



Electropolishing

Improve Finish, Fit & Function

70

YEARS

WHITE PAPER

Electropolishing for Safer, Cleaner, More Durable Medical Parts

2001 S. Kilbourn Ave, Chicago IL 60623
888.868.2900 | sales@ableelectropolishing.com
WWW.ABLEELECTROPOLISHING.COM

High Stakes and Opportunities



The cleaning of medical devices can be a complicated, high-stakes process with multiple opportunities for error, even when protocols are followed meticulously.

The growth of antibiotic-resistant bacteria like methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Staphylococcus* (VRSA) have brought new urgency to the effort, which has been described as a “systemic challenge” bigger than the shortcomings of any single device or process.

That’s why the concept of incorporating “cleanability” into the design of medical devices is seen as such a critical – and promising – area of focus.

Devices engineered to make cleaning processes more effective, while impeding the growth of harmful pathogens in the first place, are at the frontier of efforts to eliminate the threat.

Electropolishing, a precise finishing process that can leave metal parts for medical devices with a microscopically smooth surface finish that resists bacterial adhesion, is increasingly built into the specifications as device designers and infection control researchers try to find the solutions and opportunities that lie between device design, pathogen-resistance and cleanability.

Electropolishing for Safer, Cleaner, More Durable Medical Parts



The cleanability of medical implants, instruments, and other metal devices is critical to patient safety and health.

Metal parts that contain burrs, fissures or surface defects left behind in the machining process can trap liquids, bacteria and debris, initiating the growth of pathogens and making devices more difficult to clean.

By eliminating these common surface imperfections, electropolishing impedes the growth of dangerous pathogens and provides important visibility into design flaws that make devices more susceptible to bacterial growth.

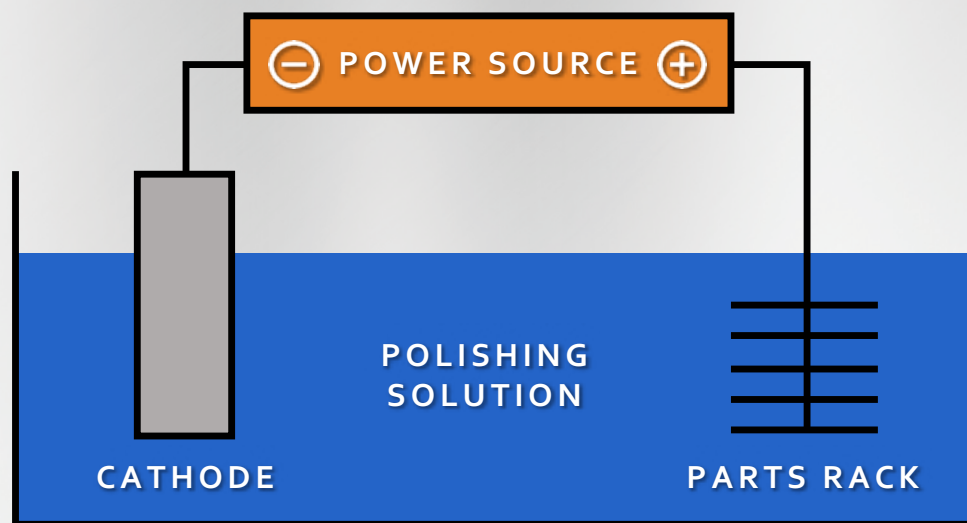
Electropolishing uses a modified electrical current and a blended chemical electrolyte bath to remove a microscopically precise amount of surface material, leaving behind an ultrasmooth surface that impedes bacterial growth, resists corrosion and makes cleaning more effective.

That's why medical device manufacturers frequently rely on electropolishing for metal parts used to make medical and surgical devices and instruments, as well as medical implants.

How Does Electropolishing Provide A Smooth and Pathogen-Resistant Surface?

Also known as “reverse plating,” electropolishing combines electrical current and a chemical bath to precisely eliminate metal surface imperfections, often improving the finish, fit and function of a part.

The signature bright, shiny finish of electropolished parts is prized in many industries for its aesthetic appeal. But for medical device manufacturing it’s a shine with a serious purpose, making reusable medical devices, along with parts for devices like orthopedic and cardiovascular implants more durable, cleanable and resistant to pathogen growth.



The resulting bright surface is what helped give electropolishing its name

METAL REMOVAL



METAL IMPROVEMENT



Electropolishing can be used across a wide variety of metals and alloys used in medical device manufacturing, including:

- 316L stainless steel
- Cobalt chrome
- Nitinol
- Titanium
- Other alloys used in medical device manufacturing
- 17-4 PH, 17-7 PH
- 300 series stainless steel
- 400 series stainless steel
- Aluminum, copper, steel, and other alloys

Cleanability Challenges

In a study of reusable duodenoscopes, over 5% of sterilized tools contained pathogens like *E. coli* and *Staphylococcus aureus*, highlighting the ongoing cleaning challenges associated with reusable medical devices.

While antibiotic-resistant bacteria have compounded the difficulty, electropolishing provides a finish that resists bacterial attachment and makes cleaning more effective, with a microsmooth finish that can reduce the risk of:



**IMPLANT
REJECTION**



**PREMATURE
FAILURE**



CORROSION



**BIOCOMPATIBILITY
ISSUES**



**SURFACE
CONTAMINATION**

The Able Electropolishing Process:

Getting Your Parts to Market Quickly, with Consistent High-Quality Results

Here is an overview of the Able Electropolishing process our customers rely on to ensure that their metal parts get to market quickly, cost-effectively, free of surface defects and with improved finish, fit and function.



PART REVIEW

We'll set up a Teams call to review your part drawings and designs to confirm that electropolishing will meet your needs and work with your engineers to establish the parameters needed for the highest quality results.

[Learn More](#)

PROTOTYPE PROCESSING

Once we have established the specifications for your part, we move into Prototype Processing, where we test electropolishing on sample parts and do a thorough quality review. During this phase, we determine critical parameters like stock removal and racking techniques.



PREPRODUCTION PROCESSING

In this phase, we process a larger lot to replicate a full production scenario, ensuring everything—down to handling and packaging—is accurate and achieves the precise results required. It's a vital step for establishing quality control measures and for demonstrating consistency before moving to full-scale production.

PRODUCTION LAUNCH

Part specific steps include:

- Incoming Inspection
- Precleaning
- Electropolishing
- Rinsing & Drying
- Outgoing Inspection
- Final Packaging (from wrapping in foam to bulk packaging based on your needs)

Our team is committed to the highest standards of metal finishing excellence at every step.

[Learn More](#)



Cleanability Starts with Design



While electropolishing is often one of the last steps in the manufacturing process, it's a process that provides insight into potential design flaws and can even be more effective when cleanability is designed into the part at the outset.

Our customer engagement steps work to prevent design flaws that can impede the finishing process. We work closely with our medical clients to ensure compliance and safety at every step in the process development, helping to deliver medical device parts with improved finish, fit and function.

These steps take advantage of the precise visibility that the electropolishing process provides into design features that trap liquids – flaws that are often revealed in the rinsing and drying process. By working with our experts in the prototyping phase, medical device designers gain insights into features that work against the goals of cleanability and pathogen resistance.

These can include:

- Metal to metal contact
- Rivets
- Blind holes
- Small cavities or narrow through-holes
- Porous metals
- Spot welding, weld slag and weld scale
- Welded components vs. sub-assemblies that can be broken down
- Solid rod vs. tubing

It's a collaborative process that holds great promise for improving patient safety and reducing product recalls and one that Able has been fine-tuning – in collaboration with clients from a wide array of industries – for decades.



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ABOUT ABLE ELECTROPOLISHING INC.

As the world's largest provider of electropolishing, Able uses state-of-the-art technology, including robotic automation, to deliver consistently exceptional results for medical device manufacturing.

To learn more about electropolishing for medical parts, read our technical guide: [Metal Finishing for the Medical Industry: Improving Sanitation, Performance and Safety](#) — or contact us through the link below.

SEND US YOUR PART TO PROCESS FOR FREE

The best way to determine if electropolishing is the best solution for YOUR part is to send us a sample. We will electropolish it for FREE and send it back to you in a few days.

[Click here to take advantage of our free sample offer.](#)



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