

Product Information Report

Broken Bolt and Stud Removal



Overview

When a bolt or stud breaks in a tapped hole, the remedy can be frustrating. But patience and strict attention to detail can result in success.

Procedure – Screw Extractors



Screw Extractors work best when the following four steps are followed.

Step 1: Apply penetrating oil to help lubricate the threads of the bolt.

Step 2: Drill a hole in the center of the broken bolt, parallel with the tapped hole, using a left hand drill. Flatten the top of the broken bolt with a carbide bur if necessary. In some cases the left hand bit will catch and remove the broken screw.

Step 3: Insert the screw extractor into the hole, maintaining the parallel position. Slide nut style screw extractors perform better than tapered styles in difficult situations.

Step 4: Apply perpendicular torque to loosen the bolt and avoid breaking the extractor.



Sometimes heating the assembly to expand the metal components and/or freezing with a chilling product to shrink the bolt, will make removal easier.

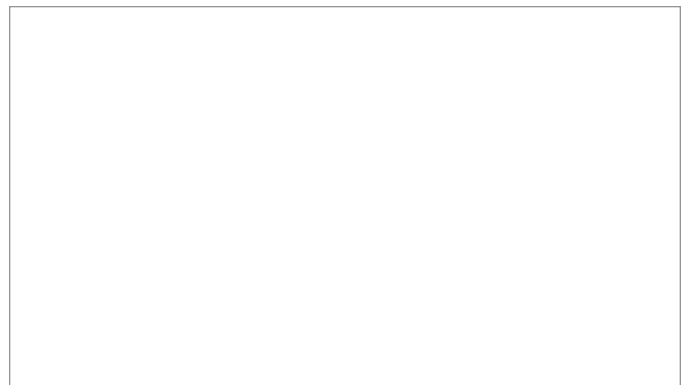
When all else fails, use a welding rod as described on the next page to remove the broken bolt.



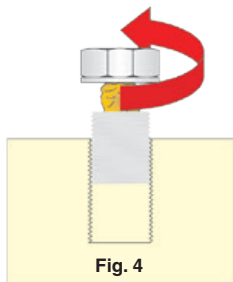
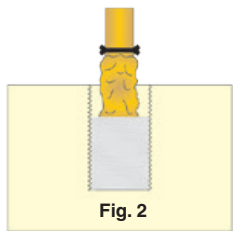
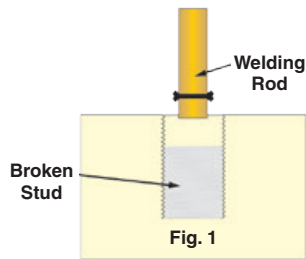
Thread repair kits are very helpful if the broken cap screw or stud needs to be drilled out completely.



(1 of 2)



Procedure – Welding Rod



Flat Position

1. Fig. 1 is a cross-section of a housing showing a stud broken off below the surface of the component.
2. As shown in Fig. 1, place the Cronatron™ 333 Electrode in the center of the threaded hole. While keeping the electrode perpendicular, strike an arc in the center of the broken stud. Avoid tilting the electrode to avoid an arc to the threads.
3. While maintaining a short arc, use a slight circular motion, not to exceed 2 times the diameter of the electrode, to fill the hole with weld deposit. As the electrode burns off, the flux will form a protective barrier between the weld deposit and the threads.
4. Continue the procedure to build up a column of weld metal until it reaches the surface of the housing as shown in Fig. 2. Break the arc by lifting the electrode straight up. Do not allow the weld deposit to roll over onto the housing surface.
5. Chip the slag away from the top of the weld deposit and place a washer (used for spacing) and a nut over the deposit as shown in Fig. 3. The nut should be approximately equal to the diameter of the broken stud.
6. Weld the nut to the electrode deposit, completely filling the inside of the nut with weld metal.
7. Allow the stud, electrode deposit and welded nut to completely cool to room temperature. **DO NOT QUENCH.**
8. Using a hand wrench, remove the broken stud as shown in Fig. 4.
9. After the broken stud is removed, chase the threads with the proper size tap to remove any remaining slag and to clean up the threads.

Overhead Applications

Use the same procedure as for flat position instructions, with the following exceptions:

1. Amperage settings for removal of broken studs overhead might need to be reduced approximately 10% from the settings for flat applications.
2. A continuous arc and build-up may not be possible. The build-up can be achieved with short, intermittent welds, making sure to hold the electrode vertical so as not to arc the threads.

Horizontal Applications

Use a procedure similar to overhead applications with the following additional steps to prevent the molten weld deposit from sagging:

1. Sleeve the threaded hole with a copper tube. Sleeving the threaded hole is also recommended when removing broken studs from aluminum.
2. Place the electrode in the center of the hole, strike the arc and weld with a slight circular motion, maintaining as short an arc as possible.
3. When (if) molten slag begins to run out of the hole, break the arc and let it cool. When the redness disappears, re-strike the arc and continue welding.
4. Follow Steps 5 through 9 listed under the Flat Position instructions to complete the broken stud removal.