holdson
DYNAMIC ELECTROCHEMICAL SOLUTIONS

RENISHAW
apply innovation™

Ti6Al4V

CASE STUDY

ELECTROCHEMICAL POLISHING

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CASE STUDY

THE CHALLENGE

Holdson was approached by Renishaw, a leading manufacturer of 3D printing technology, to explore the surface finishes achievable using electrochemical polishing.

Renishaw tasked Holdson with processing a promotional bottle opener printed using their laser powder bed fusion (LPBF) technology, testing both matte and shiny finishes to evaluate the range of achievable results. Renishaw left the scope open-ended, simply aiming to assess the potential of electrochemical polishing.

This collaboration reflects the growing demand for streamlined, turnkey solutions that seamlessly integrate with 3D printing workflows. By eliminating the need for extensive pre-processing and manual finishing steps, electroform™ presents a viable pathway for improving the efficiency and sustainability of post-processing in metal additive manufacturing.

Input surface finish	8.1 µm Sa
Manufacture method	PBF printed
Material	Ti6Al4V

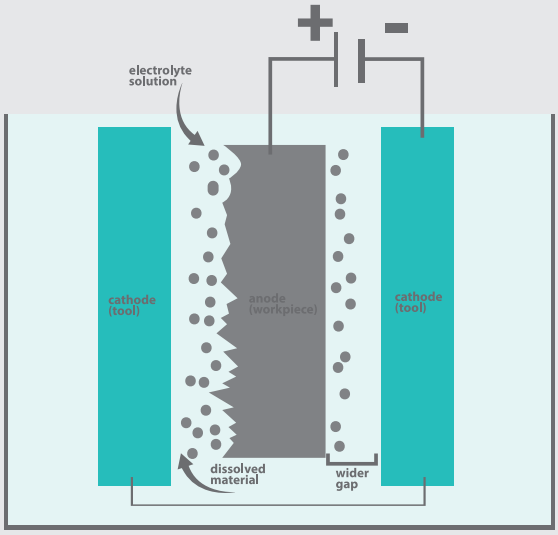
PRE-POLISH SAMPLE

THE SOLUTION

Renishaw sought to evaluate the versatility of electrochemical polishing in achieving different surface finishes tailored to the needs of various industries. Its primary objective was to assess whether electroform™ could deliver both matte and shiny surface finishes while allowing for controlled and uniform material removal.

Holdson processed the titanium bottle opener part using the ef-150 machine and its custom-formulated ef-Ti electrolyte, designed to enhance material removal on titanium surfaces.

To ensure uniform and consistent material removal, the process began by uploading the CAD model of the part into Holdson's proprietary machine control system. The shiny and matte parts were polished on separate cycles, selecting the correct parameters from the integrated control software to achieve the differing finishes. The parts were then submerged in the electrolyte bowl, where Holdson's advanced Computational Fluid Dynamics (CFD) technology optimised fluid flow to direct clean electrolyte across the part's surface. This ensured even material removal and eliminated inconsistencies that are common in other post-processing methods.



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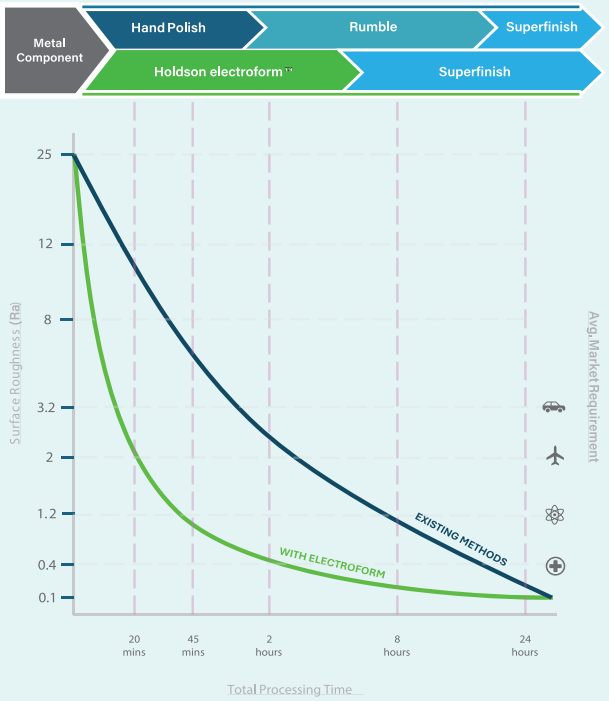

Holdson's process allows for the acceleration of processing times, reducing cost and increasing throughput of post-processing for metal components.

Compared to traditional steps and competitors, Holdson's system can take a metal component at any input roughness and provide a rapid surface improvement within 20 minutes.

THE RESULT

Holdson successfully reduced the surface roughness of Renishaw's titanium part, achieving a polished finish of 1.19µm Sa in a 20-minute cycle for the shiny finish and 1.03µm Sa in a 30-minute cycle for the matte finish.

POST-POLISH SAMPLE

Desired finish	Input surface roughness	Output surface roughness	Actual cycle Time
Shiny	8.1µm Sa	1.19µm	20 minutes
Matte	8.1 µm Sa	1.03µm	30 minutes

The results demonstrated the versatility of electrochemical polishing in achieving different surface textures based on application requirements. The ability to control surface removal and refine roughness levels ensures that manufacturers across multiple industries can tailor post-processing to their needs, whether prioritising aesthetics, functionality, or performance. Holdson's ef-150, combined with its ef-Ti electrolyte, delivered a repeatable and efficient solution for enhancing AM titanium components.

To experience the results of electroform™ for yourself, contact us today at: sales@holdson.co.uk.

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THE RESULT

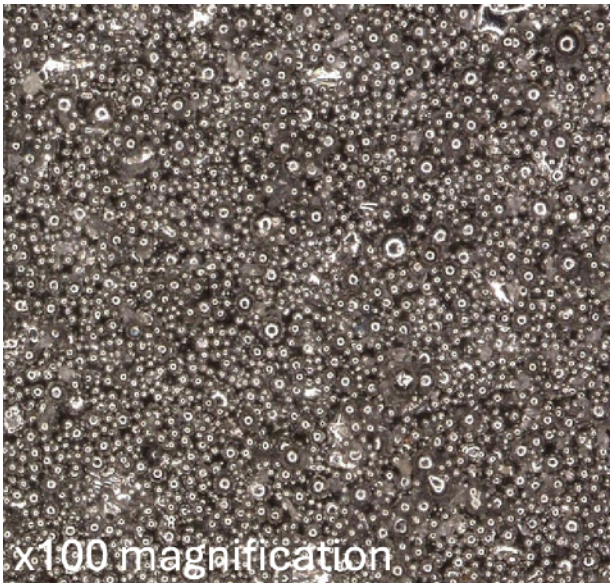
Pre-polish

Matte polish

Shiny polish

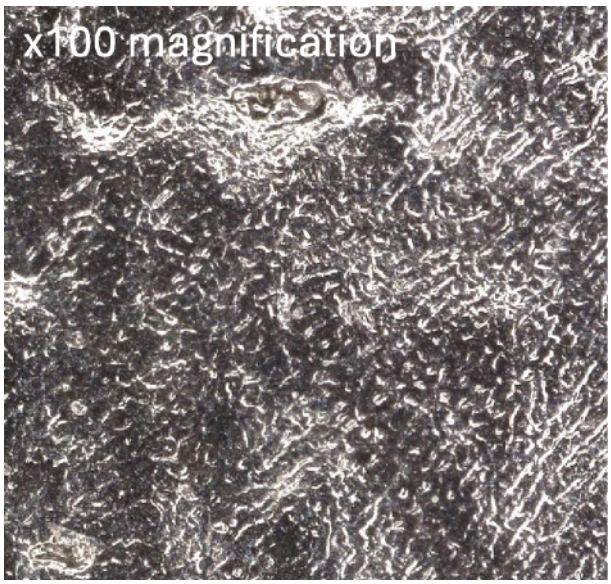
PRE-POLISH SAMPLE

= 8.1 µm Sa



POST-POLISH SAMPLE

= 1.19 µm Sa (shiny)



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