damaged stud must be repaired or replaced before nuts are installed.



WRONG SHANK SIZE

On mag shank style applications, the diameter on the lugnut is too small. The most common cause is using a passenger car lugnut on a truck wheel.

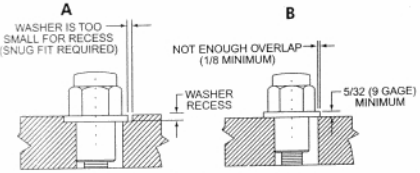
The total clearance between the lugnut shank and the wheel hole should not exceed 1/64".



NO WASHER

Mag shank style applications must be used with a washer.

If not the shoulder of the nut will dig into the softer aluminum preventing proper clamping of the wheel.



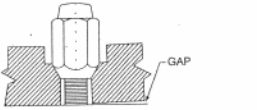
WRONG WASHER ON ELONGATED AND MULTIFIT HOLES

A) Aluminum wheels that have a specific washer recess should use a washer that was designed specifally for that recess.

The washer should fit snug and be the same shape.

Do not put a round washer in a oval hole or vice versa.

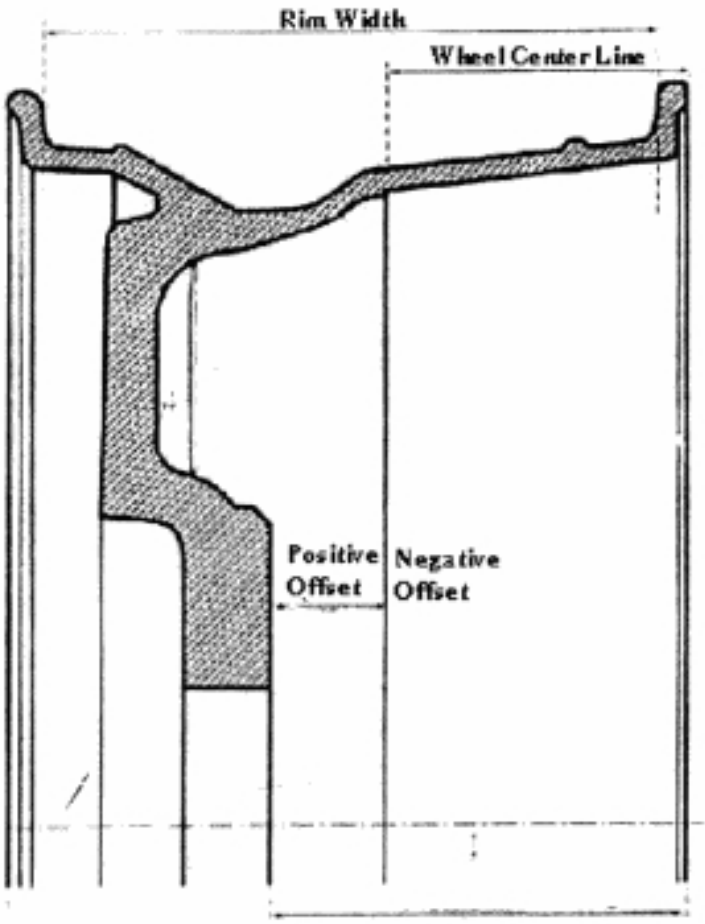
B) Wheels without a washer recess or Dual and Tri fit wheels must use a washer that overlaps the hole at least 1/8 in all around and is at least 5/32 in thick.



MOUNTING SURFACE INTERFERENCE

When the wheel cannot be mounted flush to the vehicle mounting surface due to some form of obstruction.

The most common is drum retainer clips, rivet heads or large calipers.



To calculate offset you'll ne following measurements:

- Wheel backspace
- Wheel Width
- Wheel Center line (outboard flange to in flange measurement /

Subtract:

- Wheel center line fro Wheel backspace to offset.
  - If backspace is l than the wheel centerline the of negative
  - If backspace is greater than the wheel centerlin offset is positive

Tip:

- To convert from inche mm multiply by 25.4
- To convert from mm t inches divide by 25.4

BACKSPACE	3.25"	3.5"	3.75"	4"	4.25"	4.5"	5"	5.25"	5.5"	5.75"	6"
WHEEL WIDTH											
5.5"	0	6	12	19	25	32	44	52	57	63	69
6"	-6.4	0	6	12	19	25	38	44	51	57	63
6.5"	-12	-6	0	6	12	19	32	38	44	51	57
7"	-19	-12	-6	0	6	12	25	32	38	44	51
8"	-32	-25	-19	-12	-6	0	12	19	25	32	38
8.5"	-38	-32	-25	-19	-12	-6	6	12	19	25	32
9"	-44	-38	-32	-25	-19	-12	0	6	12	19	25
9.5"	-51	-44	-38	-32	-25	-19	-6	0	6	12	19
10"	-57	-51	-44	-38	-32	-25	-12	-6	0	6	12
10.5"	-63	-57	-51	-44	-38	-32	-19	-12	-6	0	6
11"	-69	-63	-57	-51	-44	-38	-25	-19	-12	-6	0
12"			-69	-63	-57	-51	-38	-32	-25	-19	-6

Backspace to Offset Conversion Chart

The table on the right is q q reference for finding offset, the rim width and follow the over to the backspace of yo wheel.