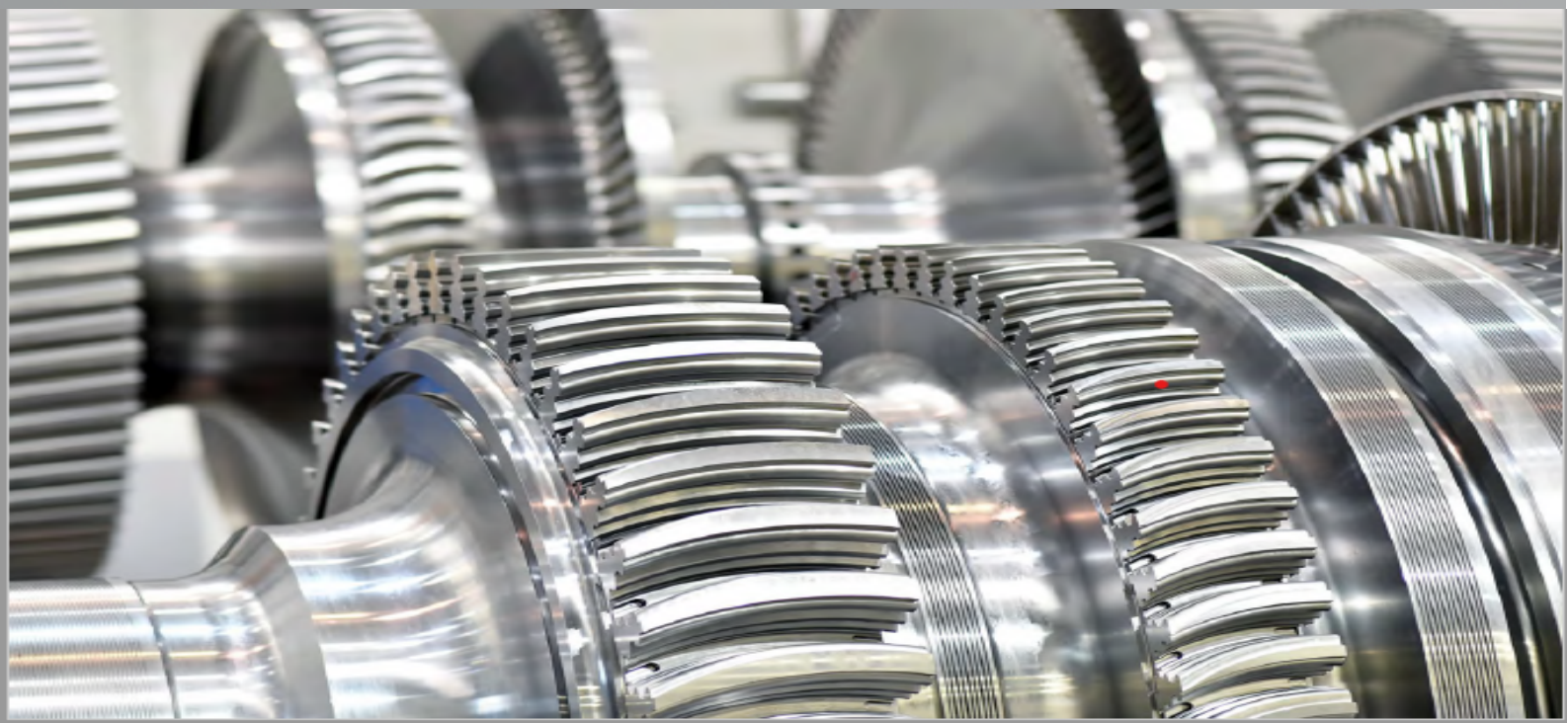
Dry electropolishing equipment for high performance and superior finishing applications

Pakistan Institute of Additive Manufacturing

The Metal Surface Finishing Revolution in Pakistan



Dry electropolishing

The Dry Electropolishing system differs from conventional polishing methods in its ability to achieve a uniform, mark-free finish on any surface and geometry, without causing micro scratches, and deliver a mirror finish while respecting the tolerances on the piece being processed. The equipment meets various surface finishing requirements of the industry, production quantities, and piece dimensions.

The following finishing processes and range of materials can be processed in DLyte ensuring production performance, and achieving target cost, lead time, and quality.

FINISHING PROCESSES

- Precision finishing
- Smoothing
- Mirror finishing
- Deburring
- Corrosion resistance
- AM post-processing

RANGE OF MATERIALS

- Cobalt Chrome
- Stainless Steel
- Carbon Steel
- Nickel Alloys
- Aluminium Alloys
- Titanium Alloys

Fields of application

A variety of industries use dry electropolishing to meet the unique surface requirements of their components.

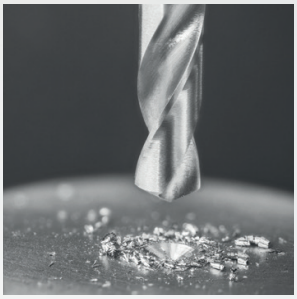
01. Aerospace

02. Automotive

03. Dentistry

04. Food & pharma

05. Medical device



06. Toolmaking

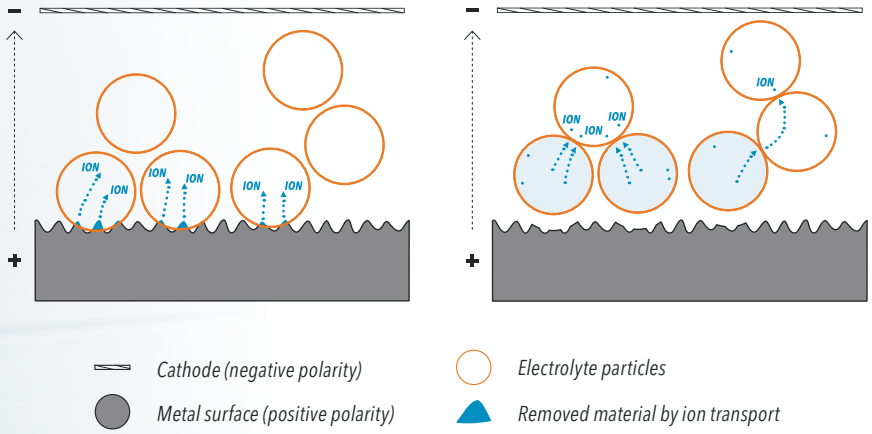
07. Jewelry & fashion

DryLyte Technology Process

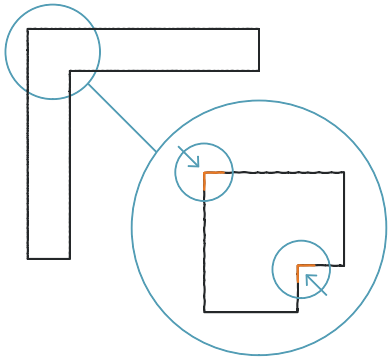
The DryLyte Technology used in the dry electropolishing machinery DLyte, is a patented technology for grinding and polishing metals by ion transport using free solid bodies. In DryLyte the liquid acids are replaced with a set of tiny solid spheres of a non-conductive polymeric material capable of retaining liquid electrolyte and conducting electricity while removing the oxides produced during the electropolishing process.

It works by combining the electrical flow created by a high-precision rectifier with the movement of the pieces through the dry media. This results in an ion exchange and **removal of material only from the peaks of roughness. The process does not round edges** and can access corners that are not easily accessed mechanically.

DryLyte®



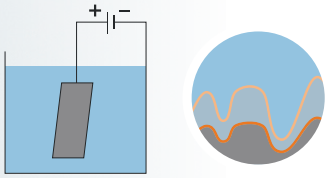
Cathode (negative polarity)
Metal surface (positive polarity)
Electrolyte particles
Removed material by ion transport



The process does not round edges and can penetrate the internal cavities of the piece.

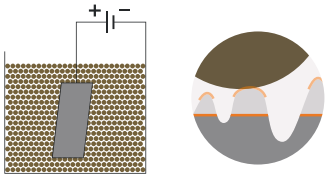
Comparison with traditional processes

LIQUID ELECTROPOLISHING



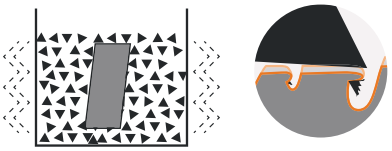
+ All surfaces contact liquid
+ General oxidation
+ Low discrimination

DRYLYTE TECHNOLOGY



+ Spheres contact on roughness peaks
+ Localized oxidation
+ Selective removal of metal
+ Geometry preservation
+ Improved corrosion resistance

ABRASIVE FINISHING



+ Plastic deformation of roughness peaks
+ Inclusion of broken abrasive
+ No improved resistance to corrosion
+ Rounding of peaks and geometry harm

Technical benefits

01. HOMOGENEOUS RESULTS WITH CONSISTANT REPEATABILITY

DLyte delivers consistent results across the surface, eliminating micro scratches, unlike abrasive polishing. This system operates effectively on both micro and macro levels and provides stable outcomes for multiple batches throughout the life of the electrolyte media. Additionally, there is no physical wear, as seen in abrasive particle methods.

02. GEOMETRY PRESERVATION

It respects the tolerances and preserves the initial shape, even the cutting edges. It does not round the edges as there is no mechanical abrasion of the surface.

03. BEST-IN-CLASS SURFACE ROUGHNESS

DLyte significantly reduces roughness by 80%, while avoiding negative effects. Liquid electropolishing only reduces roughness by 50% with the risk of unwanted side effects like orange peel or pitting.

04. LOW MATERIAL REMOVAL IN COMPARISON TO OTHER POLISHING PROCESSES

The DLyte process removes material only from roughness peaks as the diameter of the particles is bigger than the roughness profile.

05. BIOCOMPATIBILITY PROVEN

DLyte only uses a combination of polymeric particles and acids to enhance surfaces. It has proven the biocompatibility of the products processed with its technology.

Biocompatibility of the Process Test Study
DLyte has proven the Biocompatibility of the products processed with DLyte System. The product can be considered non-cytotoxic. The study has been made according to the specifications of standard UwNE-EN-ISO 10993-5:2009.

06. IMPROVE THE CORROSION RESISTANCE

DLyte is the only technology that drastically **removes roughness, and enhances the corrosion resistance of metal pieces,** while reducing the number of manufacturing processes required.

Corrosion Resistance Test Study
The results of the study show that DLyte achieves better corrosion resistance than liquid electropolishing. The dry EP sample corrodes slower than the traditional EP sample.

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