The Electro Arc Metal Disintegration process

Electro Arc's patented process cuts like a drill along a single axis through electrically conductive material. But the work is done by an electric arc created at the end of a hollow electrode.

An arc can vaporize metal or even carbon. It pulls particles out of the electrode and the target metal, rapidly eroding both. A carbon-arc searchlight uses Direct Current (DC) which maintains a continuous arc.

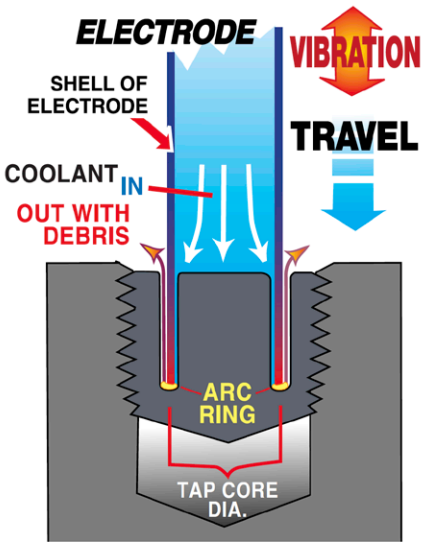
An Alternating Current (AC) arc fluctuates to zero 50 or 60 times per second. Our process uses the low-voltage moments to flush vaporized material away between arc cycles. That's done by high-pressure coolant flowing through the tubular electrode. Flushing out happens as the electrode is pull back on each upstroke.

The coolant thermally shocks the particles of hot metal and flushes them downstream before they know what hit them. The arc is re-created on each downstroke.

Efficiency depends on all components working right: voltage, current, electrode quality, coolant composition and pressure, precision of electrode vibration and advance, all supported by a strong, stable electrical and mechanical setup.

How Electro Arc Metal Disintegrators work

Our machines are set up roughly like a drill press. Instead of rotating, the Electro Arc operating head, vibrates a hollow-tube electrode along its axis. The electrode, insulated from the rest of the machine, is connected to one side of a **low-voltage high-current** power supply, and the workpiece to the other.



Coolant is pumped at 90 psi through the hollow electrode. The operator advances the vibrating electrode toward the target material until it's just close enough to strike an arc with the workpiece on the downstroke and break it on the upstroke.

The arc is hot enough to make a momentary molten ring on very hard materials, but that alone won't dig a hole. It's the sudden heating and cooling that breaks off tiny bits of material which are flushed away by the coolant. That digs the ring into the material.

The operator has to keep the electrode advancing into the workpiece at just the right speed to keep the arc repeating but not so fast as to let the electrode actually strike the workpiece. An Auto Feed Unit lets you set the advance speed for efficient cutting. Play Video

To work well, the length and intensity of stroke (vibration) and the arc voltage must be precisely co-ordinated. Electro Arc disintegrator heads and power supplies are built to provide that precision, with factory settings optimized for maximum performance.

The process is most efficient when connections are tight and the spindle action is precisely controlled. The quickest removal of any given tool is accomplished by choosing the best strategy, not necessarily the most obvious.

The electrode sizes and settings recommended in our machine manuals are the result of years of experience with materials and machines. See Strategies for Removing Broken Tools.

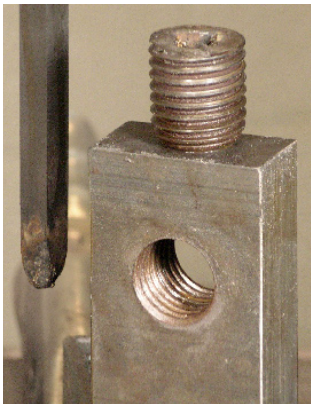
A metal disintegrating machine can be built to use either an AC or a DC arc – not both. Both types run on standard supplied AC shop power, but use very different power supply and head designs. We build both kinds.

To choose which is best for you, see Electro Arc AC or DC Metal Disintegrators.

Cutting different sizes and shapes with a Metal Disintegrator

With AC disintegrators, the business end, the electrode, is usually cylindrical, cutting a ring into the workpiece. Diameters vary from ultra-thin 0.040" (1mm) to nearly half an inch (12 mm).

To remove a broken tool without damaging the threads in the workpiece, you use an electrode only about 4/5ths the O.D. of the tool. The arc cuts a wider swath than the electrode. The coolant and pulverized material escape through the extra space. Our Selector Charts do the math for you.



Carbon electrodes can come in different cross-sections like the square electrode shown. It made a square hole in the bolt so it could be backed out with a wrench.

Specially-shaped carbon electrodes can cut square, hex or other shapes into the material. The arc forms along the edge of the tip, cutting its shape into the workpiece.

Carbon electrodes require more power. For AC, you need a 20KVA machine. For the larger carbon electrodes you need a DC disintegrator.