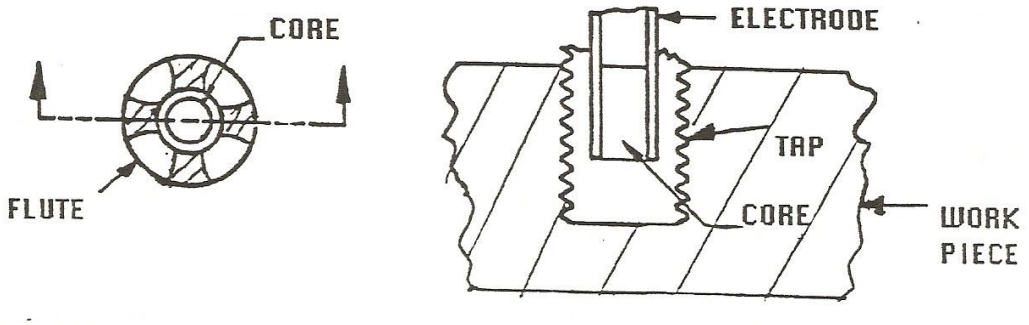
Applications for Metal Disintegrators

The Electro Arc Metal Disintegrator has proven indispensable in removing broken taps, drills, studs, screws, pins, etc,. The Electro Arc process works on thermal shocking metal, the harder the material the faster the disintegrator will cut since it is heating and chilling the metal and breaking it down into small particles. Disintegrating through a tap or drill which is usually in the 60 Rockwell range disintegrates much faster than disintegrating through a stud that is work hardened. Usually, a stud that is work hardened can get as hard as 40 Rockwell. You can work many hours trying to remove a stud under conventional means and then eventually wind up ruining the threads. When you use the Electro Arc process, studs of all sizes can be removed without distortion to the threads.

How to remove Broken Taps using The Electro Arc Process

The objective in using a metal disintegrator to remove a broken tap is to cut out the core of the tap, leaving the flutes to be collapsed without damage to the wall threads in the workpiece.



(Figure 1)

To determine what electrode should be used to remove taps, you can refer to the remove electrode selector chart. If you need to remove the standard three and four flute taps, the

electrode should be approximately one-half the O.D. (outside diameter) of the broken tap. When removing two flutes, spirals, or pipe taps, larger electrodes should be used because the core of the tap is heavier.

Referring back to Figure 1, the circle in the illustration is the electrode, which is hollow. Its size is selected, so it will break through the walls of the tap to separate the flutes as previously mentioned. The cross section shows the core formed as the hollow electrode advances in the tap. **Note:** The electrode will cut a larger hole than its own outside diameter and a smaller core than the electrode's inside diameter. The amount of overcut that the electrode will make during the cutting process depends on the heat selection (which you can refer to in the operating instructions).

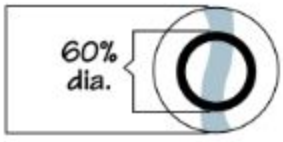
When you are disintegrating a broken tap in a blind hole and the depth of the broken tap is reached, the core of the tap which is going up the electrode will loosen and fall over. This will sometimes cause the electrode to short. This is your indication that the tap is loose and is ready to be removed. You can now remove the remaining pieces of tap, as well as the core. The pieces can be picked out with a magnetic pick or be blown out with an air hose.

When working in blind holes, there are two precautions :

1. Set the depth gauge to the maximum allowable depth so overtravel is not possible. Allow for electrode wear when setting the depth.
2. When the vibration of the disintegrating head becomes erratic, it is usually an indication of a loose core in the workpiece or that loose pieces of tap are in the hole. You should clean out the hole by removing the core and pieces of tap. If you have a machine with automatic feed, the needle of the ammeter of the feed will move to the red area when shorting or when loose particles are in the hole. Never operate the machine when the ammeter is in the red.

Before you start to remove the next broken tap, check to see if the electrode burned in an erratic shape. If so, dress the electrode off the square before disintegrating again. When disintegrating broken taps in through holes, it is helpful to plug the bottom of the hole with clay or some other material. This ensures that the coolant is not lost during the cutting process since as much coolant is very necessary for the disintegrating process.

You can use the Electro Arc Process to remove Broken Drills



You can use the same technique described for removing broken taps in removing broken drills.

1. Determine the correct electrode to use for removing the broken drill by referring to the

selector chart.

2. Many drills shatter in breaking. A loose piece of drill can cause shorts. If your machine has automatic feed with aameter, as previously discussed, the aameter will indicate an aameter on your machine, the vibration of the disintegrating head will become erratic, as stated before. In any case, the machine should be stopped and the loose particles removed from the hole. An Electro Arc deep hold inspection light (pictured) and a set of magnetic picks are helpful in cleaning out the hole.

3. When you are removing a broken drill in a blind hole with automatic feed, when the electrode has passed through the broken drill and begins to cut the parent metal, the aameter on the automatic feed will go in the red area, an indication to stop the machine. It is not recommended to disintegrate soft metal with a disintegrator. Conventional drilling is much faster.

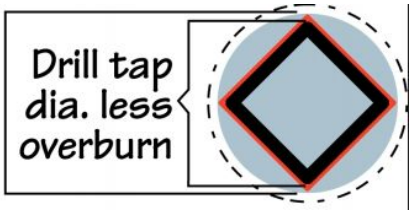
4. When removing broken drills from a through hole, the same steps can be taken as removing a broken tap in the previous section.

Broken Reamers

Removing broken reamers is similar to removing broken drills except that the larger electrode is needed to break through the core and into the flute area of the reamer.

Using the Electro Arc Process to remove Broken Studs, screws and roll taps

For removing these types of items you may find it helpful to disintegrate a square or hex hole using a square or hex electrode. The electrode size should be selected to stay well inside the main threaded diameter. The square or hex electrode is always hollow and a core is formed in the broken item.



The core can usually be broken; use an allen wrench to try to remove the stud or bolt. If the bolt or stud does not move, then you can remove it by cutting a round hole the size of the tap drill. The round electrode will oberburn during the cutting process approximately .015 total, Allow for the overburn so you will be close to the tap drill size of the hole in the stud or bolt. A tap and wrench can then be used to remove the shell remaining in the hole. For studs and bolts larger than ⅝” diameter, it is advisable to disintegrate two or more holes across the stud or bolt and cut it in half for removal. Some picking will be required. Screws and studs should be drilled whenever possible as opposed to disintegration. Disintegration works better with hard material.

Removal of Dowel Pins

In Blind holes, disintegrate a hole into the bottom of the dowel and remove the core. Then a brass or soft steel pin can be inserted in the hole after oil or grease is put in the hole. Striking the pin with a hammer, the resulting hydraulic pressure should force the dowel up and free. If this is not successful, then you will have to chip out the shell or disintegrate the thin wall of the remaining portion of the dowel.
If you are removing a dowel pin from a through hole, use an electrode that will leave a thin wall that can be chipped out or disintegrated.

How to Cut shaped holes in hardened die steel

Keep the following fundamentals in mind when doing this type of work:

1. The electrode will always overburn approximately .015 larger than the electrode size that is used, This is determined by the amount of voltage that is used during the cutting process.
2. The finish of the hole will never be any better than a drilled or machined surface. (Approximately 200 RMS)
3. There will always be a taper in the hole, larger at the electrode entry side and smaller at the bottom.
4. The cutting speeds in disintegrating holes in hardened die steels will vary depending on the material, how it is hardened and the rockwell hardness of the material.
5. You will find it helpful to use an insulated bushing to guide the electrode to get a much better hole. Holes can be cut with an approximate .007 overburn if guided.

5 Steps for Small diameter hole work
Small holes are usually holes that are smaller than .060” in diameter. In cases of this type, the following steps should be taken:

1. The vibration of the head should be reduced according to the operating instructions.
2. The stroke of the head should be shortened according to the operating instructions.
3. Never let the electrode make contact with the workpiece - simply jump the spark between the workpiece and the electrode. If the electrode makes contact, the water supply coming through the electrode could be cut off, which would cause the electrode to become instantaneously red hot.
4. It is also helpful to use an insulated bushing to guide small electrodes.
5. For additional help contact the factory in Dexter, MI

Electro Arc’s Metal Disintegrators are capable of removing studs, taps, and drills in practically any position. We manufacture many standard variations of machines capable of performing the

work. Many types of accessories are also available with the machines such as magnetic fixtures that are used for holding the disintegrator head to get in hard to reach locations or angles or compound angles for removing frozen bolts.

OPTIONAL
Mini Mag
Head Support Fixture
The ideal way to bring disintegrating power to bear at ANY angle.
800 lb.- force permanent magnet.
6 precision angle/position adjustments. 5" (127 mm) vertical, 4.5" (114 mm) horizontal movement.
4" (101 mm) of downfeed.
Part # A1425

Electro Arc Metal Disintegrators are built with many size power supplies. The largest power supply available is 20 KVA which will remove any diameter stud up to 6 to 7 inches in depth. A 20 KVA power supply is capable of disintegrating a 1" diameter hole 2" deep in approximately 15 minutes. 15 KVA power supplies will disintegrate 1/2" diameter hole 2" deep in approximately 15 minutes. A 10 KVA power supply will disintegrate a 1/4" hole 2" deep in approximately 15 minutes. 15 and 10 KVA power supplies are not capable of removing studs that are over 4" in depth. These times are only approximate in as much as studs are semi-hard as previously stated. The holes could be cut faster in Rockwell 60 hardened steel.

OPTIONS

V0116

Build your complete mobile disintegration station

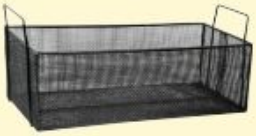
Cabling options

20 foot Power Cable	Part #S-220
20 foot Ground Cable	Part #S-221
Head Cord Extension 10 ft	Part #S-212

Coolant Tank
16-gallon durable frosted plastic resists corrosion.
Built-in filter, barbed fitting for quick disconnect. Large screw-on fill cap with pressure relief valve. Fits perfectly on lower deck of the cart.
Part No. S-203

Stainless Steel Cart
Welded joints and handle. Room below for coolant tank and extras. Heavy-duty lockable wheels; back pair are casters. Dimensions: 30" x 60" /(762 x 1524 mm) footprint. Height: 37" (939.8 mm) to top of handle, 27" (686 mm) to top shelf.
Part No. S-202

Accessory Basket
For head, cables, accessories. Rubber coated heavy wire construction.
Part No. S-204



Coolant Valve
Offers dual coolant sources: tank or garden hose.
Part No. A6448