

Techtips is a collection of useful ideas, techniques, and procedures designed to further EDM knowledge.

TechTips



by Roger Kern

Application Tips

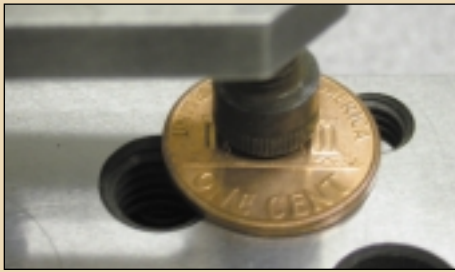
This month, I'll present another selection of application tips which will hopefully make your life in the EDM Department a little easier.

Tips for the EDM Toolmaker



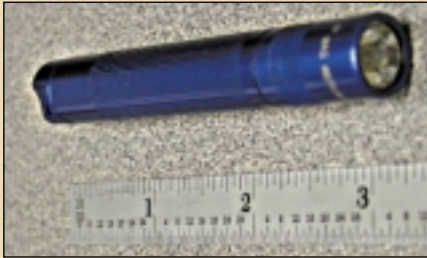
Cleaning an Arkansas Stone

A hard Arkansas stone is a virtual necessity for maintaining EDM tooling and tables without “stoning away” their accurate surfaces. However, the smooth surface of the Arkansas stone will quickly become loaded with dirt and “smears” of metal, especially when used on stainless steel tooling and soft machine tables, because these stones are usually used dry. Once the stone becomes loaded, it will stick to metal surfaces and also lose its cutting action. An effective way to clean the Arkansas stone surface is to mix some Boraxo® powdered hand soap and water into the consistency of a moist paste. Vigorously scrub the surface of the stone with your finger coated with the abrasive paste. Repeated scrubbing, rinsing, and reapplication of the paste will bring the stone back to “like new” appearance and restore its cutting action.



A Penny For Your Machine Table

Many a machine table has been permanently scarred by the screw used for a heel when setting up parts with toe clamps. You can avoid this unfortunate situation by using a penny between the heel screw and the table.



Light Up Your Life

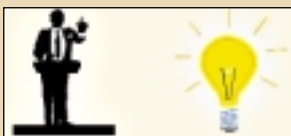
A handy flashlight is an invaluable tool for anyone running an EDM machine. Whether it be re-stringing the wire, or peering into the threader or work tank, a little flashlight should always be kept within reach. Maglite® makes an inexpensive, little pen-light called the Solitaire® that features adjustable beam focus, and all metal water-tight construction that is a joy to use. And, it's made in the USA! I wouldn't be without mine.

Hidden Dollars

The explosion in refractory metals commodity prices means that you may be sitting on a hidden pile of cash. With scrap moly fetching \$20. per pound and carbide fetching \$11 per pound, your scrap moly wire, carbide blanks, slugs, worn end mills and inserts, can be worth a small fortune. A few hours collecting years of scrap moly wire and carbide netted my company several thousand dollars! Check the internet for refractory metal scrap dealers, many of whom will even make the freight arrangements for you.

Getting Help

One of the most overlooked sources of applications knowledge is your machine tool manufacturer. Invariably, when I take an applications call from a customer and ask what advice the OEM gave him, I find that the customer hasn't considered making that important call. Your OEM has a wealth of experience with your machine, and has a vested interest in your being successful with it. Call them first!



Take the Training

One of the most foolish things a shop can do is to purchase a new EDM and forego the class at the factory training center that comes free with every new machine. We've all made the excuses: The airfare, the hotel cost, the operator's wages, the lost production ... These excuses are false economy. Your operator will absorb ten times more valuable information in this uninterrupted educational setting, and return to your shop ready to take advantage of all the features of your new machine.

The second most foolish thing a shop can do is to not take advantage of the advanced training offered by most OEMs. These classes are designed for the operator that has had a year or more experience with the machine, and concentrate on advanced features and procedures that can make a huge difference in your shop's productivity and capability.

Tips for Wire EDM



Cleaning Clogged Start Holes in HSS WEDM Blanks

High Speed Steel is often tempered in molten salt. Sometimes the molten salt enters and solidifies in the start holes, making it impossible to thread the wire or pick up the hole as the solid salt is non-conductive. Attempting to remove the hard salt with a drill will often result in a broken drill stuck in the workpiece. A better way to clear the salt from the holes is to immerse the part in boiling water to dissolve the salt.



Are You On Edge Making Outside Starts?

Starting a WEDM cut from the outside edge of a part will usually lead to numerous wire breaks, due to the fact that the flushing stream is not contained and follows the path of least resistance away from the wire. However, in many situations, starting from the outside is unavoidable. A simple and effective solution to this problem is to utilize one of a number of commercially available outside start flushing aids. These devices are merely a piece of Plexiglas® with a center slot and imbedded magnets. This "portable start hole" is guaranteed to make your life a lot easier.



Is Your Machine Too Tense?

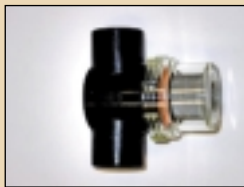
Maintaining the correct wire tension is the key to both achieving maximum accuracy, as well as minimizing wire breaks. Yet, often what you set is not necessarily what you get. During a recent visit to a major Wire EDM facility with 23 machines, I discovered that the wire tension in many of the machines was off by as much as 50%! Regularly checking and adjusting your wire tension with a calibrated tension meter should be a standard part of your machine preventative maintenance. Please note that a tension meter must be calibrated for the specific wire diameter, material, and tensile strength of the wire you are using.

Give Your Filters a Rest

Did you know that you can increase the life of your filters by giving them a rest? Many shops leave their machines running all the time with the filter pumps on. Not only does this consume substantial unnecessary filter pump and chiller energy, but it also shortens filter life. It is an established fact that depressurizing a filter cartridge will allow some of the dirt cake on the pleats to fall to the bottom of the housing, and re-open some of the pores. The next time your filters need changing, try turning off the filter pump overnight and note how much the overflow from the clean tank improves the following morning.

Shake It Out Baby!

Have you ever had your resin system go down due to an exhausted bottle, just as you begin a hot job on a Friday night, only to find you don't have a fresh spare? By carefully shaking the bottle you may expose enough fresh resin bead surfaces to extend your bottle capacity and complete the job.



Add a Safety Screen To Your Resin System

Have you ever thought about the nightmare possibility of all those resin beads in your resin tank being circulated throughout your dielectric system?

You can be sure that those shops who have had to pay a couple thousand dollars for a factory service engineer to clean those beads from the solenoids, lines, valves, flowmeters, pumps, filter housings, jet nozzles, and numerous other components that make up the dielectric system have.

The center lance of a deionizing bottle contains a filter assembly that keeps the beads in the tank from escaping. Sometimes rough shipping can either dislodge the filter from the lance, or cause the lance to separate from the tank head. If this happens, the machine will rapidly pump out the entire contents of the resin bottle into your machine when the conductivity system calls for deionizing.

The solution is an inexpensive secondary filter screen assembly that is inserted between the outlet side of the resin bottle and the hose leading to the machine. This secondary filter contains a clear bowl which allows you to monitor the accumulation of resin beads on the screen. If the resin bottle fails, the machine will cease deionizing, and you'll see the screen clogged with beads through the clear bowl.

The secondary filter screen is a cheap insurance policy that you can't afford to pass up.

Avoiding spooling problems

Wire tangling or cross-overs on the spool are one of the most common reasons for returned EDM wire, yet the vast majority of these incidents are caused by improper handling and storage of the spool.

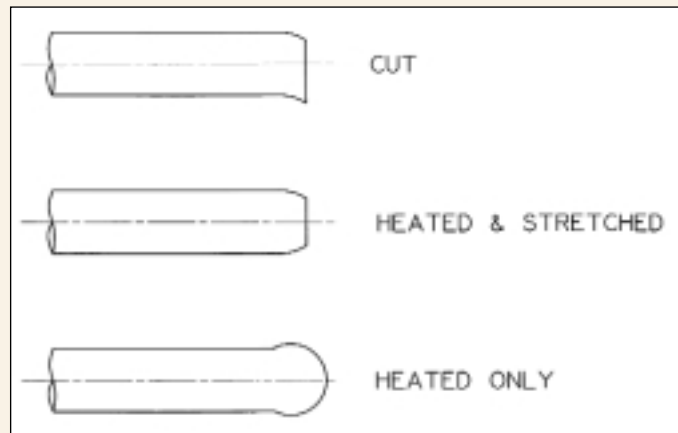
Storing a spool by laying it on its flange, when combined with improper fixing of the free end, is an invitation to a spooling problem the next time you use the spool. Relaxed wire tension can propagate from the surface layer into the spool. The slightest impact while the spool is on end can cause the coils to slip past each other creating a tangle.

Wire manufacturers package their wires with the axis of the spool in the horizontal position to prevent this problem. It is a good idea to save the box for properly storing partially used spools.



Don't Get Mad, Get Glad®

Sometimes it is necessary to protect adjacent tooling, fixtures, or parts in a non-submerged Wire EDM tank from the water spray emerging from the cut. An example would be to protect a non-stainless index fixture or vise from the inevitable corrosion caused by the water spray. I have found Glad® Press'n Seal plastic wrap ideal for this purpose. The bottom side is treated with a Griptex surface which will tenaciously cling to any smooth, dry surface or itself and seal out water spray. Once the job is done, just peel it off and toss it.



Do you get the point?

In order to successfully manually thread a Wire EDM, it is necessary that the wire have the proper end condition to readily pass through the guide, which is generally only 5 microns larger than the wire. Mechanically cutting the wire will result in an end condition that has a burr as well as being out-of-round, so many operators thermally cut the wire with a butane lighter to get the “bullet nose” that is ideal for threading. However, some operators complain that when they use this method, they end up with a ball on the end of the wire that is slightly larger than the wire diameter, that won't pass through the guide. This situation is most common with coated wires, and is caused by too much heat and not enough stretch. You don't want the flame to melt the wire, which causes the spherical ball to form. Instead, you want to soften the wire with the flame so it can be stretched as it is parted, leaving the desired bullet nose profile.

Tips for Sinker EDM

A Poor Man's Toolchanger

If you don't have a toolchanger for your CNC EDM or you don't have enough positions in your toolchanger, don't despair.

Why not mount the part in the ram of the machine and mount a series of electrodes onto the table. Some shops have made up a fixture with a dozen or more slots to hold electrodes, while others just place them randomly on the table and probe and store their locations.

The number of tool change positions is limited only by the table size, machine travel, and the size of the part.

You'll also gain the added flushing advantage of gravity carrying the EDM debris out of the cavity, as opposed to EDM debris settling at the bottom of the cavity.

Tips for Both Wire and Sinkers EDM

*Next Issue: IMTS Highlights
Any suggestions for future topics
are welcome.*

*Tell us what you would like
to read about.*

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If A Little Is Good, Is More Better?

When it comes to flushing in a sinker, that all depends.

It has been documented by at least one OEM that the wear in copper electrodes increases with increasing dielectric flow. In fact, in certain machines, the dielectric flow is turned off during the down portion of a peck cycle burn, in order to minimize electrode wear. When reverse burning punches with a copper female electrode, I have found that the optimum pressure is about .5 psi. Higher pressures can more than double the wear percentage. Copper Tungsten is another electrode material that likes a little, but not a lot, of dielectric flow when low-wear burning steel. Copper Tungsten burns with high flushing pressures, often exhibit short-circuit instability.

On the other hand, graphite electrodes like lots of flushing, in order to remove the copious debris that graphite burns often produce.

Chill out!

When installing a chiller, please observe the following precautions:

- Plumb the chiller only into the clean tank. Passing dirty dielectric fluid through the chiller will eventually coat the interior surfaces of the heat exchanger with EDM debris, seriously reducing its cooling capacity, or even clogging it completely.
- Plum the chiller lines such that the chiller intake and return lines are not adjacent to each other, to ensure uniform temperature throughout the clean tank.
- Install an air filter (or better yet purchase it pre-installed as an option) in front of the intake of the condenser fan, and clean it regularly.

Sizing An EDM Chiller

It is important to properly size a chiller to the machine's heat output into the dielectric. While it is often difficult to accurately predict the BTU/hr capacity required to absorb the heat of the machine pumps, and the erosion process based upon the pump HP and the power supply KVA, there is a simple method to assure that you buy the right size. Starting with a cold machine, measure the dielectric temperature. Turn on the machine and begin cutting a typical thickness block for 1 hour. Then measure the water temperature again. Note the temperature rise. Report this temperature rise, along with the machine dielectric tank capacity and dielectric type (oil or water) to your prospective chiller vendor. This information will allow them to accurately calculate the heat output of your machine system, and accurately size the chiller.

Don't Let The Sun Shine In

The localized thermal distortion caused by a sunbeam shining on a machine tool frame can be the cause of significant contour and positioning errors. This problem is particularly vexing, because the sun will only affect the machine at certain times of the day, and that time changes with the seasons. A ten dollar window shade will solve this problem.

HVAC and Machine Stability

The improper placement and adjustment of heating and air conditioning ducts in the EDM room can cause a significant deterioration in the accuracy of your machines. Intermittent streams of either 110°F heated air or 50°F chilled air blowing on the machine casting, can cause all kinds of mysterious positioning and contour errors on fussy parts. Also, the EDM room is not the place for an energy saving setback thermostat.