

# DLyte technology

Customer Care Department





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# 1. DryLyte technology

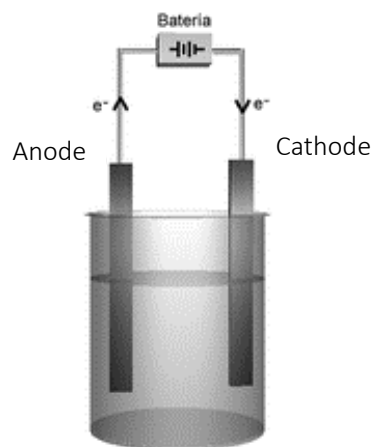
# DryLyte technology

State of the art

**Electrolysis** → Nonspontaneous redox reaction

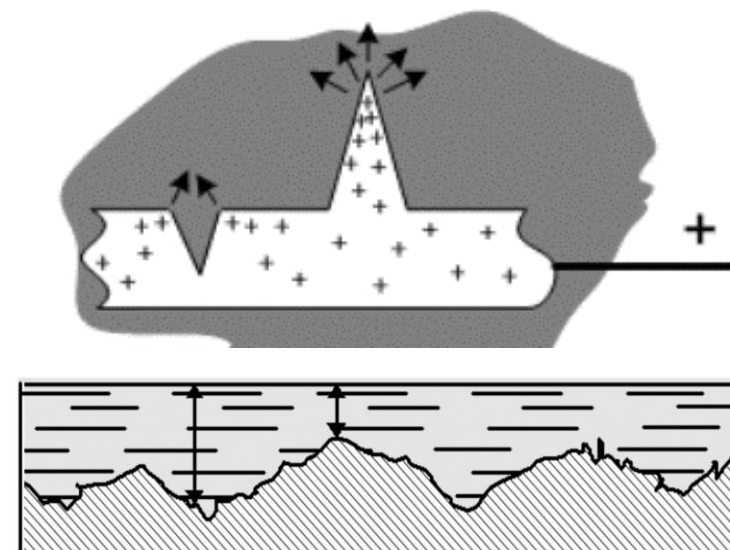
- Electrical contact → Electrons mobility
- Electrolyte → Ionic mobility
- Anode (+) → Oxidation process → Loss of material
- Cathode (-) → Reduction process → Material gain

**Electropolishing:** Electrolysis of a material (anode) with the main goal of reducing superficial roughness



**Note that:**

- ✓ Roughness peaks are preferably polished due to higher current density
- ✓ An ionic diffusion layer is created



# DryLyte technology

State of the art

**Pulse/Pulse reverse:** Changes on polarity cycle

Benefits:

- Avoid dangerous acids
- No pitting on passivate materials
- Controlled process

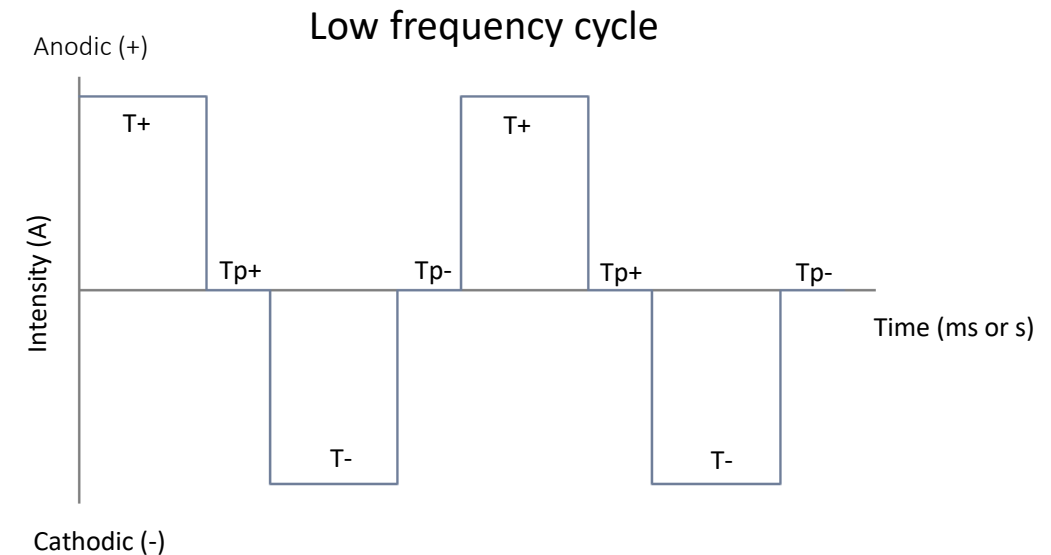
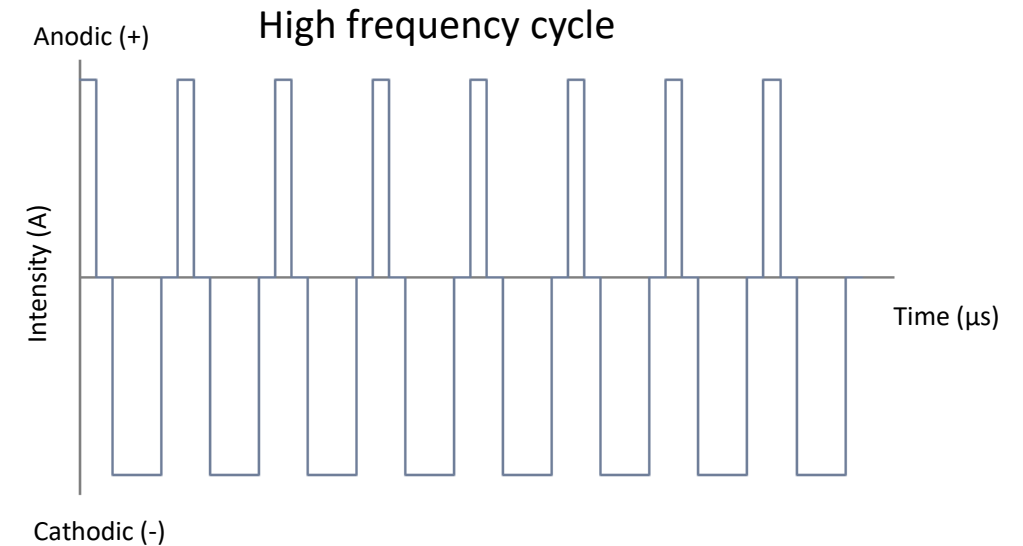
**Main concepts:**

*T+* Positive polarity time → Material removal

*Tp+* Pause → Electrolyte homogenization

*T-* Negative polarity time → Depassivation

*Tp-* Pause → Electrolyte homogenization



# DryLyte technology

State of the art

## Low Frequency Cycle

- ✓ More time to let the electrical field to establish
- ✓ Quick roughness removal
- ✓ Focus on macroroughness
- ✓ More penetration in difficult areas



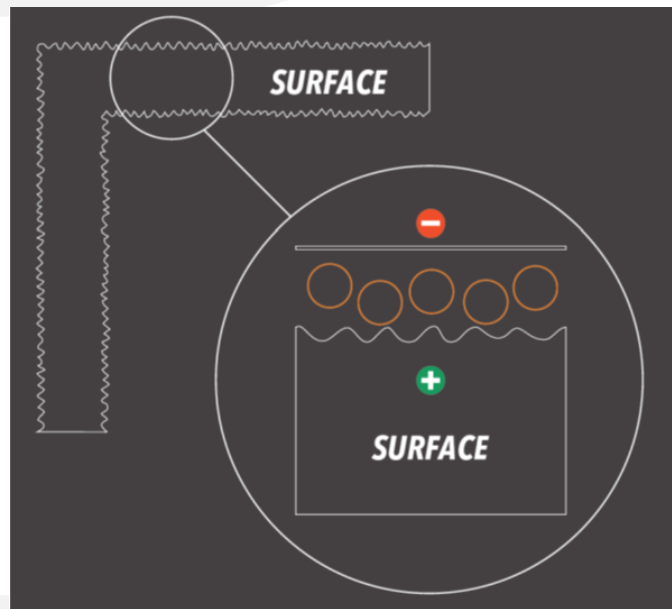
## High Frequency Cycle

- ✓ Less time to let the electrical field to establish
- ✓ Slow roughness removal
- ✓ Focus on microroughness
- ✓ Mirror finishing + bright results



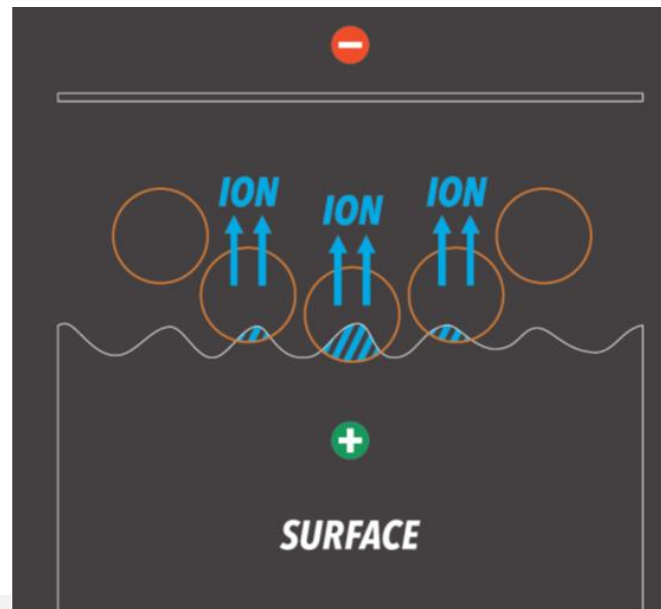
# DryLyte technology

## Basics



### General Situation:

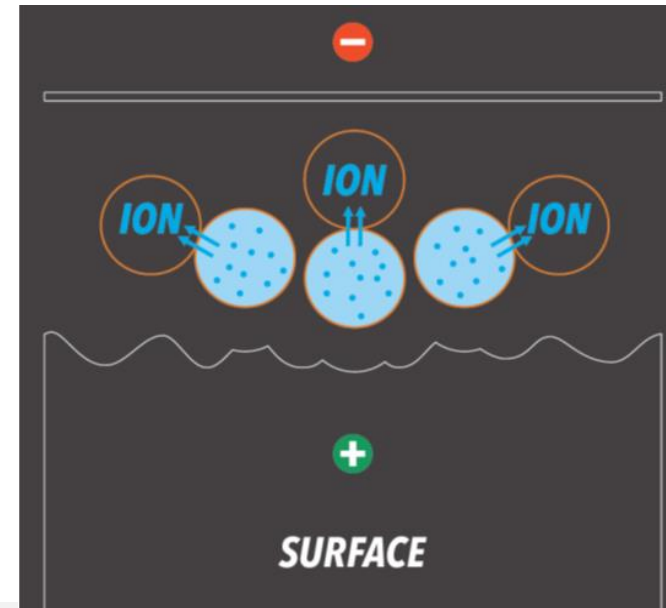
Solid particles from electrolyte contact the surface of the part. Due to its spherical geometry, they have direct contact with the peaks of roughness



### Positive Polarity Time (T+):

1. An oxide layer is created on the surface ( $M_x O_y$ ).

It can be understood as the oxidation of the surface

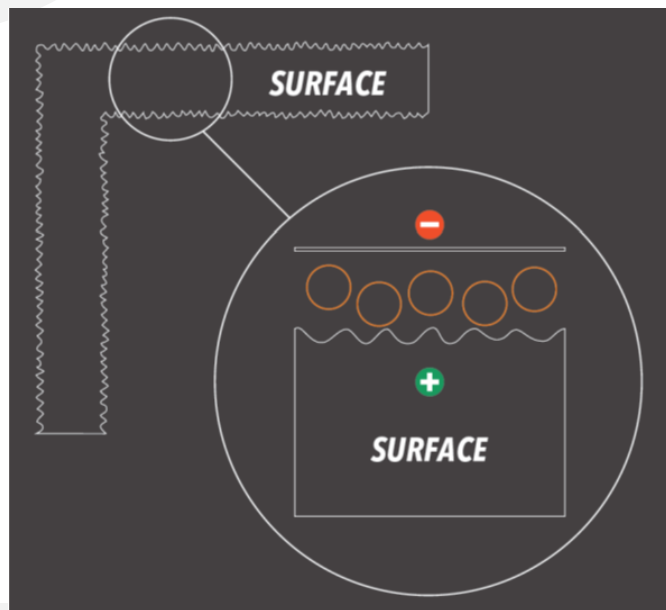


### Pause Time (Tp+ / Tp-):

During pauses, cationic interchanges occur between particles by diffusion. Homogenization is reached with the aid of mechanical movements and vibrations

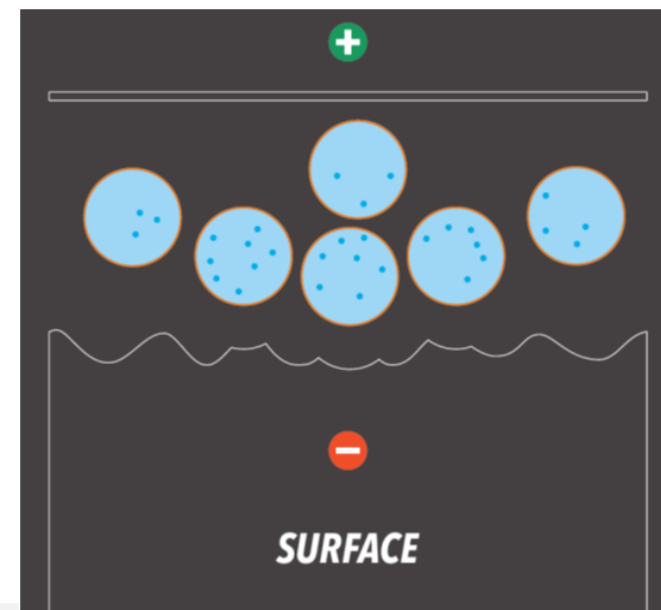
# DryLyte technology

## Basics



### Polarity change:

Polarity changes: the part that was acting as the “anode” behaves as the “cathode” after the pulse reverse. Meanwhile the TiPt mesh that was acting as the “cathode” behaves as the “anode”.



### Negative Polarity Time (T-):

1. The oxide is solubilized ( $M^{V+}$ )
2. Metal cations are trapped by the solid particles ( $M_xSO_y$ )


It can be understood as the reduction of the surface




# DryLyte technology

## Benefits

**1** Respects the tolerances and preserves the initial shape even the cutting edges




**2** Achieves homogeneous results across the surface and eliminates micro-scratches




**3** Avoids contamination on the surface




**4** Increases resistance to corrosion



**5** Fully automatic polishing to a mirror finish in one step



**6** Ability to process without programming (specially important for AM)





# DryLyte technology

## Benefits

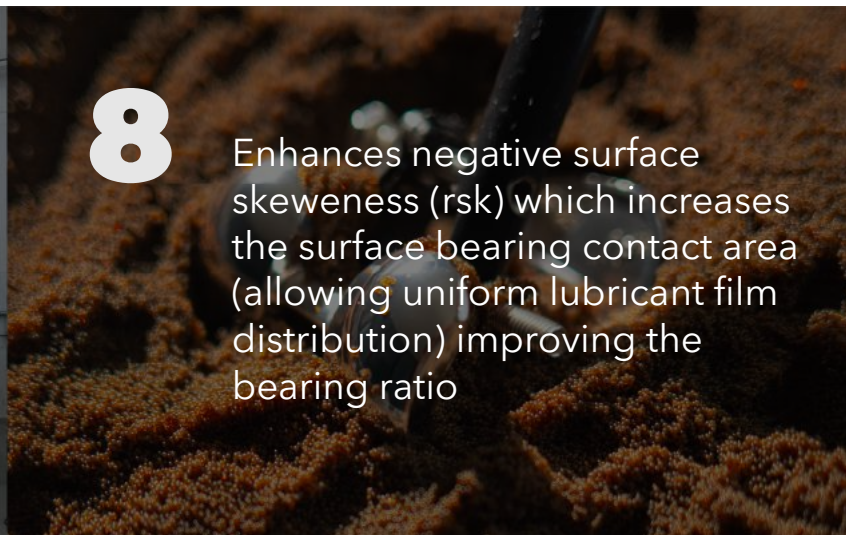
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Traceable industrial process



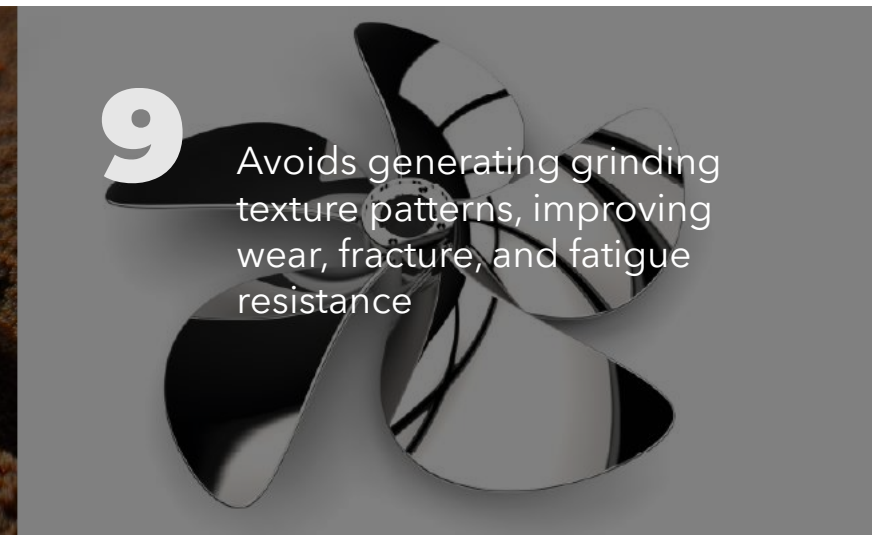
**8**

Enhances negative surface skeweness (rsk) which increases the surface bearing contact area (allowing uniform lubricant film distribution) improving the bearing ratio



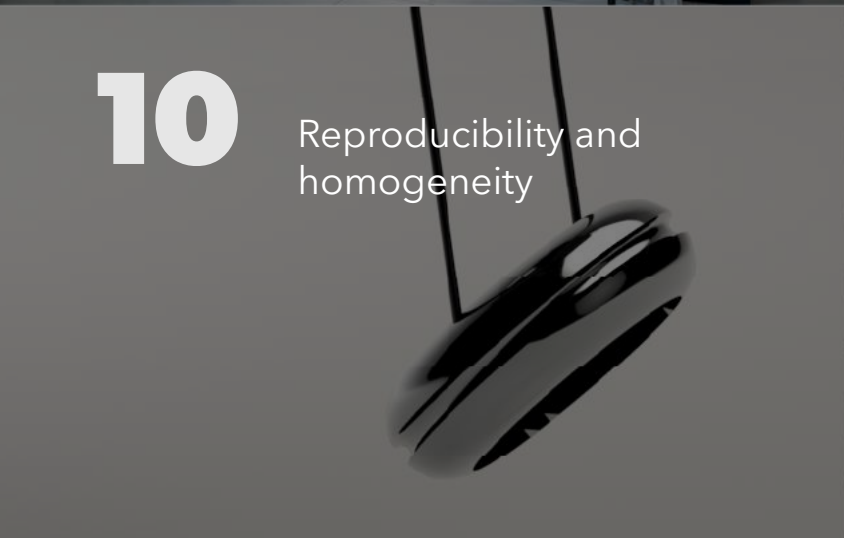
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Avoids generating grinding texture patterns, improving wear, fracture, and fatigue resistance



**10**

Reproducibility and homogeneity



**11**

Controlled costs and predictable lead times



**12**

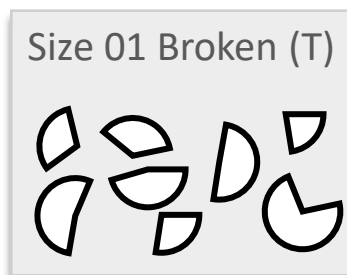
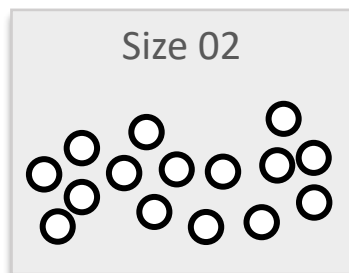
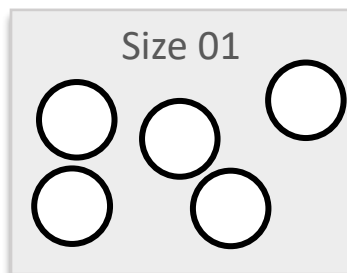
Clean, non-hazardous and easy waste management



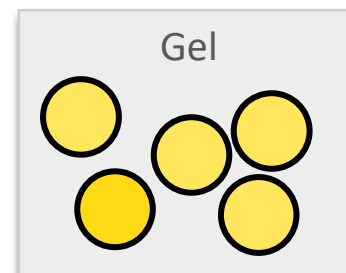
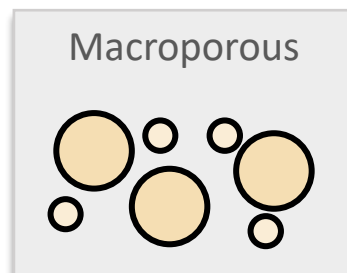
## 2. Electrolytes

# Electrolytes

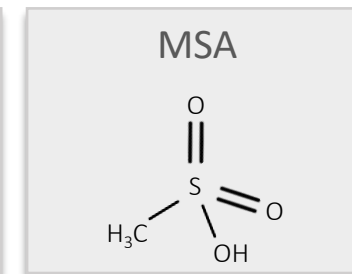
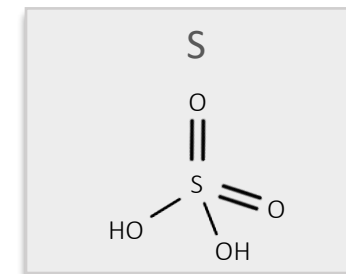
## Particle Size



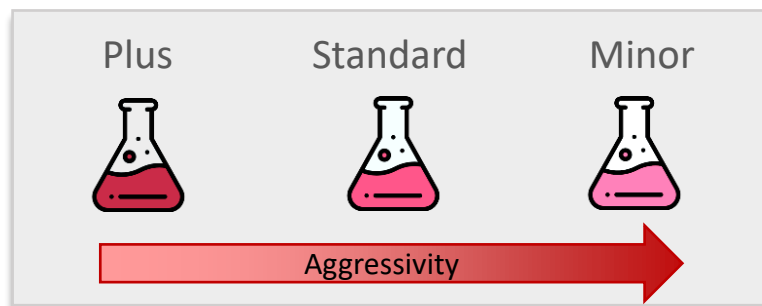
## Resin type



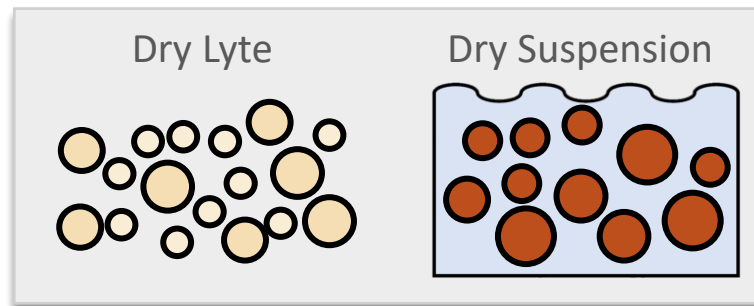
## Acid type



## Acid Concentration



## Electrolyte Type





# Electrolytes

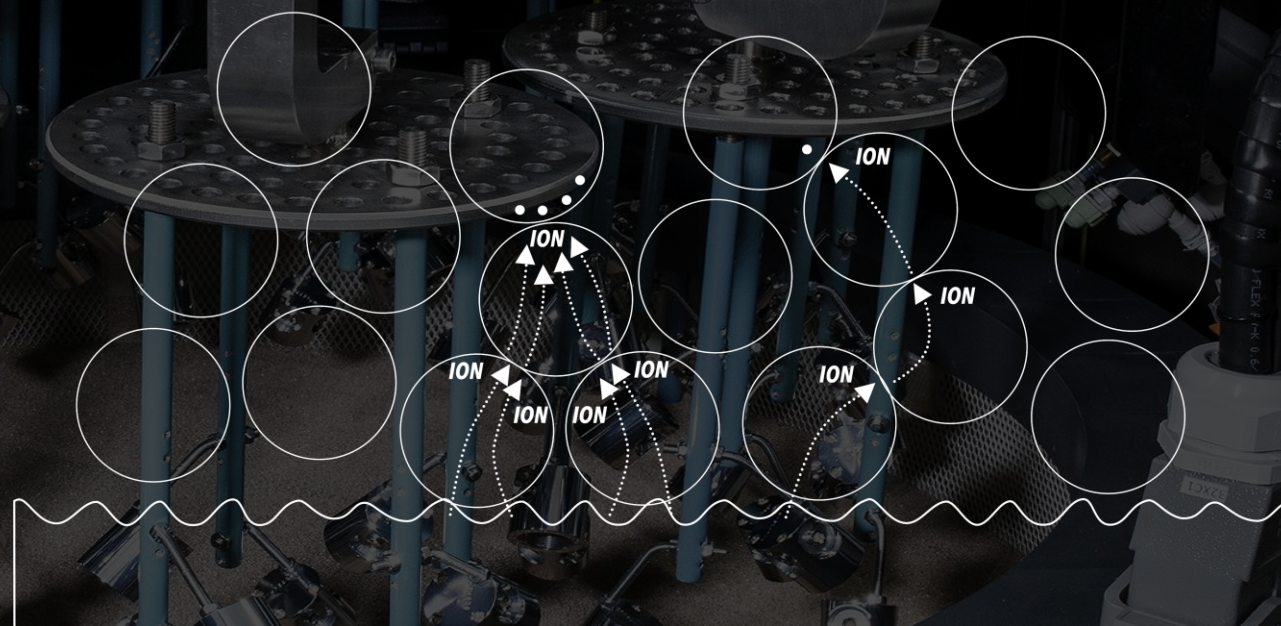
## Dry media

### DRY MEDIA

Mixture of solid particles freely moving that transport electrical current from the cathode to the anode creating a local electro erosion which is responsible for the metal ion exchange.

### DRY MEDIA'S BENEFITS

- ✓ For simple geometries
- ✓ Bigger footprint in the contact with the surface
- ✓ Faster roughness removal
- ✓ For metals that can auto passivate





# Electrolytes

## Dry suspension

### DRY SUSPENSION MEDIA

Mixture of solid particles in suspension in a non conductive liquid that communicate among them. They are responsible of electrical current transport from the cathode to the anode. Particles electrically charged that are in contact with the surface create a local electro erosion which is responsible for the metal ion exchange.

### DRY SUSPENSION'S MEDIA BENEFITS

- ✓ For complex geometries: inner channels, grooves, slots, etc.
- ✓ Shiniest results
- ✓ Part protected by the liquid: minimizes undesired oxidation with less footprint of the particle on the surface



# 3. Product description



## Compact series – Industrial sector



**DLyte 1 Dental**  
1 holders of Ø90 mm

**DLyte 10 Dental**  
1 holder of Ø140 mm

**DLyte 100 Dental**  
1 holder of Ø180 mm

### DLyte 1, DLyte 10 and DLyte 100

#### Product configuration range:

- **HF:** only high frequency parameters (for titanium and other material shiny step)
- **LF:** only low frequency parameters (for CoCr/stainless steel basic settings)
- **+HF:** full frequency parameters (for all materials)

#### Product capabilities:

- ✓ Electrolyte lifetime measured in hours
  - ✓ 100 h for all materials in exception of titanium (50h)
- ✓ Versatile machine to run different materials and geometries depending on the gamma.
- ✓ Recommended for Research and Development and technology understanding as a first step before the acquisition of bigger machines.



**Luxury parts**  
x12 parts / cycle



**Steel tooling**  
x24 parts / cycle



**Chains**  
x2 parts / cycle



## 100 PRO



**DLyte 100 PRO**  
**DLyte 100 PRO Carbide**  
16 L work-bowl  
x1 holder of  $\emptyset$  mm

### DLyte 100 PRO Standard

#### Product capabilities:

- ✓ Manual loading and unloading of the holders to the machine
- ✓ Stronger mechanics than compact machine to fulfill industry requirements
- ✓ Polishing capacity of 1 holders of  $\emptyset$ 200 mm per cycle
- ✓ Versatile, compact solution
- ✓ Fulfil Generic Equipment specification requirements for healthcare, pharma and aeronautics sectors
- ✓ Possibility of adding inner cathodes to improve polishing results in closed areas
- ✓ Possibility of adding a self-axis rotatory system for specific geometries (drills, revolution bodies)
- ✓ Tungsten carbide polishing thanks to:
  - ✓ Asymmetric power supply (V+/V-)



**Steel tooling**  
x24 parts / cycle



**Medical screw**  
x10 parts / cycle



**Coronary stent**  
x8 parts / cycle



**Small fracture plate**  
x9 parts / cycle

# PRO 500



**DLyte PRO 500**  
**DLyte PRO 500 Carbide**  
210 L work-bowl  
x8 holders of Ø200 mm

## DLyte PRO500 (GPA013280S03) / DLyte PRO500 Carbide (GPA026930S01)

### Product configuration range:

- 1 machine, 1 robot
- 2 machine, 1 robot
- 1 machine and, 1 cleaning station and 1 robot
- 2 machines, 1 cleaning station and 1 robot

### Product capabilities:

- ✓ Manual loading and unloading of the holders to the machine
- ✓ Easy pneumatic clamping system
- ✓ Polishing capacity of 8 holders of Ø200 mm per cycle
- ✓ Versatile, compact solution
- ✓ Fulfil Generic Equipment specification requirements for healthcare, pharma and aeronautics sectors
- ✓ Possibility of adding inner cathodes to improve polishing results in closed areas
- ✓ Tungsten carbide polishing thanks to:
  - ✓ Asymmetric power supply (V+/V-)

# DLyte



**Femoral Stem**  
x3 parts / holder  
24 parts / cycle



**Femoral Component**  
x3 parts / holder  
24 parts / cycle

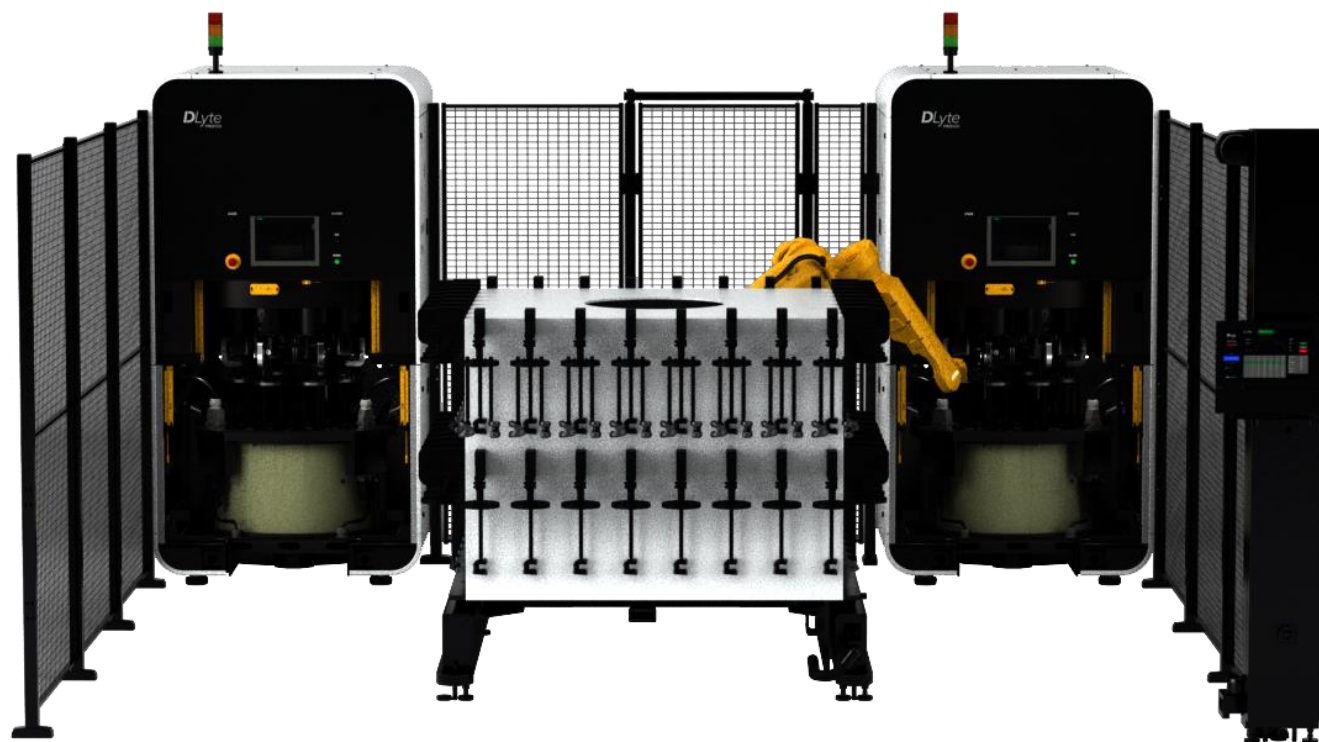


**Fracture plate**  
x12-24 parts / holder  
96-192 parts / cycle



**Joint component**  
x6 parts / holder  
48 parts / cycle

# Automated cell configurations



## DLyte Automated cell

### *Product configuration range:*

- 1 machine, 1 robot
- 2 machine, 1 robot
- 1 machine and, 1 cleaning station and 1 robot
- 2 machines, 1 cleaning station and 1 robot

### *Product capabilities:*

- ✓ Automatic loading and unloading of the holders to the machine and between machines
- ✓ Loading cell with a total capacity of 64 holders of Ø200 mm
- ✓ Possibility of including a cleaning station with steam and rinse system to mostly remove oil and acid traces
- ✓ Fulfil Generic Equipment specification requirements for healthcare, pharma and aeronautics sectors