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Purpose

As you review this newsletter, I hope you can appreciate the time and effort it took to put this together.

Having been in this business for over 30 years I find that over the last several there has been a huge increase in bad, incorrect information and half-truths provided to EDM users.

My salespeople and I experience this every day with clients that have been completely misinformed. My family has and is in manufacturing here in the USA. I believe you become competitive by having solid, documented information to make solid business and manufacturing decisions.

Whether you buy from my company or not, I hope you can use this information to grow your business and bring some manufacturing back to the USA.

Fred A. Wisen

President

North American EDM Supplies Inc.

Filter Facts

As machines have become better at efficiency, faster in speed and closer in accuracy, the filter becomes a main player in the interaction.

The dielectric, whether water or oil, has several jobs it must do to make the edm process work. It must insulate the workpiece from the electrode, It must provide cooling and temperature stability during the cut and it needs to flush away the debris from the cut.

One of the biggest factors with the newer machinery is the gap has been reduced to increase surface quality but making much smaller "chips".

The smaller particles, if not removed, create havoc in the gap. These particles can cause premature sparking, low energy sparking, low quality surface finishes, wire breakages and the most expensive item: accelerated wear on all the internal machine components.

It is important to understand that using a cheap filter or a filter with a larger micron rating is not saving money. They may increase the filter life but at the expense of the machine components.

All edm machine manufacturers spend a lot of time issuing articles dealing with the maintenance of the edm. In every case, filters are a main focus. Unfortunately, the cost of not paying attention to the edm filter does present itself immediately. It is a slow death of the machine and the entire edm process. One which will exceed any cost savings that were thought to be gained.

You need to remember that your machine contains many very small and delicate components. All of which need to function quickly and repeatably. Further, your machine cuts with very definitive shape electronic pulses tuned to a clean machine. As the machine gets dirty these items send errant signals, fail to operate as designed thus reducing your accuracy, surface finish and performance.

Filter Terminology:

Absorption: The gathering in or soaking up of one substance into the body of another by molecular or chemical action.

Adsorption: The gathering of a dissolved substance on the surface or interface zone of another material.

Algae: Primitive organisms which are classified as plants, many microscopic, which become visible by multiplication causing trouble by blocking filters.

Colloids: Small particles that do not dissolve and remain dispersed in a liquid due to their small size and electric charge. These negative particles repel each other. This repulsion prevents them from settling.

Interface: The common boundary layer between two substances.

Turbidimeter: An instrument for measuring and comparing the turbidity of liquids by passing light through them and determining how much light is reflected by the particles in the liquid.

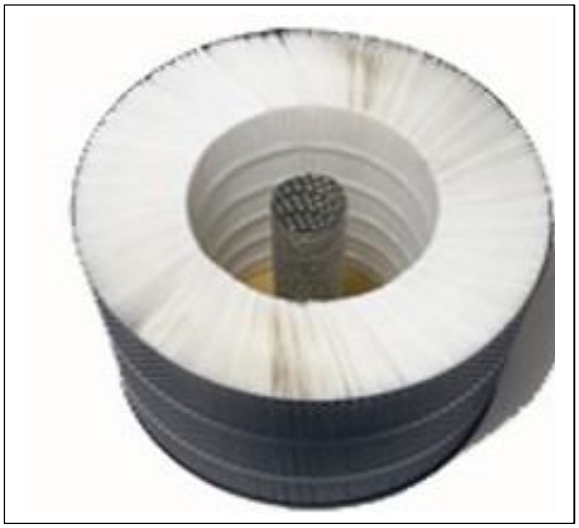
Filter Construction& Filter Media

When we talk filters the first consideration is the filter media being used. These can range from low end filters using a resin-impregnated cellulose to pleated / stacked paper, fiberglass, silicone-treated cellulose, micro-glass fiber, string wound, synthetic fibers to polyester. Including in some cases diatomaceous earth filters.

A lot of talk from salespeople these days deal with the amount of filter media in the filter. This is only 1 part of a filter's construction.

An important aspect of filter design is the pleat to area relationship along with the pleat depth and spacing.

The actual filtration takes place in the filter media. This filtration is considered depth filtration or deep bed filtration. In all edm filters performance is ONLY achieved after a corresponding amount of dirt has been processed and embedded into the filter media. This is true of all filters regardless of manufacture or liquid to be filtered. A number of filter manufactures attempt to hide this fact by providing a secondary wrap on the filter so that the initial "dirty" water is not apparent to the operator. Apparent or not it still exists until the filter reaches its performance



There have been many different approaches to pleating. From single bellows to M and W pleats, double bellows and triple bellows.

All of these have a common path; That is to increase the capacity of the filter. The capacity of a filter is determined by the volume of "dirt" the filter media can absorb in relation to the cubic feet of media in the filter and forms the basis of filter life and operating efficiency.

When we look at filters, we need to look at the filter media, the micron rating (absolute 5 micron = 5 micron or nominal 5 micron = 5 -7 micron), we need to understand the pleat type, pleat depth and the amount of filter media in our filter.

Lastly, what effect will our decision have on the longevity of the machine and current efficiency / profits.

Give me some Real World facts!

What do I need to know about filters?

The stability of your machine, the number of wire breaks, the surface finish and the speed of cut are all determined in part from your filters.

1) Metals like Aluminum, INCONEL alloys, and some coppers have a gummy characteristic. They tend to break off in larger “chunks” but they also tend to stick to each other. Making them very difficult to filter effectively or have any real filter life.

Regular tool steels tend to break in smaller pieces and can pass right through filters with larger pores. Basically, the effect is the same as running your machine without filters.

The difference between these two examples is a few microns. These particles act more and more like sand in your machine as time passes.

2) Anything larger than an **absolute** 5 micron filter in your machine is causing damage. Period.

Current machinery is generating particles down to 0.75 micron and lower. The ideal situation is to run a 0.2-micron filter however that would be both stupid and extremely costly. So, you have to make a choice between how much damage and how much cost. The consensus is an **absolute** 5-micron filter is the magic number, at this time. If you are running a 5 -7 or a 10-micron filter in your WEDM machine and not cutting aluminum, Inconel or a similar material, you are kidding yourself about filtration. On a sinker machine, we do not recommend over a 10-micron filter.

3) CHANGE YOUR FILTER BASED ON THE FILTER PRESSURE GAGE. Filter life is NOT determined by how many hours, how many weeks or water flow. All filters have a specific maximum pressure rating. DO NOT EXCEED THIS RATING. Most are at 2-1/2 bars of pressure.

4) The larger the wire size the larger the “chunks” generated. A 0.3mm wire will make larger particles than a 0.15mm wire.

5) Zinc coated wires, will in most cases decrease your filter life.

6) Large micron filter will cause the edming of your power feeds as the particles left in the water will spark on the power feed.

7) Most edm manufactures state filter life to be between 150 – 250 hours. If you are getting considerably more – it just means you are not filtering all the debris.

EYE ON IT

As machines become faster, accuracies more important, metals much more advanced; the role of the edm changing.

It is imperative that you stay competitive.

Unfortunately, many companies feel that buying a cheaper product is the way to save money and be competitive. Nothing could be further from the truth.

An edm is balancing act of theories. It must remain in balance. For every action there really is an opposite and equal reaction somewhere in the machine.

Cheap products have a high but hidden cost.

Let's Get Technical

A popular misconception is that particles are removed in the filtration process by physical straining. Straining is a term used to describe the removal of particles from a liquid (water /Oil) by passing the liquid through a filter whose pores are smaller than the particles to be removed, While the straining mechanism does play a major role in the overall removal process, especially in the removal of large particles, it is important to realize that most of the particles removed during filtration are considerably smaller than the pore spaces in the media.

This is particularly true at the beginning of the filtration cycle when the pore spaces are clean (that is, not clogged by particulates removed during filtration).

Thus, a number of interrelated removal mechanisms within the filter media itself are relied upon to achieve high removal efficiencies.

These removal mechanisms include the following process:

1) Sedimentation on the media (sieve effect)
2) Adsorption
3) Absorption
4) Biological Actions
5) Straining

As a note: The use of rust inhibitors, particularly oil / petroleum based will adversely affect all the above 5 factors and dramatically reduce your filter life.

CONCLUSION:

Your filters are an integral part of your edm machine longevity and performance. In this day and age, it's a fools adventure sending out quotes to 5 suppliers and buying the lowest price.

The quality of the products in the market today are from one extreme to the other. Name brands kept the name but not the quality. Many suppliers have no idea what they are selling but sell it on price. Ten years ago, many service people of today would not have lasted in their job a day; with their limited knowledge of the edm process and consumables.

You paid a high price for your machine. As a former machine tool distributor, I am sure you probably had test cuts done before buying, put isolation plates under your machine, you may even have added a buck booster and line conditioner. You have a considerable investment, so for this reason, I don't understand clients that buy the cheapest products they can find. Why go through all of that effort and time to lose all the benefits on cheap products?

There is a big difference between value and price.

If you have any question, comments or suggestion; please let me know.

I am available by phone (440) 918-3770 or by email Fredw@edmsupplies.com

References:,

Special thanks to, ProSource EDM Consumables

The following filter manufactures were invited to comment and/or provide input but did not respond: Dynamic Filtration, Refilco, Hoff Engineering and Quality Filters.

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Please send your comments, questions or ideas for future newsletters to Sales@edmsupplies.com