TECH OFFER

Electropolishing of Additively Manufactured Stainless Steel Parts

KEY INFORMATION

TECHNOLOGY CATEGORY:
Manufacturing - Chemical Processes
Manufacturing - Additive Manufacturing

TECHNOLOGY READINESS LEVEL (TRL): TRL4
COUNTRY: SINGAPORE
ID NUMBER: TO175377

OVERVIEW

Polishing stainless steel parts with internal channels remains a challenge when aiming for high-quality surface roughness and tight tolerances. Mature technologies often fall short in this area, and traditional polishing methods can also be expensive to set up. Surface finishing is a persistent issue across all metal additive manufacturing (AM) processes, directly impacting part quality and limiting applications. This challenge is particularly pronounced in AM compared to conventional methods due to the inherently rough surface finish and the frequent use of hollow or lattice geometries.

The presented technology offers a potentially more cost-effective, high-quality, and scalable solution for polishing internal channels of 316L stainless steel. It enables rapid, automated improvement of both internal and external surfaces, enhancing appearance, corrosion resistance, and mechanical properties.

The technology provider is open to R&D collaboration where proof of concept for specific applications can be explored. During deployment, guidance on set up and training can be provided. Target audience are additive manufacturers who are interested

license and implement this technology to perform electropolishing in-house. The technology owner is also looking to work with product owners or OEM who are interested to implement this technology into their production workflows.

TECHNOLOGY FEATURES & SPECIFICATIONS

The set up consist of:

- Customised chemicals
- Electrodes
- Other apparatus that work together to polish the surface and internal channels of metal parts

Specifications:

- Surface Roughness: Minimum surface roughness achievable as low as Ra = 1.0 µm, with surface roughness reduction of 91% (tested on 2205 duplex and 316L stainless steels, applicable to austenitic and ferritic stainless steels)
- Channel size: 5 mm or greater
- Maximum part size: 200mm

POTENTIAL APPLICATIONS

This technology can be implemented in industries that require precise, repeatable, high-quality metal parts or polishing of typically inaccessible surfaces. It is suitable for automation for improved productivity. Applications includes:

- Precision engineering
- Aerospace e.g. propellers
- Medical e.g. surgical tooling and jigs
- Oil and gas e.g. impellers
- Chemical
- Electronics
- Food and beverage
- Other applications that require polishing of stainless steel channels

UNIQUE VALUE PROPOSITION

Compared to traditional polishing methods for stainless steel channels, this technology is more superior due to below reasons:

- Better surface roughness
- Better tolerance for internal channels
- Potentially more cost effective compared to methods that require high pressure settings
- Better corrosion prevention with passivation
- Eliminates laborious manual residual powder removal during post-processing process for additive manufacturing
- Proprietary process avoids the use of perchloric acid and flammable solvents, and ensures complex internal geometries are uniformly and optimally polished