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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.



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What Is EDM Resin?

Resin consists of small plastic beads with very small capillary passages throughout.

Most resin used in EDM is "Mixed Bed". This consists of 2 resins the first is Cation holding a positive charge (Hydrochloric Acid) and an Anion holding the negative charge (Sodium Hydroxide * Caustic Soda). In some cases, the Cation is Sulfuric Acid. Sulfuric Acid is cheaper but has the potential to cause calcium sulfate fouling of the cation resin.

It is important to note that 60 -70% of the ion exchange capability of the resin is inside the beads residing in the capillary passages. This is a very important factor when we discuss cleaners and rust inhibitors.

Resin allows for the control of conductivity in the water system (Dielectric System). In EDMing, each material to be cut has potentially a different conductivity setting to achieve the best results in surface integrity, surface finish and speed of cut.

This need is adjusted with the conductivity control on the machine.

In its basic form the conductivity of the water determines the amount of power that must be held by the wire before it reaches a critical point of generating a spark. Too much or too little presents a poor cutting condition. IE: broken wire, poor surface finish, slow cutting times and unstable cuts.

Ions conduct electricity. Electrical current passes through water using ions as stepping--stones to pass current from one conductive ion to another. As a result, by measuring the electrical conductance of water it can tell us what the ionic content of the water is. Fewer ions in the water will make the passage of electricity more difficult. Therefore, water with a lower conductivity value is considered more "deionized" than water with a high conductivity value.

Sent to you by:

North American EDM Supplies Inc. www.edmsupplies.com (440) 918-3770

Heavy Metals you should be aware of:

Barium

EPA Allowable Amount

100.0 p.p.m.

Cadmium

EPA Allowable Amount

1.0 p.p.m

Chrome

EPA Allowable Amount

5.0 p.p.m.

Lead

EPA Allowable Amount

5.0 p.p.m.

Mercury

EPA Allowable Amount

0.2 p.p.m.

Selenium

EPA Allowable Amount

1.0 p.p.m.

Silver

EPA Allowable Amount

5.0 p.p.m.

Arsenic

EPA Allowable Amount

5.0 p.p.m.

You are ultimately responsible for the proper disposal of your resin or its treatment by-products forever. Your liability is unlimited by either dollar amount or time, even if its your vendor that violated the law.



Resin regeneration has come a long way since the 90's. In the beginning the quality and life of regenerated resin was at best poor. However, advances in technology and processes have changed dramatically. Regenerated resin today is very close to the quality and life of virgin resin and in some cases even better.

The basic process to regenerate resin is as follows:

- 1) Tank is emptied and washed out.
- 2) The resin is backwashed.
- 3) The cation and anion resins are separated.
- 4) The resin is regenerated and recharged using the chemical process of HCL and caustic soda. (Not all resin uses this chemical combination, but the process is the same)
- 5) The cation and anion is rinsed with pure water.
- 6) The resin is ready to be refilled back into the tanks, bags or bulk containers for use.
- 7) The wastewater for the regeneration process is neutralized by adjusting the PH

NOTE: This is where the difference in resin quality and cost is determined.

Regeneration OF Resin

Resin Regeneration



and adding a polymer to settle the heavy metals. The Water is pumped through a filter press to remove the heavy metals and the metals are disposed at a licensed certified lined land fill.

It is important to make sure your regeneration facility has an EPA Generator License Number. You as the user have cradle to grave responsibility.

RESIN SHOULD NEVER BE DISPOSED IN A TRASH / SCRAP CONTAINER OR DUMPED ONTO THE GROUND. Remember, you have cradle to grave responsibility. Improper disposal could subject you to EPA fines and possible jail time.



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.

Give me some Real World facts!

What do I need to know about my resin?

Out of sight – Out of mind, that's the role of edm resins. It just sits in the back on the machine.

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 resin.

There are several things you can do to extend the life of your resin and some things that will end it prematurely.

If you are getting your resin regenerated, which you should be, from the same company then the life and quality should be consistent. If it is not, then we need to look at what is occurring in the machine environment. The odds of bad resin, unless you have had it sitting on the shelf, is small.

One issue to look at, particularly during the summer, if you are topping

your di-tank with city water is chlorine. Chlorine is removed by the resin. You are depleting your resin every time you "top off". Distilled water is a better choice and much cheaper in the long run. Also, water from a well or trout stream is a killer to the resin.

OK, now we have good water, but we buy cheap or large micron filters. We save a dollar or two on the filters but now we turned our expensive resin bed into a secondary filter. Real life example: customer saved \$10.00 per filter; his resin life fell by ½. Cost to regenerate his particular tank \$ 185.00. He saved \$20.00 to spend \$90.00. Cheap, low end or larger micron filters (above 5 micron) are never a good deal, they will always cost you more in the end game.

Ok, now we have good water and the right filters in ..

the machine, but our machine is a bit dirty. We pull out the cleaner and we are ready to go. That is after we make sure there is no chlorine in our cleaner, we disconnect the drain hoses as we NEVER want that cleaner in our di-tank. It will destroy your resin and possibly oxidize your solenoids and valves. We recommend a phosphoric detergent based cleaner. Rinse well and then rinse again before connecting the hoses.

We are running well but have some rust. A rust inhibitor is a great thing if used correctly. Bruce from Nationwide stated, "My biggest concern is when rust inhibitors are used in the work tanks. When used correctly in the work tank it's not a problem, but I think some machine operators are just dumping it in guessing at the amount needed. Rust inhibitors will coat the resin beads and decrease the resin life greatly". Good Advice.

Let's Get Technical

The goal of deionization is to remove ionic dissolved salts and minerals from the water. By passing water through ion exchange resin, these sediments are removed from the water, effectively rendering it in a highly purified "blank state."

To produce the high-quality purified water with the maximum resistivity, mixed bed deionization is used, which should produce water quality of 16 – 18 megohm.

There are two types of mixed bed di resin – cation resin and anion resin. The cation resin will attract positively charged ions, such as calcium, sodium, magnesium, iron, manganese, hydrogen and potassium. The anion resin will remove negatively charged ions, such as sulfates, chlorides, carbonates, bicarbonates, nitrates, hydroxyl and silica.

There are three different types of deionization, and the types of resin used will determine the water quality. Here's a quick breakdown:

Weak base deionization: Using a strong acid cation and a weak base anion, the lowest quality of di water. (Resistivity of 50,000 ohms.) Used in spot-free car washes or window/glass cleaning.

Strong base deionization: Using a strong acid cation and a strong base anion, creates a mid-range quality di water. (Resistivity 200,000 ohms.) Used in manufacturing that doesn't require the highest quality purified water.

Mixed bed deionization: Using a 40/60 ratio of strong acid cation to strong base anion. (Resistivity of more than 16 megohms, or 16 million ohms.) Used in medical applications, research facilities, laboratories, biotech manufacturing, pharmaceutical and electronics.

Note: The lower the water conductivity the more "deionized" the water. IE: the less conductive.

CONCLUSION:

Your resin is an integral part of the entire EDM process. I hope that this newsletter provides some information that can be used to increase your resin life and in turn increase your machine up time.

Points to remember:

Dispose of your resin responsibly.

Know who is handling your resin regeneration.

Look at your make up water source

Keep cleaners out of the Di-tank

Use rust inhibitor according to manufactures specification.

Seriously look at resin cost and filter life to see if there is a correlation.

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 Bruce Iverson, Nationwide DI Water Solutions

other companies were invited to provide input and comments but failed to do so.

Presented for your enjoyment and information by North American EDM Supplies Inc.

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