

Not Causing My Wire Breaks!

What crazy things are you saying?



All too often we hear that the wire is breaking because of tensile strength. Or it is used as the only criteria for wire selection, Many EDMers, Salespeople and Service Technicians believe that the higher the tensile strength the less wire breaks they will encounter. This is true if you are running wire smaller than 0.0024" diameter. But for most of the EDM processes this is not the case. Since most, if not all, wire breaks occur BELOW the actual tensile strength of the wire this logic does not apply. It is a fallacy.

To prove this point. Put a spool of your wire on the machine, turn the tension up to the correct setting, turn on the wire spool, now sit and wait for the wire to break. You will need to go home before the wire breaks.

So tensile strength is not the most important factor in wire breakage.

Wire toughness or resilience is a better metric to use. Described as the ability of the wire to resist the hostile environment that occurs during the EDM process in the spark gap.

Let's talk about what is the EDM process in technical terms: It is the removal of material from two electrodes by vaporization along with the pressure dynamics as established in the spark gap by the collapsing of the plasma channel. Still today there are varying thoughts of what is really occurring in the spark gap. Currently there is not a definitive answer or agreement.

We do know what leads up to a wire breakage and some of the steps that can be used to reduce the occurrence.

As you know when EDMing, the wire leaves the workpiece smaller in diameter than when it entered. The cross section of the wire is reduced by spark erosion as it moves through the workpiece. This provides a considerable amount of stress to the wire. At the same time, craters are being burned into the wire, many larger than those on the workpiece. These craters become flaws in the wire and begin to create cracks reducing the fracture resistance of the wire. Toss in too much current, poor flushing, insufficient wire travel speed and secondary discharge and you will exceed the stress capability of the wire, resulting in a wire break.

Now we know that toughness not tensile strength is important in wire selection as related to wire breakage.

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