Technical Spotlight

Submitted by Leonard Bex and Greg Eastin

Company: **American Mold Technologies Inc;**
42300 Executive Drive; Harrison TWP., MI 48045
Machine: **LeBlond Makino EDNC 156W**
Electrode: **POCO EDM-200 with EDM-100**
Application: **Automotive – Climate Control Air Duct**

Approximately 60 electrodes were used to produce the mold. The largest electrode size was 12" x 10" x 4" and the smallest was 1" x 1". Each burn used one rougher and one finisher. Electrodes were produced with extra length so they could be redressed and reused on additional molds. Only small blades needed to be recreated. At this time, two molds have been completed and they expect to produce three more molds with these electrodes.

Although many of the cuts involved ribs and blades, external flush using a swing pattern and jump kept the cuts stable. The MF3 adapter was used to obtain a fine finish that required only minor bench time with 320 paper. EDM time per mold was 150 hours.

The Wrong Polarity

Most EDMers know that a positive graphite electrode gives better wear and a negative graphite electrode gives better speed. Following this guideline, some EDMers try to cut tungsten carbide in positive polarity and are disappointed with the results.

Tungsten carbide is a difficult to cut workmetal with a melting temperature around 6000°F compared to tool steel at 2700°F. Due to the high melting temperature, there will be more electrode wear than with other workmetals. Often positive polarity is used in an attempt to minimize this electrode wear. With a little work and careful adjusting of the machine settings, the cut can be stabilized. Unfortunately, this only appears to be a stable cut. Actually, all that has been achieved is stable erosion of the

electrode with almost no cutting of the workmetal. Eventually the cut can be made, but it will probably take many electrodes and hours of EDM time.

Tungsten carbide is a workmetal that has to be cut in negative polarity. There will still be electrode wear, but the metal removal rate and EDM time will be greatly improved.

Other difficult workmetals include titanium and those with a high copper content. They should also be cut with negative polarity to the electrode. Check the Performance Charts in your Technical Manual for help in selecting the best parameters for your job.

Graphite Machining Tip

Fluids

Generally graphite is machined dry, but there are times when it is necessary to use a cutting fluid or coolant. Centerless grinding is an operation that requires a coolant. The heat that is generated in centerless grinding would destroy the grinding wheel if fluid were not used to remove some of the heat. We use water with a rust inhibitor, but a cutting fluid can also be used.

Fluids can also be used as a method of dust control. Directed streams or fluid curtains around the spindle can be used to trap the dust.

Since graphite is porous, liquids (even water) used to lubricate, cool, or flush can penetrate the pores and introduce impurities into the graphite. Graphites with larger pores will absorb more fluid than small pore graphites. Materials such as EDM-AF5, EDM-C3, EDM-3, EDM-2, and EDM-1 absorb very little fluid even after soaking in fluid for several hours. Generally, these materials only need the surface moisture removed.

Impurities can cause problems in some applications, but the EDMer usually doesn't have a problem if the fluid is removed from the graphite. After machining with fluids, expose the finished electrode to a temperature of about 250°F for one hour to remove the fluid (do not use a microwave oven). Electrodes can also be air dried if they are not immediately needed.

If you are using a porous graphite, it is important to remove trapped moisture. Trapped moisture can turn to steam in the EDM process and the pressure could damage the electrode.