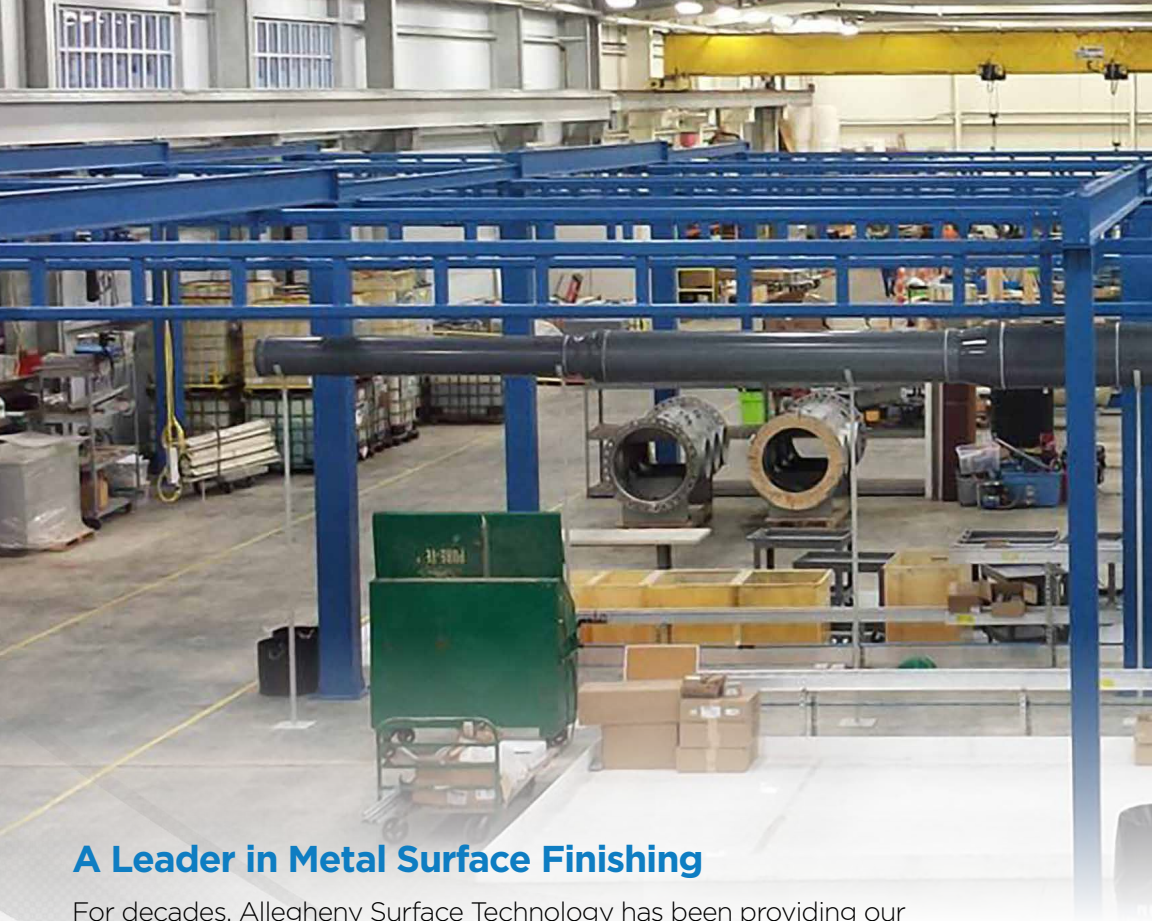


www.alleghenysurface.com

A LLEGHENY
SURFACE TECHNOLOGY





A Leader in Metal Surface Finishing

For decades, Allegheny Surface Technology has been providing our customers with outstanding service in electropolishing, pickling, passivation, and mechanical polishing. Allegheny Surface Technology will develop the best solution for your application. We currently process components for the pharmaceutical, chemical, food & beverage, electronic, architectural, and automotive industries.

We distinguish ourselves by our exceptionally high standards of customer service, workmanship, quick turnaround, and high level of commitment and dedication.

Our production services range from one of a kind custom parts to repetitive production runs.

At Allegheny Surface Technology, our Quality Assurance Department guarantees that all of our processes are controlled and repeatable, which assures our customers that the agreed upon specifications and criteria are met, and if possible, exceeded.

We recognize the importance of our service to customers, and we are aware that this is a partnership that relies heavily on each other, and when executed to its fullest potential, will ensure a successful future for both parties.



ALLEGHENY

SURFACE TECHNOLOGY

The Right Solution

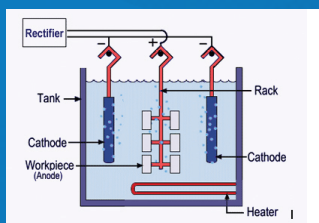
Regardless of the size and complexity of your product, we will find the right solution. If your application is too large to be shipped to us, we will come to you. One of our many on-site crews is ready to travel anywhere in the United States. Their expertise includes new installations and restoration of existing equipment to keep your project or production on track.

If you are a new customer inquiring about a sample, call us at (866)-266-9293 for more information.



ELECTROPOLISHING

Electropolishing is an electrochemical process that removes surface material by attacking the high points on the surface. The surface becomes smoother as contaminants and free irons are removed. This will enhance the corrosion resistance of austenitic metal, while also reducing in some applications product adhesion and contamination buildup. Sharp edges will be deburred and frequently a lustrous and reflective finish can be achieved if so desired.



Electropolishing is performed by submerging an electrically conductive work piece into a temperature controlled electrolytic bath. The work piece is connected to the positive terminal of a rectifier supplying DC at low voltage and high current. The negative terminal of the rectifier is connected to specially designed cathodes to enable proper current flow

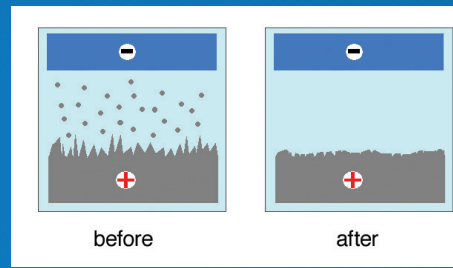
from the work piece through the electrolytic bath to the cathode. Applying electric current to the setup will start the electropolishing process. The electric current will depart the work piece through numerous peaks (high points) in the material and dislodge metal particles from the surface, dropping them into the bath or plating them onto the



cathode. The electrolytic bath contains acids which facilitate the dislodging of the particulates, similar to the pickling process. Therefore the combination of the single directional electric flow and the acid creates a superior passivity on the austenitic metal in comparison to pickling and passivation. The longer the current is applied the more material will be removed.

The design and placement of the cathodes, the design of the rack holding the work piece, and the number of contact points on the work piece are critical to ensure a uniform finish.

Allegheny Surface Technology has continuously developed its expertise in electropolishing for more than two decades. Our employees are constantly looking for improvements to product surface finishes. These process improvements were incorporated into the process flow of our new state of the art facility, built in 2013. Proper electropolishing demands both consistency of the electropolishing solutions and precise electric current transfer through the parts.



ADVANTAGES OF ELECTROPOLISHING

- **ELECTROPOLISHING** decreases the surface roughness without creating directional lines and creates a lustrous surface. Corrosion resistance will be improved by removing contaminants introduced to the surface during the manufacturing process and handling of the part. Electropolishing also leaves a nickel-chromium enriched surface layer that enhances the metallic properties of stainless allowing the protective oxide layer to form.
- **EASE OF CLEANING** By attacking the high points, electropolishing levels the surface of the material; thereby reducing unwanted product adhesion and contamination build-up. Therefore, cleaning can be performed more efficiently and effectively.
- **ELECTROPOLISHING** has been proven to reduce bacterial biofilm build-up, appearance of rouging.
- **DE-BURRING** Electropolishing is well suited for de-burring. The electropolishing process naturally has greater current densities at high points and less at low points. Due to the higher current densities at the high points, the burrs dissolve at a much faster rate, leading to a smooth clean surface.
- **AESTHETICS** Through proper electropolishing, the microscopic surface becomes smooth and clean, containing a nickel-chromium enriched surface that results in a lustrous finish. This facilitates a visual inspection, since any remaining imperfections will be magnified.



PICKLING / CHEMICAL DESCALING

Pickling is a metal surface treatment used to remove impurities, such as stains, inorganic contaminants, rust or scale from stainless steel. A solution containing strong acids, is used to remove the surface impurities.

Allegheny Surface Technology offers Pickling / Passivation services. We can pickle passivate inside or outside a tank, depending on the size of your product.

Pickling or chemical descaling is but one of several pretreatment steps available for preparing an article for further processing such as passivation or electropolishing, or to perform a superior cleaning operation on welded structures.

Pickling is the removal of oxide layers resulting from welding and heat-treating.

Pickling is the chemical cleaning of metallic surfaces in order to remove impurities, stains or scale with an acidic solution. Allegheny Surface Technology uses pickling solutions consisting of nitric and hydrofluoric acids to remove the scale and underlying chromium depleted layers to restore the corrosion resistance of stainless steel.

Mechanical removal of those imperfections may leave abrasive material or other particles embedded in the surface and in some applications mechanical polishing may be impractical. Pickling is considered the preferred solution for the restoration of the corrosion resistance in stainless steel. Pickling will further create a uniform dull finish on the work piece.

Allegheny Surface Technology is also capable of performing localized pickling. For those applications, pickling pastes, where the solution is mixed with an inert carrier, are used to treat selected areas such as welds. Examples are parts that just need welds cleaned up or parts which have other than stainless steel components as part of the assembly.

Our new facility has a containment area for the processing of large components. This enables us to process nearly any part that can be transported to our facility. If this is not feasible, we can deploy our on-site crews to perform this treatment at your facility.

For some applications electropolishing may be preferred to pickling. Metal removal is achieved by applying electric current to a part submerged in an electrolytic bath. Electropolishing typically creates a bright, smooth and more highly corrosion resistant finish.



BEFORE



AFTER

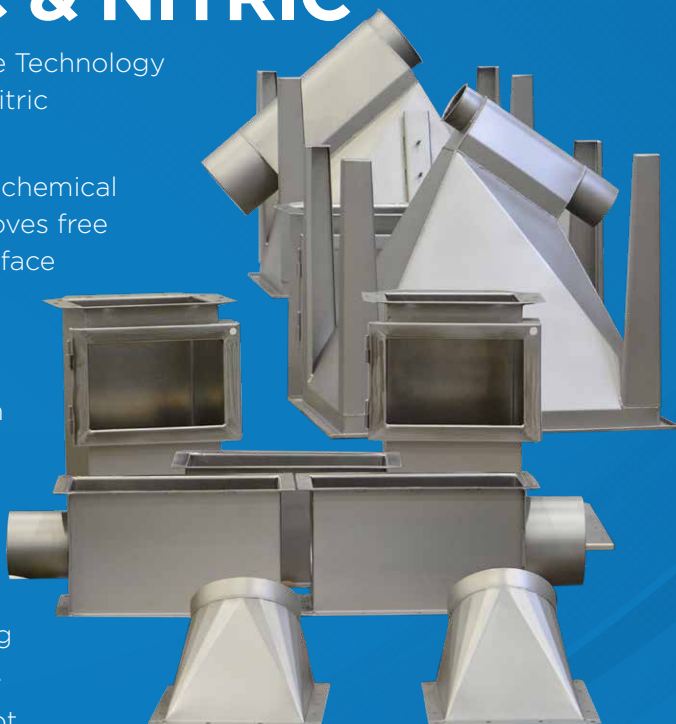
PASSIVATION/ CITRIC & NITRIC

Allegheny Surface Technology offers citric and nitric passivation.

Passivation is the chemical process that removes free irons from the surface of stainless steel.

This creates a chromium rich surface which can form an invisible inert (passive) oxide layer as soon as it is exposed to an oxygen-containing environment (air).

Passivation will not change the appearance of the stainless. If the stainless has been heat treated or welded, the resulting scale or discoloration must be removed by either abrasive methods or by pickling. Passivation will not cause any change to the surface roughness. To verify the effectiveness of the passivation, Allegheny Surface Technology applies saline, copper sulfate, and ferroxyl testing to ensure a successful passivation. The highest form of



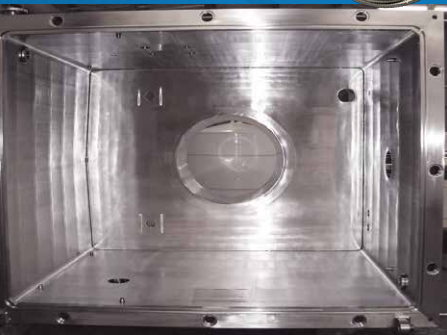
passivation is electropolishing. Electropolishing is an electrochemical process. Due to its more aggressive nature, it results in a more prominent passive surface than nitric or citric passivation.

We can handle almost any size and shape. If you can't send it to us, we will come to you. We passivate vessels, pipes, tubing, manifolds, enclosures, and frames and architectural components, just to name a few.

MECHANICAL POLISHING

Mechanical Polishing is the mechanical smoothing and removal of contaminants. It involves grinding, polishing and buffing of the surface. This process is used to smooth out welds, prepare metal surfaces for electropolishing or provide a surface with a specified roughness.

Allegheny Surface Technology employs experienced and highly skilled craftsmen who have the training and certification to perform at any facility.



Our state of the art polishing facility and equipment enable us to consistently achieve your surface requirements, as fine as single digit R_a readings. We are able to work on OEM parts as well as refurbished used vessels and equipment in-house and on-site.

Allegheny Surface Technology can also perform compound - free mechanical polishing, a requirement in several pharmaceutical applications.

The techniques available are:

- Abrasive belt polishing
- Abrasive wheel polishing including nylon, flap and combination wheels
- Automated and hand polishing equipment
- Custom machinery for OD and ID polishing of tubular work pieces.

ON-SITE SERVICES

Allegheny Surface Technology offers turnkey on-site services to address your refurbishment needs. These services may include: vessel or tank repair, electropolishing, passivation and mechanical polishing. Each of our on-site teams will follow all federal, state, and site-specific safety regulations. All necessary inspections and testing will be performed and documented. We pride ourselves on efficient and professional work habits.

Each of our on-site teams are led by a qualified Allegheny Surface Technology Site Coordinator. The coordinator implements the work plan. The coordinator is the customer liaison for progress reports, paper work, and general communications.

Each on-site technician has completed all OSHA required training needed to perform the work at your site. Safety training is completed annually and is reviewed before each job to ensure a complete understanding of the requirements and possible hazards associated with your job and facility.

Upon arrival at the site, Allegheny Surface

Technology technicians will meet with the customer contact. Technicians will work the agreed upon time frame to achieve the desired finish detailed in the scope of work.

All necessary inspections will be performed and documented by our on-site quality representative or third party inspector. Necessary testing to ensure equipment meets all standards will be performed and recorded. A documentation package will be issued within the agreed upon time frame.

ON-SITE SERVICES

- Electropolishing
- Mechanical polishing
- Citric passivation
- Complete vessel refurbishment
- ASME code welding
- Vessel assessment
- Level II inspection
- Liquid penetrant testing
- Surface measurement readings (R_a)
- Borescope inspections
- Documentation package & mapping



VESSEL INSPECTION



Vessel Refurbishment is the process of returning your used vessel to a “like new” condition. On-site services can include any or all of the following: project

management, vessel assessment, certified ASME code weld repair or vessel modification, mechanical polishing and electropolishing.

Allegheny Surface Technology offers extensive on-site services designed to address your refurbishment needs. We bring our equipment and expert technicians right to your location, perform the necessary work, provide complete documentation and certification of all repairs and modifications. When our on-site team completes the job, your equipment is in “like-new” condition, ready to go. On-site services can include any or all of the following:

Project Management under the direction of an experienced on-site Coordinator.

Vessel Assessment to evaluate the condition of your equipment:

- Visual inspection
- Ultrasound testing
- Liquid penetrant testing
- Profilometer measurement of surface finish
- Borescope inspection and videotaping
- Complete documentation including mapping of imperfections and problem areas
- Qualified level II

Certified ASME code weld repair or vessel modification Mechanical Polishing by experienced polishers

Chemical Cleaning and Passivation Electropolishing using a proprietary process that address both environmental and safety concerns

Documented and Certified Processes Component Replacement Safety Compliance including technicians with all required OSHA training



TECHNICAL INFORMATION

At Allegheny Surface Technology we meet standards set by the following to better satisfy the needs and expectations of our customers.

ASTM B 912

ASTM A 380

ASTM A 967

ASME BPE 2015

AMS 2700

Whatever your surface finish requirements, AST is the one stop shop. New or used, your place or ours, we'll finish the job in time for you to do yours.

Note: The chart to the right is to be used for reference only. Material and processes can and will affect results.

Grit#	R _a Microinch Mechanical Polish	R _a Microinch Electropolish
60	80-140	60-130
80	50-75	30-65
120	35-45	20-40
150	25-40	15-35
180	20-30	10-25
240	15-25	8-20
320	10-20	5-18
400	<10	5-10
500	<7	3-7

π is approximately equal to 3.14

Radius = diameter / 2

1ft³ = 7.481 gallons

1ft³ = 28.23 liters

1 gallon = 3.785 liter



ALLEGHENY

SURFACE TECHNOLOGY

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