



Zenith Ultrasonics

Waves at Work

85 Oak St., Norwood, NJ 07648-0412 Tel: 800-432-SONIC (7664) sales@zenith-ultrasonics.com www.zenith-ultrasonics.com

Ultrasonic Wire Cleaning for Annealing Ovens

Annealing ovens are commonly used in the wire and metal profile manufacturing industry to toughen the material and remove internal stress after forming. The wire must be perfectly clean to prevent build-up of carbon inside of the oven, and to prevent spots and discoloration from forming on the surface of the wire. Zenith's ultrasonic wire cleaning systems for annealing ovens will remove all contamination from the wire surface to prevent both of these issues from occurring using highly-efficient ultrasonic cleaning technology. Wire exits the annealing oven residue-free while simultaneously reducing the time and cost of servicing the annealing oven.

What is "ultrasonic cleaning?"

Ultrasonic cleaning is the introduction of high-frequency sound waves into a cleaning fluid to create millions of small bubbles known as *cavities* that cover any item submerged in the fluid and gently scrub it clean. These cavities are so small that they are not visible with the naked eye, and as a result of their size they have the ability to scrub the surface at a microscopic level to produce a level of cleanliness that is simply not achievable by any other technology such as spray washing.

Depending upon the frequency of ultrasonic system included, these bubbles are created and scrubbing at rates of 40,000-80,000 times per second. The material is not damaged in this process, and all contamination is quickly and completely removed very rapidly.



How is my material passed through the cleaning system?

The wire or metal profile is passed through the cleaning system horizontally and is not bent or redirected in any way. Spools of wire are typically positioned on the entry end of the cleaning system and existing pay-out and take-up equipment pulls the wire through the cleaning system.

The wire is loaded by simply passing it through a series of holes which are provided in the system. The number of holes which are provided depends upon the system purchased, but it is common for systems to include more than 10 wire ports which would allow more than 10 wires to be processed simultaneously. Loading a single strand of wire would take less than 10-15 seconds to perform.



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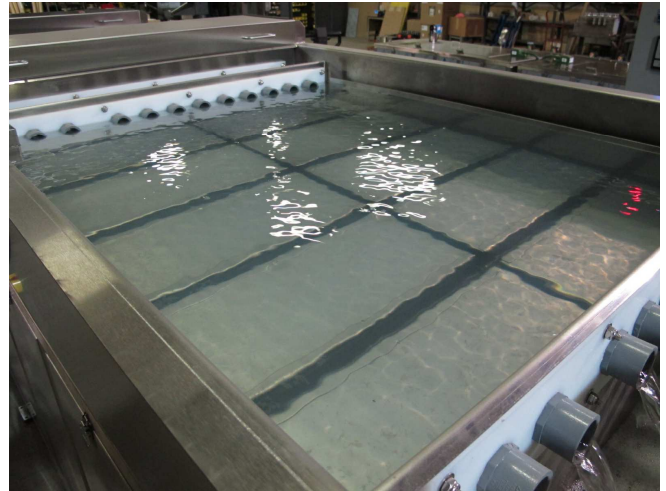
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What takes place as the wire passes through the system?

The wire or profile first enters the patented CROSSFIRE multi-frequency ultrasonic cleaning chamber where contamination is removed using biodegradable aqueous cleaning fluids. As the wire passes through the system, it is bombarded with bubbles that gently scrub the wire clean. Any floating oils or particles that are removed from the wire are directed to a holding tank which is equipped with filter and oil skimming systems that will remove the particles and oils from the fluid to extend its life and reduce waste disposal expenses.



After the wire exits the ultrasonic cleaning chamber, it passes through another small chamber where excess detergents are removed from the wire to prevent it from transferring into the rinse bath. This extends the life of the rinse water while simultaneously reducing the amount of fresh water that will be needed to maintain the quality of the rinse water.

Next, the wire enters the CROSSFIRE Ultrasonic Rinsing Chamber where ultrasonic systems are used again to remove any remaining detergents from the wire. This will prevent detergent residues from burning into the surface of the wire as it passes through the annealing oven.

After rinsing, the wire is dried using air knives which remove the rinse water leaving a perfectly dry product that is ready to be passed through the annealing oven. Wire exits the system perfectly and spotlessly clean.

What liquids are used in this system?

The liquid used in the ultrasonic cleaning chamber is a mixture of alkaline detergent and water. There are many detergents to choose from, each of which is suitable to a particular type of oil or contaminant that is being removed. The liquid in the rinse chamber is simply tap water.

How much does the detergent cost and how long goes it last?

To charge a 10-wire ultrasonic cleaning chamber with a 10% concentration of detergent typically costs about \$300.00 depending upon the detergent being used.

The amount of time that the detergent lasts would depend largely upon how contaminated the wire is but detergents commonly last 2-4 months or more before requiring replacement in facility that runs wire through the system 24 hours a day 7 days a week.



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How would I dispose of the process liquids?

Many Zenith customers use a waste water evaporator to evaporate the majority of the waste generated by this equipment. Over 95% of the liquids used in this equipment is simply water and the cost of evaporating the water is significantly less than the cost of traditional disposal methods. In addition, the system is equipped with a pump drain system which would allow operators to drain the liquids to the evaporator or other waste collection point using control switches.

Does the system emit hazardous fumes or odors?

No odors or hazardous fumes are emitted when aqueous cleaning agents with no volatile organic compounds are present. Only water vapor will be emitted and this can be greatly reduced if optional process area covers are included that will cover the ultrasonic cleaning chambers.

Is this system easy to maintain?

This system requires very little maintenance. Operations includes replacing filter cartridges when needed, replacing cleaning fluids and cleaning holding tanks during fluid replacement, draining the skimmed oil collection container, and blowing out the ultrasonic generators annually using clean and dry compressed air. Maintenance is made easier by the very design of the equipment itself. Holding tanks and filter cartridges are easily accessible, tank bottoms are sloped to drain nearly completely, filter systems will alert operators when maintenance is needed, and all other components are positioned at locations where easily accessed.



What does my facility require for installation?

You will need to position the equipment where required, connect electrical power (any voltage is available), connect a pressurized water line for filling of the holding tanks, and attach drain connection to the drain pump.

Does Zenith guarantee system performance?

System performance is guaranteed for a specified time period if the customer takes advantage of Zenith's Lab Testing Service. Zenith cleans 12" lengths of wire contaminated with the same contamination that requires removal by the full-scale cleaning system under conditions which closely match those that will be found in a full-scale system. Samples are then returned to the customer with a lab report which details the process completely. If the samples are acceptably cleaned, the system is guaranteed to produce the same or better results as those on the tested samples as long as the system is operated in accordance with Zenith's recommendations and the system is maintained properly.



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Not only will this prove that the technology will work but will also allow Zenith to develop the entire process for you, including detergent to use, detergent concentration, optimal operating temperatures, wire residence time required and more. The only costs associated with this testing is shipping of the materials to and from our location in Norwood, NJ.

What standard sizes does Zenith offer?

Zenith has annealing oven wire cleaning systems that can process 1, 9, and 14 wires simultaneously as standard equipment. However, if one of these sizes does not suit your needs, then Zenith will custom-manufacture a system that does, and there is no additional charge for customization at Zenith Ultrasonics. Each facility is different with regards to the number of wires that require simultaneous cleaning, equipment layout already installed in the facility, and available space. Zenith will design your equipment to your specific needs, and this can reduce costs significantly. Why buy a 9-wire cleaning system when you only want to clean 5 wires? By custom manufacturing a 5-wire system, you will save on the initial purchase price, electrical consumption, water consumption, and detergent consumption while simultaneously reducing the cost of the equipment. In addition, the system components can be positioned and connected in a way that doesn't require that any existing equipment be moved or altered in any way.

What is my next step?

Contact Zenith Ultrasonics directly to discuss your specific needs and possibly set up and test cleaning of your material. We will ensure that the machine delivered to you will meet your every need and will produce the cleaning results you require.

Standard Equipment Features

- Multiple Wire/Profile Capabilities
- CROSSFIRE Multiple Frequency Ultrasonic System
- Automatic Back-up Flow Pumps
- Automatic Liquid Level Maintenance
- Particulate Filtration Systems with Maintenance Alerts
- Oil Skimming Systems
- Pump Drain System to pump waste to preferred location
- All stainless steel construction
- Air-knife Drying Systems
- Touch-screen Human/Machine Interface
- Ultrasonic & Heat Liquid Level Protection
- Immersible Leading Edge Protection
- Immersible Cavitation Erosion Protection
- Ultrasonic Power Intensity Controllers
- Digital Rinse Resistivity
- Light Signal Tower with Alert Horn
- NEMA4X Control Enclosure
- Designed specifically for your plant layout and available space