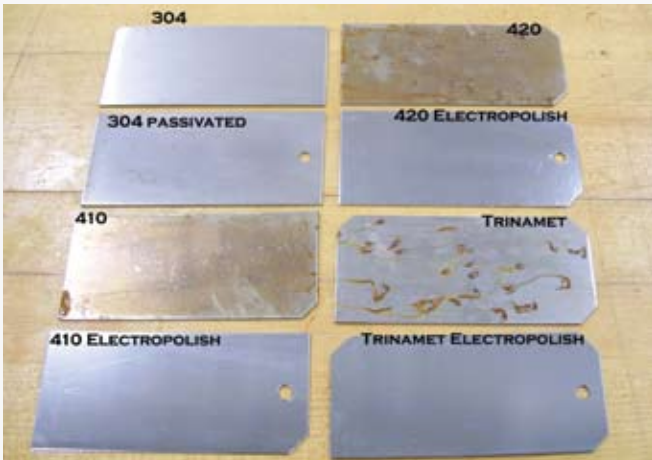


Metal Finishing White Paper:

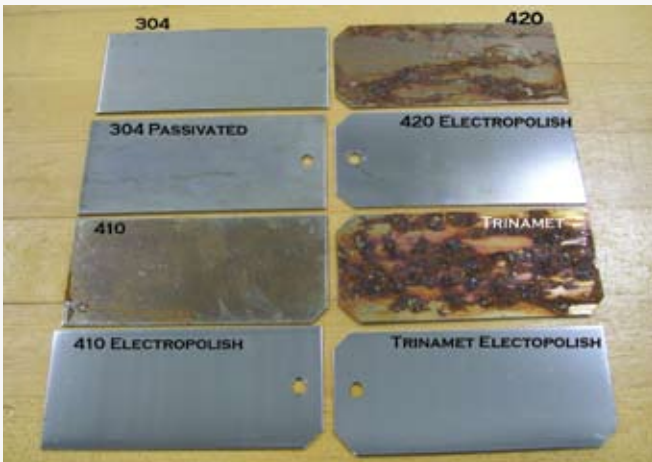
Electropolishing to improve corrosion protection.



After 2560 hours salt spray - Passivated (left), Electropolished (right).



After 24 hours ASTM B-117 salt spray testing.



After 888 hours ASTM B-117 salt spray testing.

Case Study 1:

The samples shown on the left were submitted to the ASTM B-117 salt spray test by an independent laboratory. These photos show how the electropolished stainless steel samples have a superior corrosion protection compared to the raw parts. Stainless steel applications that require high resistance to corrosion for food, semiconductor and biopharmaceutical equipment often specify electropolishing. The electropolished parts shown here have no visible signs of rust even after 888 hours of exposure to salt spray.



The parts pictured above are made from type 303 stainless steel. After a series of machining operations, the parts needed to be decontaminated to remove imbedded steel and other impurities.

Under 40X magnification using the scanning electron microscope, you can see the passivated part is actually rougher, due to the chemical attack of the 303 stainless steel by normal passivation. In contrast, the electropolished part is smooth and clean. By carefully monitoring the amount and rate of metal removal, electropolishing dissolves the surface skin and its impurities, including impinged steel flecks and other contaminants.

Services Provided:

We are **ISO 9001:2008** certified. Additionally, we are a certified **ISO 13485** vendor for Medical device parts as well as a certified vendor for dozens of manufacturing companies in industries from Aerospace to Semiconductor.

Electropolishing: Our proprietary reverse plating technique offers solutions to a wide variety of metal surface problems. Brighten, deburr, size and passivate your parts all in one operation.

Passivation: An acid cleaning process designed to remove free iron from the surface of corrosion resistant steels. ABLE passivates per the ASTM A967 specification, as well as many other industry and customer-specific standards.

Contract Cleaning: Able provides contract cleaning services on metal parts from vapor degreasing to complex customer specific cleaning specifications.

Titanium Electropolishing and Color Anodizing: Deburr, passivate, and improve surface finish on your parts while providing easy identification through color coding.

Laser Engraving: Our on-site laser engraving department can engrave almost any part with whatever information is required, saving a step in the production of finished parts.

Bake-Out: Electric Blue M over to bake-out parts in Oxygen-free atmosphere.

Custom Packaging: Many packaging options are available depending on your requirements, from bulk to sealed Nitrogen purged bags

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Electropolishing

Advanced Metal Improvement Technologies



Raw Part after 72 hours in salt spray



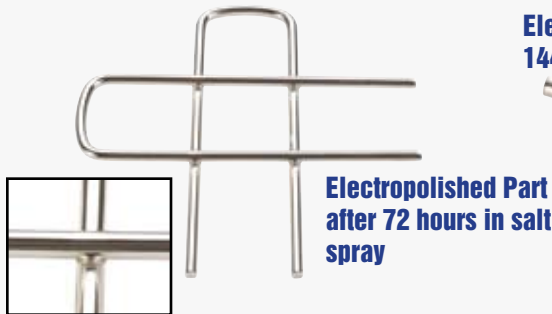
Raw Part after 144 hours in salt spray



Passivated Part after 72 hours in salt spray



Passivated Part after 144 hours in salt spray



Electropolished Part after 72 hours in salt spray



Electropolished Part after 144 hours in salt spray

Case Study 2:

To portray the benefits of passivation versus electropolishing, we subjected two sets of parts to the ASTM B-117 salt spray test at an independent testing facility. The test parts included a formed auger made from 430 stainless steel and a wire weldment fabricated from 304 stainless steel. The testing was performed on each part in the raw, passivated and electropolished state.

The pictures (below on the right) show the auger after 144 hours of exposure in the salt spray cabinet. As you can see, after 144 hours of exposure, the raw and passivated parts show advanced red corrosion on the extremities and in the hole. The electropolished part exhibits light red corrosion at the extremities and shows the superior corrosion resistance gained with the use of Able's electropolishing process.

After 72 hours of exposure to the salt spray, the raw and passivated wire weldment parts (below on the left) developed red corrosion in the resistance welded areas. The electropolished part showed no visible corrosion after 144 hours of testing.

Electropolishing is effective in treating the carbide precipitation condition that occurs in the heat affected zone during welding. It also improves the chrome to iron ratio on the surface which greatly improves the corrosion resistance.

One of the most common applications for electropolishing is to enhance corrosion resistance on a wide variety of metal alloys, specifically stainless steel. Electropolishing is quickly becoming a replacement process for a long established treatment: passivation. Passivation is a chemical process that has been used for years to help restore contaminated stainless steel to original corrosion specifications.

Applicable to ALL grades of Stainless Steel. Since electropolishing removes surface metal, all surface impurities are removed as well. Heavily contaminated surfaces such as machined parts, welded or brazed assemblies or other components that typically respond poorly to passivation alone are good candidates for electropolishing. Unlike passivation, 300, 400 series and precipitating grade stainless steels can be electropolished without distortion, flash attack or hydrogen embrittlement.

Anti-corrosion solution for many alloys. Just as electropolishing is used to enhance corrosion resistance on stainless steel, it offers corrosion resistance on other alloys as well. Many companies use the process to delay or retard the corrosion properties of copper, brass, aluminum and carbon steels. On these and other alloys, the removal of surface skin and impurities enhances the corrosion resistant properties of the component. For components needing light corrosion resistance that cannot afford an expensive plating operation, electropolishing may be a solution.

Works where passivation does not. Several popular grades of stainless steel cannot be passivated due to low levels of chromium and nickel. When these stainless steels are passivated by standard methods, the resultant flash attack actually weakens the base material and does irreparable damage to the part.

By dissolving surface metal, we remove deeply imbedded contamination, reduce surface area and remove the false or amorphous layer that is produced by grinding, machining, stamping or lapping metal. Less imbedded contamination, less retained surface moisture means less chance for corrosion to begin. Our process is approved under ASTM B912, and is approved by many of America's largest companies.

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