

#1098 — Electropolishing Titanium Parts for the Medical Industry

INDUSTRY:

Surgical/medical

MFG/METHOD:

Thread rolling/machining

ALLOY:

Titanium (Ti-6AL-4V)

PROBLEM:

Machining and thread rolling can be dirty processes, and often embed cutting fluid and shop dust into a part. In the case of the parts pictured above, friction and heat from the thread rolling operation causes a black discoloration to form on the threads.

The client tried multiple solvents and solutions in ultrasonic cleaning tanks to remove the black, amorphous layer created by thread rolling, but none of these metal finishing attempts worked. The part is used in a medical application, and would not be acceptable in this condition. Besides its dark and grimy appearance, the parts could potentially corrode prematurely because of embedded contamination from tooling, and the dirty surface is more likely to harbor bacteria than a clean, smooth surface. Before moving forward with the final machining operations to finish the part, the client needed an economical and consistent way of removing the discoloration and contamination in its threads.

Before:



After:



SOLUTION:

Electropolishing titanium parts like these is a popular choice in the medical and surgical industries, as it provides the corrosion resistance, clean, smooth surface, and pristine shine that other metal finishing operations cannot. This is because electropolishing allows us to remove a controlled, uniform layer of surface material, eliminating embedded contaminants and discoloration in the process.

We electropolished samples with the minimum amount of material removal required in order to clean and passivate the part. By electropolishing the titanium, we removed approximately .0005" total material from the part's diameter (.00025" per surface), providing a consistent finish that would be acceptable for a part used in a medical or surgical setting.

In addition to cleaning the threads, electropolishing titanium and other alloys reduces the coefficient of friction, creating a better finish on the thread—this can reduce galling and provide a better-functioning finished part.

Note to Engineer : Complex and expensive assemblies do not lend themselves to bulk finishing methods. Those assemblies often are finished with poor uniformity and/or become warped or distorted by the harsh media or overloading of parts. Hand finishing on parts like these can be very expensive with tedious and expensive hand cleaning of crevices to remove polishing compounds. In cases like these, balancing the efficiency of mass finishing with the quality of hand finishing often yields the best results.

