



TUNGSTEN

ENERGY CASE STUDY ELECTROCHEMICAL POLISHING

THE CHALLENGE

Tungsten is renowned for its extreme hardness, brittleness and high melting point, making it a valuable material for advanced energy applications - but also one of the most difficult to finish post-print. An energy company working at the forefront of next-generation power systems approached Holdson to explore whether our electroform™ process could polish tungsten tensile samples to an application-ready finish.

Their objective was to validate our technology's ability to smooth and refine tungsten parts ahead of more complex trials on mission-critical energy components. Traditional post-processing methods had proven either ineffective or too aggressive for tungsten, often damaging the integrity of the parts.

Through early discussions, it became clear that any process used would need to deliver significant roughness reduction while preserving the geometry and tensile structure of the parts.

Input surface finish	13 µm Sa
Manufacture method	SLM printed
Material	Tungsten



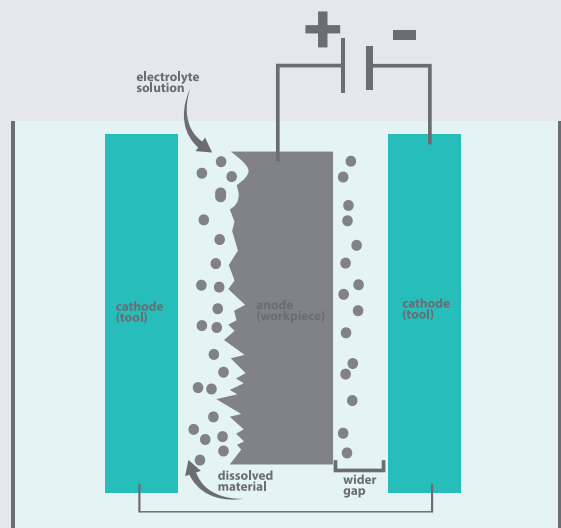
PRE-POLISH SAMPLE

THE SOLUTION

Holdson's electroform™ technology was selected for its ability to polish ultra-hard metals using a non-contact, acid-free process that preserves geometry and mechanical properties. The tensile samples were processed using Holdson's ef-300 machine, applying a custom electrolyte formulation developed specifically for refractory metals.

CAD data for the parts was uploaded into the control system, and polishing cycles were run at 20 and 45 minutes. Throughout each cycle, the ef-300's advanced CFD system ensured even flow of electrolyte over the surface of the samples, supporting precise, repeatable material removal.

For metrology, both Alicona G5 and Bruker Contour GT interferometers were used to assess surface finish. Measurements were taken at both macro and micro scale to evaluate the real-world impact of the polishing process.

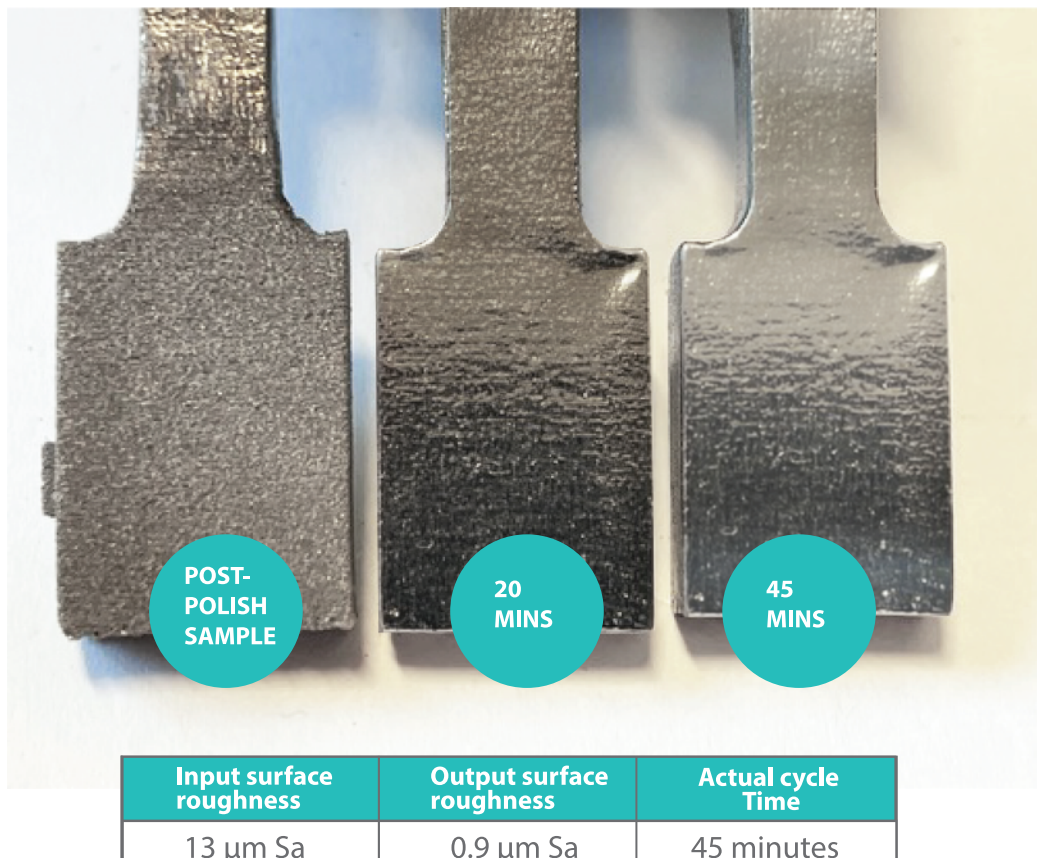


THE RESULT

The results demonstrated a significant and consistent improvement in surface finish across both macro and micro roughness parameters.

- Surface area ratio was reduced from 63% to just 4.5%, indicating dramatically lower real surface area and reduced friction potential.
- Micro roughness (Sa) improved from 13 μm to under 1 μm .
- Surface slope (Sdq) reduced from 1.6 to 0.35, indicating smoother surface gradients and improved fatigue resistance.

These improvements were achieved without any manual abrasion, mechanical stress, or compromise to the parts' dimensional stability. **The 45-minute cycle fully met the energy client's targets** for surface integrity and validated electroform™ as a viable solution for polishing tungsten.



Having successfully proven the effectiveness of electroform™ on standardised tensile samples, the customer is now progressing to trials on more complex tungsten energy components.

To test electroform™ on your most challenging materials, get in touch with us at sales@holdson.co.uk.

THE RESULT

