



## MDM Machining



### About the System and Process

Arc Services employs state-of-the-art technology through its metal disintegration machines (MDM) – the most powerful units available today in the world. Our metal disintegration technology can completely remove a stud, 3 inches in diameter and 5 ½ inches deep, in less than two and a half hours, with absolutely no damage to the female threads in the tapped hole.

The MDM (Metal Disintegration Machining) technology uses graphite, moly copper or aluminum, depending on the type of burn required, to become a high energy, low voltage, thermal shock-producing source. The electrode in the machine vibrates up and down at a rate of 3,600 times per minute. Each time the electrode touches the piece to be burned, an arc is struck. The arc has a temperature at point of contact of approximately 5,300°F. A constant supply of fresh water is pumped down through the electrode causing the molten metal to thermally break down and, at the same time, flushes the thermally shocked metal back out the discharge hole. The discharged pieces are normally less than 10 microns in size – smaller than a grain of sand. The water also acts as a heat exchanger; the only portion to get hot is the small area in contact with the tip of the electrode, unlike drilling where heat from the bit transfers to the parent metal. The MDM maintains everything at ambient temperature, except what needs to be removed.

The operator regulates the burn rate as well as the flushing parameters by means of a removable control pendant. Pendant mobility allows the operator complete control at the point of cut.

The 8-motion, 4-axis, 360-degree rotation Superstructure can be mounted in any orientation and can be clamped in place if the magnetic base cannot be utilized.

The custom-made electrodes can be designed and manufactured in a wide variety of shapes, sizes, and configurations; most commonly round, square, or hex.

### Some Examples of Cutting Times:

- ½" - 13 Tap, 2" Deep, 3 minutes cutting time.
- 1" - 8 Stud, 4" Deep, 20 minutes cutting time.
- 2" - 8 Stud, 4" Deep, 40 minutes cutting time.
- 3" - 8 Stud, 5" Deep, 2 hours cutting time.
- 4-½" - 8 Stud, 6" Deep, 4 hours, 10 minutes cutting time.







## MDM MACHINING



### Examples of Applications for MDM

- Broken Stud Removal
- Broken Tap Removal
- Carbide Inserts
- Crane Hinge Pins
- Roll Pin Removal
- Broken Drill Bits
- Turbine Stud Removal
- Snubber Pins
- Nut Splitting
- Nozzle Blocks
- Thermal Shields
- Fuel Rod Assemblies
- Steam Generator Tubes

### Advantages to the MDM Process

MDM is 40% faster than conventional drilling on average.

No heat introduced to the surrounding structure.

The MDM will cut no matter how hard the material is.

No metal chips or shavings that can be introduced into an operating system.

No ability to "stress harden" the work material.

No cutting oils or lubricants.

Faster cutting times than mechanical machining methods.

Uses ordinary tap water as the flushing agent that can be poured down any drain.

Superstructure can be mounted in any configuration and orientation.

Power Supply can be up to 50' away from the Superstructure.

Operation is quiet, with only the sound of the power supply cooling fan as the ambient noise.

Can cut remotely at sublevels in the plant and underwater.

### Limitations to the MDM Process

Will not cut aluminum or non-metallic materials.

System uses water as its cooling and flushing. This water must be contained or diverted to a container or floor drain.

Due to the electrical process, as well as the water flushing, rusting of any carbon work piece happens rather quickly. Precautions need to be put in place if this is a concern.

Electrical injuries can occur. Proper training, as well as adequate equipment maintenance, is critical for safe operation.

### Operating Requirements

Continuous clean water supply for cooling and flushing.

480V, 3 Phase, 100A service required for power supply.

### Summary

The MDM process is an efficient solution for the removal of metal and reconditioning of any hole or threaded hole where the containment and disposal of the flush water is not an issue. It is faster, cleaner, and easier than many mechanical applications. There are no heat or stress risks to the parent metal as well as no safety risk, such as sharp/hot metal chips, rotating equipment hazards, caustic fumes, or gases.