DLyte Cutting Tools_V1ENG_10/2023

DLyte

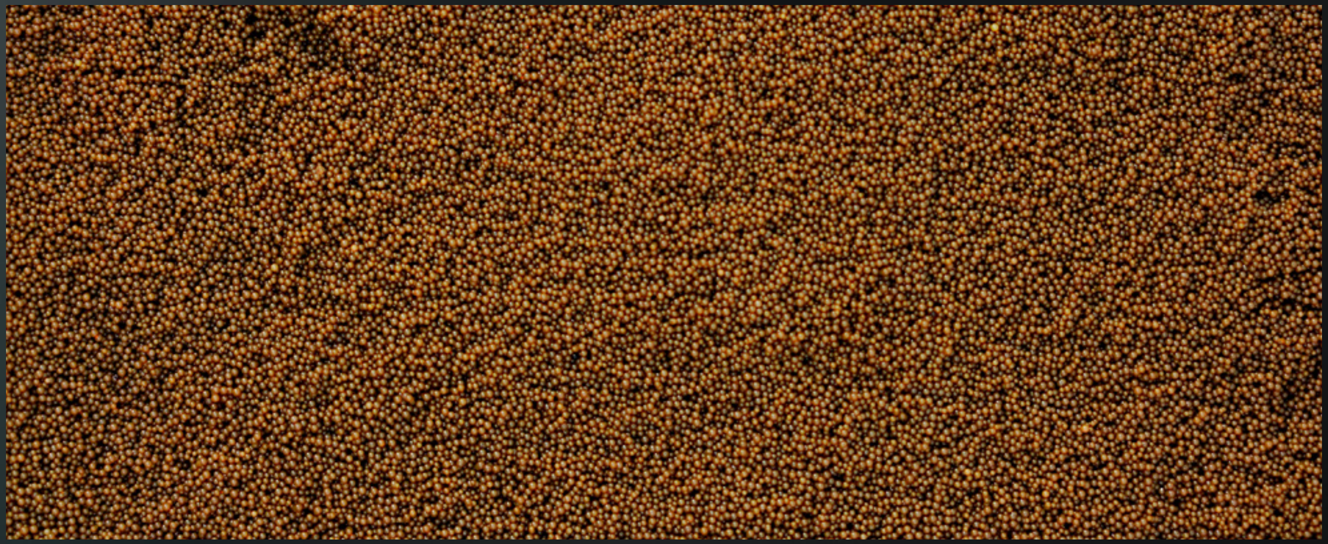
Surface finishing for Toolmaking

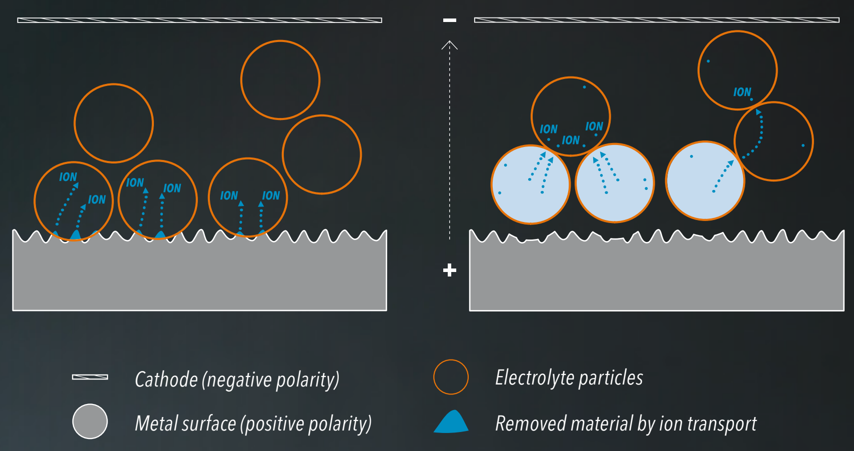
A brand of
GPAINNOVA

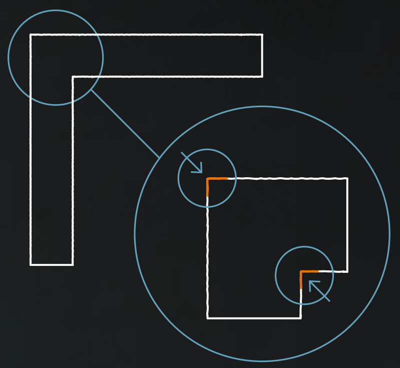
DryLyte Technology Process

The DryLyte Technology used in the dry electropolishing machinery DLyte, is a patented surface finishing technology 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 performs controlled rounding** and can access corners that are not easily accessed mechanically.







***The process performs controlled rounding** and can access corners that are not easily accessed mechanically.*

DLyte surface finishing for the toolmaking industry

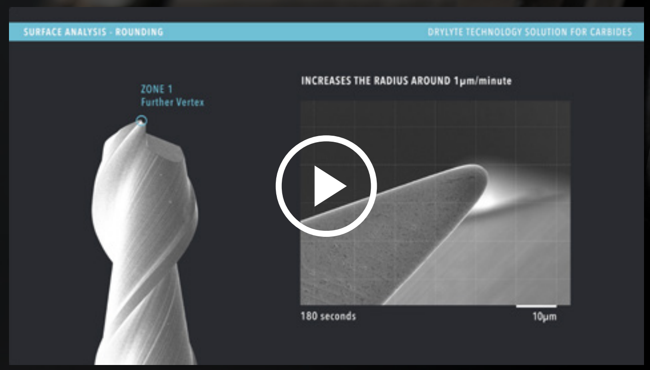
The quality of milled, formed and punched parts depends on the tool used in the manufacturing process. Drills, milling cutters or thread rods, stamping and forming tools, forming dies and tool holders require surface finishing processes to improve their performance and useful life.

Smoothing the surface, polishing coatings, decoating, removing burrs, controlled rounding and radiusing and corrosion protection increase the life of the metalworking tools providing a reliable and repeatable quality of the final parts.

Since current automated polishing techniques are almost not applicable on pieces with freeform surfaces and function relevant edges the smoothing, rounding, radiusing and deburring is predominantly done manually or with complex multi-step processes which are error prone and high resources demanding.

DLyte performs edge honing, polishing, smoothing, coating droplet removal and decoating of tools and enhances performance and extends lifespan, ensuring geometry and mechanical integrity preservation, surface uniformity, and wear reduction.

This automated solution replaces expensive diamond wheel and robotic systems, reduces roughness in flute areas and control cutting edge radius to deliver consistent and precise results in an ultra-fast process.



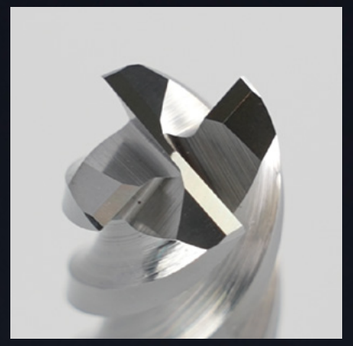
MATERIALS

Cemented Carbide/hardmetal

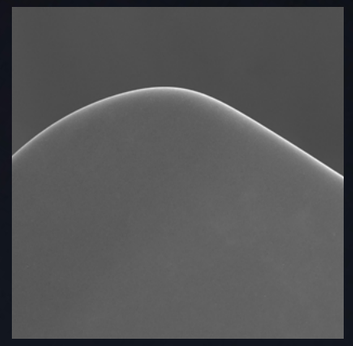
High Speed Steel

Carbon steel

Finishing processes



EDGE PREPARATION/ROUNDING/ HONING
It achieves a uniform radius along the entire edge since the process is not dependent on pressure and abrasion, unlike abrasive treatments.



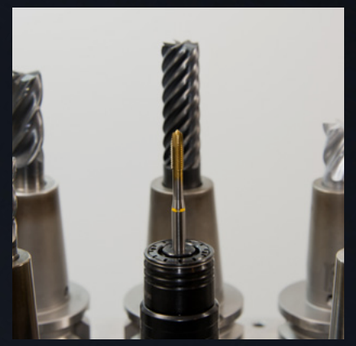
SMOOTHING & POLISHING
It reduces the friction, allowing faster machining and chip removal and prepares the surface for coating process.

DROPLETS COATING REMOVAL
It removes coating droplets,recovering cutting tools affected during the coating process.

CONTROLLED COBALT BINDER LEACHING
It prepares surfaces for a subsequent coating thus increasing the adherence between coating and substrate.

DECOATING
It replaces chemical or abrasive methods for removing the coating from parts that need to be repaired and subsequently recoated.

Applications



ENDMILLS/DRILLBITS/ THREAD-CUTTING TAPS
Fast and acurate edge preparation and smoothing of flutes.

CUTTING INSERTS
Performs high quality automated surface finishing of cutting inserts at scale.

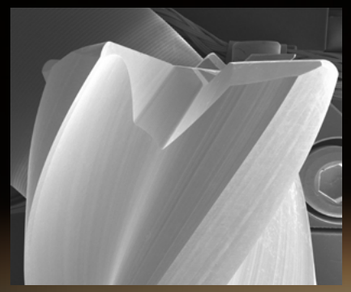
INSERT DIES
It replaces resource-intensive and sub-optimal quality of manual polishing.

FORMING TOOLS
Smoothing the surfaces with geometry preservation and zero defects.

Benefits of DLyte in Toolmaking

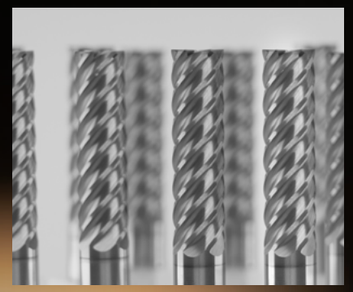
Dry electropolishing technology is a novel electrochemical process specially recommended to improve life of cutting tools through rounding of cutting edges and improvement of flute surface. Since dry electropolishing is not a mechanical process, the material hardness has no bearing on the material removal rate. In addition, it is also suitable for annealed, hardened metal parts and other materials as carbides.

TECHNICAL ASPECTS



Preservation of geometry with controlled rounding edges

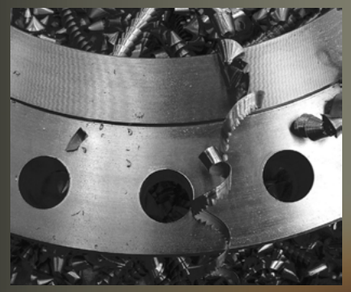
Improved passivation and corrosion resistance



Assured reliability and repeatability

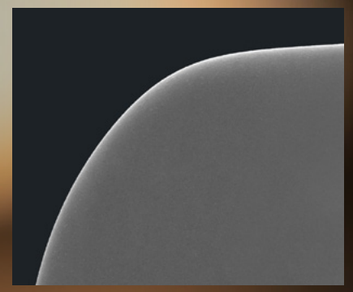
Improved quality of forming, stamping and cutting tools

Smoothing drill flutes increases work speed and lifespan

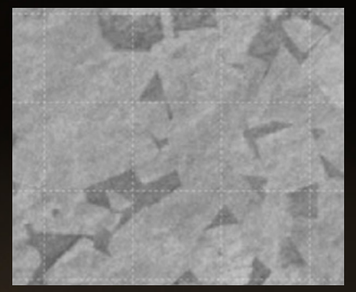


Improved chip removal increases tool productivity

Reduction of wear and increased contact area



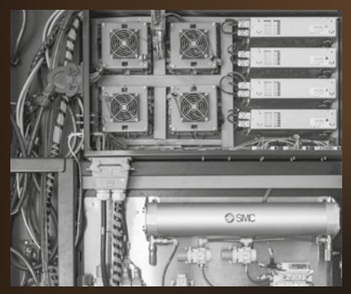
Reduced friction and defined edge rounding for longer tool life



Prevents leaching of metallic binder to achieve a completely smooth surface between constituent phases

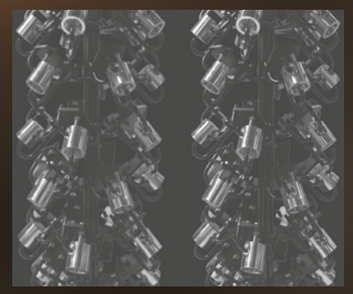
Reduced force and lubricant required for deformation

ECONOMIC AND ENVIRONMENTAL ASPECTS



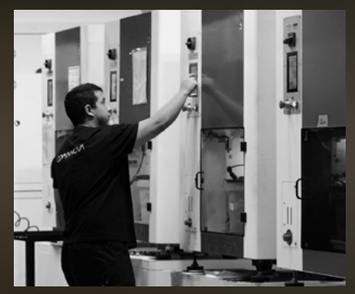
Short processing time in a compact design

No devices to manage sewage and sludge



High profitability and short payback time

Environmentally friendly



Protects workers' health

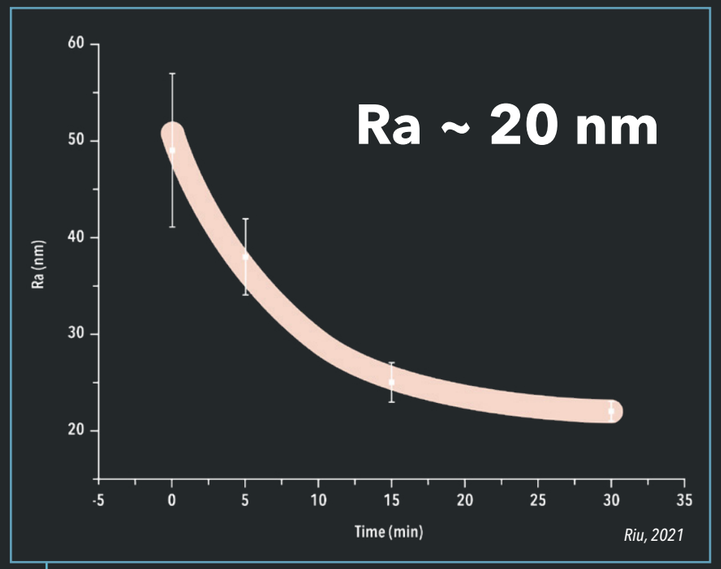
Improve carbide surfaces with controlled leaching

Cemented carbide, the predominant material in the toolmaking industry, contributes significantly in enhancing precision and surface quality due to its superior hardness, durability, and wear resistance.

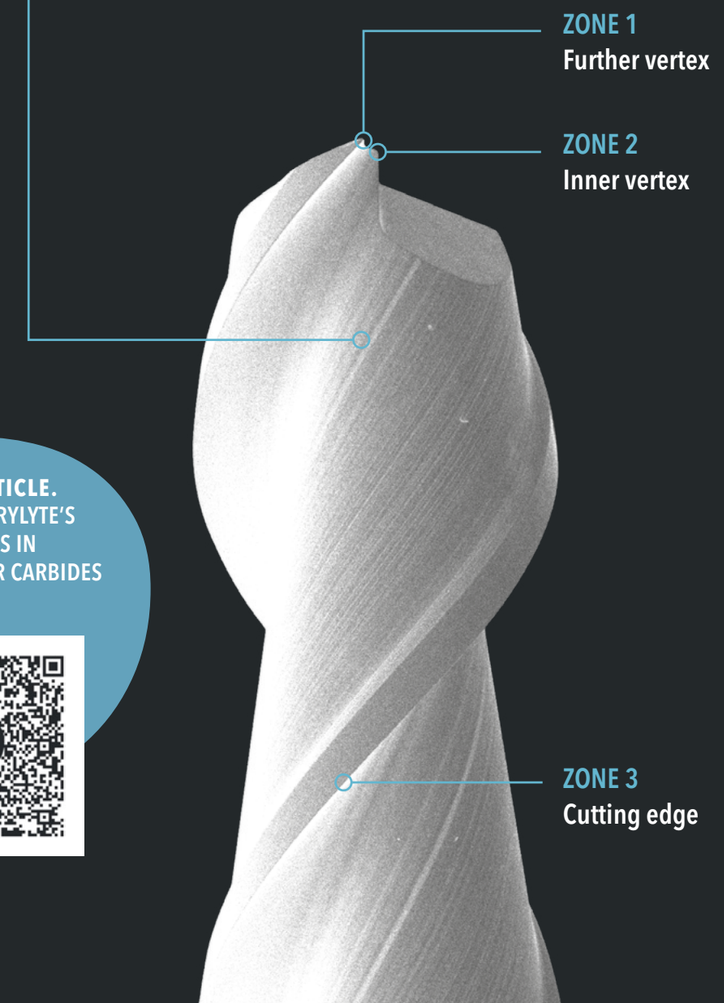
However, due to its composition of small tungsten carbide particles suspended in a metallic matrix, surface finish with state-of-the-art processes can be extremely difficult.

DLyte technology offers a plethora of advantages by maintaining the superficial chemistry unaltered, it ensures that the original properties of the material are preserved. Additionally, DryLyte Technology prevents any leaching effects on the metallic binder, which contributes to the overall stability and durability of the treated surface. The process achieves an impressive roughness between constitutive phases of below 9 nm, resulting in a smooth and consistent surface finish.

The system also allows for precise electrical parameter adjustments to achieve controlled leaching, resulting in improved surfaces for subsequent coating.

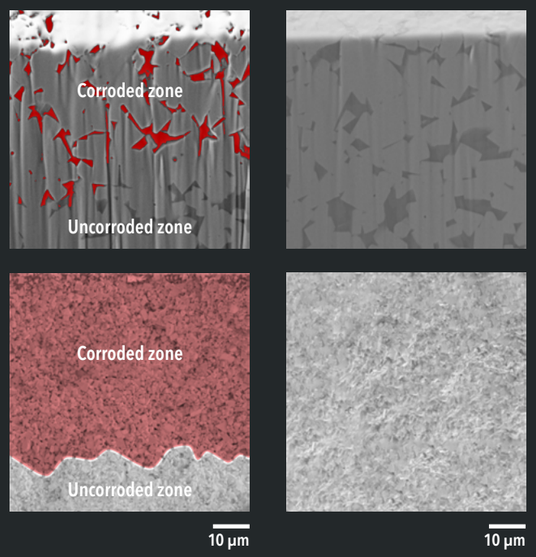


Surface quality improvement of the process over time.



CONVENTIONAL ROUTES

DRYLYTE TECHNOLOGY



Sarsanedas, Riu, Roa, 2021

Zheng et al., 2019

READ THE ARTICLE.
BENEFITS OF DRYLYTE'S IMPROVEMENTS IN POLISHING FOR CARBIDES

QR - Read the article

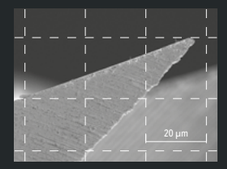
Edge preparation with controlled radius

INCREASE OF RADIUS AROUND 1 µ/min

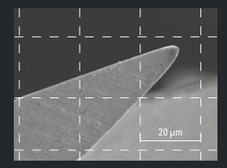
The minimum and controlled rounding effects further enhance the final surface quality, ensuring uniformity and reduced wear. Moreover, the mechanical integrity of DLyte is an effective automated process to round cutting edges of end mills, carbide inserts and carbide reamers to specific radius according to the manufacturer requirements and improve at the same time the surface quality of the flute thus allowing a faster chip flow and increased chip volume.

The dry electropolishing technology improves the result of current technologies. It overcomes the barriers of abrasive polishing using solid particles to remove material by ion exchange, even in very hard materials as carbide. As it is a non-abrasive treatment it maintains a good balance between smoothness of the flute and edge radius increasing tool life and resulting in less tool wear.

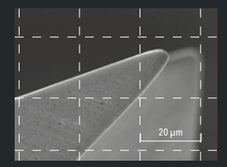
ZONE 1 - Further vertex



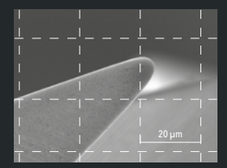
Original state - Before



Dry electropolish - After 60"

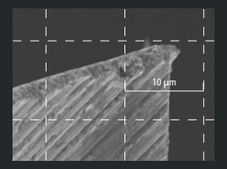


Dry electropolish - After 120"

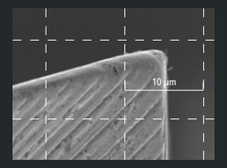


Dry electropolish - After 180"

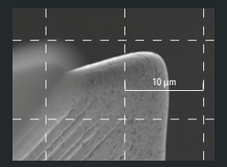
ZONE 2 - Inner Vertex



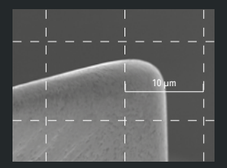
Original state - Before



Dry electropolish - After 60"

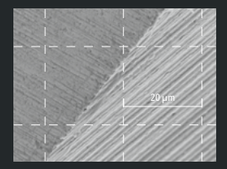


Dry electropolish - After 120"

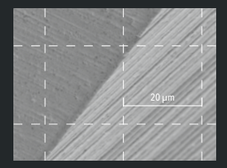


Dry electropolish - After 180"

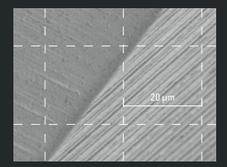
ZONE 3 - Cutting edge



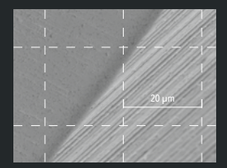
Original state - Before



Dry electropolish - After 60"



Dry electropolish - After 120"



Dry electropolish - After 180"

100PRO

This equipment provides a high-quality automated surface finishing treatment for endmills, cutting inserts and other cemented carbide tools demanding specific finishing requirements and high precision. The advanced PLC based electronics precisely applies required parameters and movements to achieves targeted surface finishing.

PRO500

The most advanced, powerful, and versatile metal surface finishing equipment on the market specially designed for mass production. This equipment delivers fully automated high-quality surface finishing for high-value, delicate, or complex work pieces with precise and targeted surface finishing requirements.

DLyte 100PRO and DLyte 100PRO Carbide	*DLyte PRO500 and DLyte PRO500 Carbide*
6 endmills/cycle	*48 endmills/cycle*
12 inserts/cycle	*160 inserts/cycle*

Process time for edge preparation:
2 to 5 minutes

Process time for polishing/smoothing grinded surfaces:
5 to 15 minutes

Process time for polishing/smoothing sintered surfaces:
40 to 90 minutes

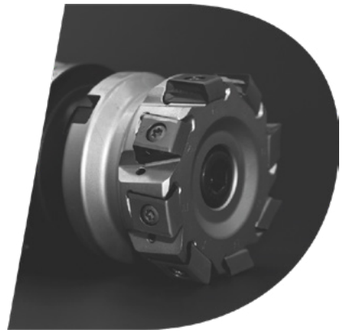
DLYTE SERVICES

Personalized assistance is assured throughout the product implementation and life cycle.

- SAMPLE PROCESSING
- TRAINING & CONSULTING
- FULL SERVICE PACKAGE
- MAINTENANCE SERVICES
- SOFTWARE UPDATES
- CUSTOMER CARE

DLyte Success Cases in the Toolmaking Industry

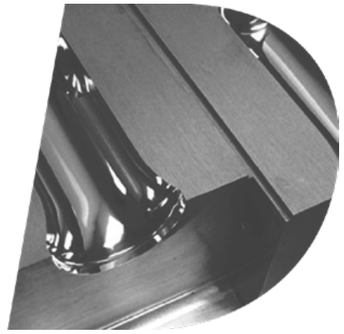
CARBIDE ENDMILL EDGE PREPARATION AND SURFACE SMOOTHING
For the Toolmaking Industry



CARBIDE INSERT POLISHING
For toolmaking industry

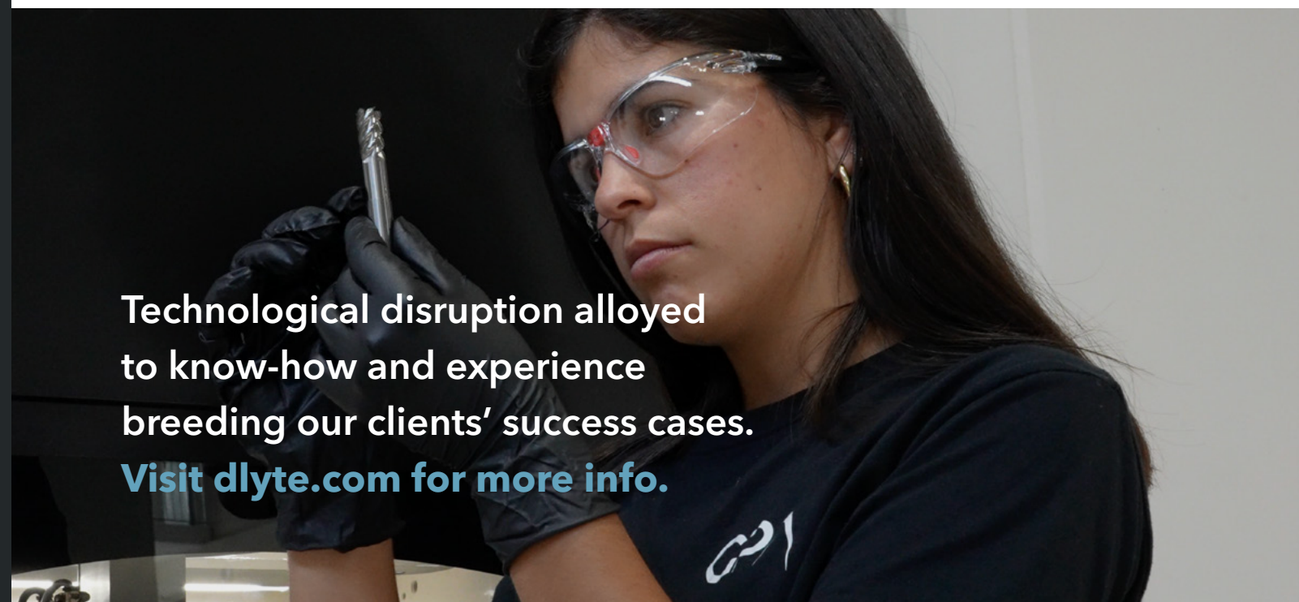
CARBIDE INSERT DIE POLISHING
For toolmaking industry

CAP COMPRESSION MOLDING TOOLS POLISHING
For food, beverage & packaging industries



INJECTION MOLDING POLISHING
For the mold and die industry

GRINDED CARBIDE INSERT POLISHING
For toolmaking industry



Technological disruption alloyed to know-how and experience breeding our clients' success cases.
Visit dlyte.com for more info.

Powered by DryLyte Technology

The patented DryLyte Technology, electrochemical surface finishing which uses active solid particles, is protected by patents owned by DryLyte S.L. GPAINNOVA owns the exclusive right to sell the DryLyte Technology, and only companies authorized by GPAINNOVA have the right to utilize or distribute the equipment and consumables using the DryLyte Technology.

The Products included in this document may be protected by one or more patents and patent applications detailed at: https://www.dlyte.com/patents/

Founded in Barcelona in 2013 and settled in Sunrise (Florida, USA), Hong Kong and Shenzhen (Mainland China), GPAINNOVA specializes in surface finishing solutions for metal and alloy parts through DLyte. The group develops, manufactures and markets advanced surface finishing machinery, accessories and consumables based on the patented, disruptive dry electropolishing technology (DryLyte).

SPAIN

GPAINNOVA Headquarters

Carrer Maracaibo, 1, sheds 2-6,
08030 Barcelona (Spain)

P. (+34) 931 256 536
info@gpainnova.com

AMERICA

GPAINNOVA America Corp.

15491 SW 12th St. Suite 405,
Sunrise, Florida, 33326 (USA)

P. (+1) 954 530 8277
officeusa@gpainnova.com

ASIA

GPAINNOVA Asia

Unit 2204, 22/F, Lippo Centre,
Tower 2, 89 Queensway, Hong Kong
香港金钟道89号
力宝中心第2座22楼2204室

P. (+852) 291 229 12
officeasia@gpainnova.com

CHINA

GPAINNOVA Shenzhen

Room 1412, 13/ f, Tower A, Building 2, Chuangwei Innovation Valley II, Tangtou Rd, Shiyan St, Baoan district, Shenzhen City, Guangdong province

P. (+86) 755 2310 8096
officeasia@gpainnova.com