

Removing rusted and broken fasteners

From Crankshaft Coalition Wiki



I pity the fool who won't edit this wiki article!

Just click the "edit" tab at the top of the page.

Or, click the "Help" link on the left.

Contents

- 1 Summary
- 2 Smack it with a hammer
- 3 Smack it with a hammer #2
- 4 The hot and cold method
- 5 Metric Method
- 6 Hot and Cold
- 7 The heat and paraffin wax method
- 8 The weld-on-a-larger-nut method
- 9 Penetrating and lubricating oils
- 10 Special tools
- 11 Tips for broken-off bolt heads
- 12 Miscellaneous tips
- 13 References

Summary

A list of techniques for removing rusted or broken bolts, nuts, screws, and fasteners.

In all cases it is better to apply steady pressure on the wrench as you try to turn. You also need to pay attention to what is turning and what is not.-----I have found that in working on Aircraft bolts and screws that do not want to come apart that intermittent pressure such as an impact wrench seems to be better suited to this job. A device that we built that works on screws that some one has stripped out the head ,Get an aircraft rivit gun(note: not a tubing cutter to fast) that has less than 2000 bpm(blows per minute) get one of the rivit gun sets and weld a piece of hex stock 3/4" to the working end of the set then weld an apex tip holder to the hex stock (of course you need an air compressor 100lbs is just fine) put a philips tip in the apex holder (prior to that grind a little off the tip as they usually are slightly to long this will allow the tip to drop farther into the screw head so it will pick up what is left of the flutes in the head.)put the whole thing together and insert the tip into the screw head slowly pull the trigger on the rivit gun while at the same time put pressure on the box end whench you have installed on the hex part of your tool,making sure to keep pressure on the gun handel so it won't jump out of the work -one more word of caution even though this works almost 100% of the time it is possible(if the screw is into a plate nut)to drive the plate nut off its mount.

Keep in mind that stuff stuck together by corrosion is stuck because the corrosion has expanded and tightly bound the fastener. This means a really stuck bolt will not allow penetrating oils in to do any good.

There are two effective means to break the friction that corrosion has caused. One is through mechanical movement, a proper good whack with a hammer. The other is through differential heating. Making one part expand more than the other.

With heating bear in mind axels and other important structures may loose their strength if they are heated much above 300 degrees. If you have the oil and grease starting to smoke than you are in the 300 degree range.

When taking off head studs look at the base. If you see erosion into the stud at the block surface, odds are pretty good you will break the stud.

Smack it with a hammer

Though this may not be practical for all situations, a stuck bolt can often be broken loose simply by hitting it on the head with a hammer. In such a case, a brass drift may be helpful. Drifts of varying lengths can be made from brass bar, and used to access hidden bolts. Brass is used because it's softer, and thus less likely to damage the head of a fastener. Brass hammers are also available and one about 3 or 4 lbs. in weight is good for this.

Smack it with a hammer #2

This method is useful when dealing with a bolt that is rusted very tightly. A lot of people will get a wrench or ratchet and push against it with a steady force. Doing this will more than likely break off the bolt head of a rusty bolt.

The best thing to do is to get a wrench or ratchet on it, and either hit it with your hand or a hammer several times. The sudden force will break the bolt loose with less of a chance of twisting off the head.

If you can get to the nut, try hitting each flat of the nut with a drift punch and ball pien hammer.

Some times a home made impact wrench will work, get a cheap wrench that fits tight and hit it with a hammer watching carefully that it isn't coming off the fastener. It's important when loosening this way to use a tight fitting wrench as a loose fitting one will round the bolt head.

The hot and cold method

This method uses alternating heating and cooling. The resulting expansion and contraction is thought to break a fastener loose from the grip of rust.

Metric Method

Hammer a close-fitting metric socket tightly on a SAE nut, or vice-versa. Then use breaker bar socket wrench (or longest you can fit in a cramped space) to turn it.

Hot and Cold

1. With a welding torch, a hand-held propane torch, or a combination MAPP gas/oxygen torch kit, heat up a bolt head until it turns red.
2. While it's still red-hot, squirt it with water.
3. Repeat the heating and cooling process again with the torch and water.

When using the "Hot and Cold Method" be sure to follow proper safety procedures. Specifically:

- Wear proper safety attire including welder's gloves and safety goggles.
- As with any time you use any flammable ignition sources, have a fire extinguisher within arm's reach.

When using the 'Hot and Cold Method', care should be taken, that only the bolt is heated. If the nut is heated and cooled, the nut will likely become seized tighter.

The heat and paraffin wax method

1. Heat the bolt with a torch.
2. Touch the threads with paraffin wax. Ensure that the bolt is situated such that the wax will run down into the mating threads.
3. Remove the bolt.

The weld-on-a-larger-nut method

1. Place a close-fitting washer over the top of the bolt to protect surrounding material.
2. Take a nut that is larger than the actual thread of the broken bolt, and weld it to the broken bolt.
3. Weld in short bursts until the weld fills the nut. This will heat the bolt but not the surrounding material. Using a 6011 welding rod in a stick welder has been reported to work well.
4. Let the welded nut cool completely without using any water or spray. The bolt will contract and break the grip of the rust.

Some more info on welding on nuts.

A tig welder is the welder of choice.

It is critical to put some penetration oil like Kroil (and not WD-40) on as it cools just low enough for the oil to not just boil off. This will draw oil into the hole. This is the only time I have seen penetrating oil actually penetrate a stuck bolt.

For more information refer to this webpage <http://idisk.mac.com/forever4/Public/pages/studremoval.htm>

Penetrating and lubricating oils

Penetrating oil is an extremely low-viscosity oil that can penetrate into the area between threads on a fastener. A stuck fastener is often heated, sprayed with penetrating oil, and then tapped with a hammer.

Some comments on penetrating oils. WD-40 is not a penetrating oil, it is a corrosion preventative. There is problem with the idea that penetrating oils can penetrate rusted together parts. I have done some testing. For a whole week I put Kroil on a head studs. I then pulled one stud from the head that felt like it wanted to come. As I suspected, it was dry. If the bolt is free enough for penetrating oil to seep through then it will come out without any oil.

If you really want to get studs out you need to use shock (hammer hits) and or careful application of heat cycles.

Some penetrating oils that are recommended by hotrodders:

- Ferrosol (<http://www.bilthamber.com/ferrosol.html>)
- PB Blaster (http://pbblaster.com/store/moreinfo.cfm?Product_ID=1)
- Kroil (<http://kanolabs.com/>)
- WD-40 (<http://www.wd40.com/>)
- Break Free (http://www.armorholdings.com/productsdiv/break_free.asp)
- Liquid Wrench

Special tools

- Flameless heat tool useful for removing rusted or broken fasteners: The Inductor (<http://www.theinductor.com/>).
- Left-handed drill bits, or screw extractors, can be used to remove many fasteners.
- For stubborn nuts, try a nut splitter. It will crack the nut without damaging the bolt inside.
- An impact driver can be used to loosen frozen nuts or bolts. Hand-held impact drivers typically have slotted and Phillips headed bits, as well as a socket fitting. The bit or socket is placed on the stuck fastener, and the other end of the impact driver is struck with a hammer. The impact of the hammer strike loosens the fastener, the downward force keeps the bit in its place, and the impact driver turns the force of the hammer strike into a sudden torque on the stuck fastener.
- When all else fails, get a set of: Craftsman 10 pc. Damaged Bolt/Nut Remover Set, Low Profile Bolt-Out Sears item #00952166000 (http://www.sears.com/sr/javasr/product.do?cat=Hand+Tools%2C+General+Purpose&pid=00952166000&vertical=TOOL&subcat=Bolt-Out%2C+Taps+%26+Dies&BV_UseBVCookie=Yes). They are useful for when the bolt head is rounded off, or there is no room to beat a socket or wrench on to it, or when a torch is not available.

- Another good brand of bolt extractor is Extractor, has a little bit more "bite" than the Craftsman and Irwin ones

Tips for broken-off bolt heads

- If enough of the bolt remains, try to grab it with locking pliers or a pipe wrench.
- Try to saw a groove in it, so that a flat-head screwdriver can be used to turn it.
- Take a 12-point socket that is just larger than the shaft of the bolt, and beat it down onto the bolt with a hammer. Turn it out with a ratchet. When finished, put the socket in a vice, and tap out the broken bolt.
- If a bolt is broken off below the surface, build it up with a welder until there is enough to which to weld a nut. If this brakes off try it again, this method is the best, the heat and cool cycle of the tig weld will loosen the fastener in the stuck piece.

I have also have had good luck by center punching the broken bolt and using a left hand drill bit about half the diameter of the bolt and as it is drilling most of the time the bit will bite and spin the broken bolt out.

Miscellaneous tips

- Weld a piece of metal to the top of the bolt, to use as leverage when loosening.
- If the slot of a round-headed screw is stripped, file two flat edges in it. Then, it can be turned with an adjustable wrench. Or, use a hacksaw to file a new slot at a right angle to the existing one.
- Six-point sockets will grip better on hex nuts and bolts than 12-point fasteners.
- Drill and tap the bolt to run another, smaller bolt down the center. A bit about half the diameter of the headless, stuck bolt is usually sufficient. Use a jam nut on the small bolt and lots of penetrating oil.
- If it is a stripped screw, either slotted or Phillips, try using a dab of valve grinding compound on the tip of the screwdriver. The valve grinding compound will help with friction to hold the tip onto the fastener when turning.

Use a piece of tubing that fits in the bolt hole (OD) with the center (ID) the size of the drill bit. This will keep the drill bit centered in the bolt, when you use the EZ out.

- Where access allows, put a box end wrench over a stripped nut or hex bolt head, then use a centrepunch on the corners of the hex to spread the metal and wedge it in the wrench.
- If the bolt or stud breaks off below the surface, try this. Using a high grade bolt of same size, grind off the threaded end until the bolt will fit into the hole and touch the broken bolt. Using an electric welder, clamp the "electrode" bolt in the stinger. This works best if someone is there to help you by turning the welder on and off. With the stinger bolt inserted into the broken bolt hole and firmly against the broken bolt, have the power turned on just long enough to fuse the stinger bolt to the broken one. You might want to practice this technique on the bench to get the power and timing right. Once they have cooled for a few minutes, but are still hot enough to burn skin, place a wrench on the slave bolt and turn them out.

References

- Tip of the day #33 (<http://www.hotrodders.com/forum/tip-day-33-a-75849.html>), *Hotrodders Bulletin Board*, December 10, 2005.
- Penetrating oil (http://en.wikipedia.org/wiki/Penetrating_oil), *Wikipedia*, retrieved July 15, 2006.
- Stuck Bolts (<http://www.chevytrucks.org/tech/stuckbolt.htm>), *ChevyTrucks.org*, retrieved July 16, 2006.
- Removing Stuck Fasteners (<http://www.pumaracing.co.uk/tooluse.htm>) *PumaRacing.co.uk*, retrieved July 16, 2006.
- Loosening Stubborn Nuts, Bolts, and Screws (<http://www.rd.com/content/openContent.do?contentId=17889>) *Reader's Digest*, retrieved July 21, 2006.

You can edit this article right now!

Just click the edit tab at the top of this page,
or click one of the [edit] links to the right of an article section.
For more information, see the 8 sentence quick-start guide.

- This page was last modified 15:44, 10 January 2007.
- Content is available under Attribution-NonCommercial-ShareAlike 2.5 .