

### ELECTRODE MATERIALS

In theory any conductive material can be used as an electrode but a material with high conductivity and a high melting temperature that can be machined to a good finish are most suitable.

There are numerous electrode materials and the choice of which to use for a specific component material and application is sometimes dependent on the availability of the electrode material in the form required. The most usual are copper and graphite.

#### High conductivity copper (H.C.C.)

This is a good electrode material that is readily available and gives a good erosion rate. Slender electrodes can be difficult to machine and may suffer from heat distortion during machining. Available in most forms including plate, sheet, bar, tube from most nonferrous material suppliers (specify half hard or hard when ordering). Small tubes (below 3mm dia.) available from specialist EDM electrode suppliers. Wear rate on high power higher than graphite. A polished copper electrode will give the best EDM finish available on steels. Use of high voltage circuit reduces electrode wear.

#### Graphite

This is readily machined without the problems of distortion evident in copper but has a tendency to chip and is fragile to handle. Dust extraction is required when machining graphite electrodes (listed as nuisance particulate not a major health hazard). Dust problems can be minimised by soaking in dielectric before machining. EDM graphites are only available from specialist EDM electrode suppliers. The graphite is available in many forms including blocks, sheets, bars, plates and tubes. High density graphites and copper impregnated graphites are expensive but useful for fine detailed work where wear resistance is important. Graphite is almost exclusively used for large work such as large die block cavities and blow moulds. It has low wear and high metal removal rates but cannot be used for very fine finishes.

#### Copper Tungsten

This is a sintered material and a 25% / 75% mix has been found to be best for EDM. It has high wear resistance and can be machined to form using normal H.S.S. cutting tools. It does not give such a high erosion rate as copper or graphite. Available in small plates, thin sheets, rods and tubes from specialist EDM electrode suppliers. Best electrode material for EDM of tungsten carbide.

#### Silver Tungsten

This is used and gives marginally better results than copper tungsten but is more expensive and less readily available.

#### Tungsten

This has a very high wear resistance but its use is restricted to holes as it is only normally available in wire form and cannot be machined readily. Penetration rate poor.

#### Tungsten carbide

This has a high wear resistance and is available in small tubes. Very good for EDM of accurate, deep holes. Penetration rate poor.

#### Brass

This is readily available but has a high wear rate. Brass and graphite are the only electrode materials that EDM Titanium and its alloys. Negative polarity.

#### Aluminium Alloy

High silicon content is best. Can be cast to produce 3 dimensional electrodes cheaply for batch production EDM applications but has high wear and gives poor finishes. If power level set high eroded component particles can stick to the electrode diminishing performance.

#### Steel

This can be used as an electrode but only for small areas as removal rate and efficiency is poor. High voltage circuit only. Most common application is the bedding of split lines on plastic mould and die casting dies (using top of mould or die as electrode and bottom of die as workpiece).

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