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GF Machining Solutions

**Tecnologie innovative per
competere**

BIMU PIU' - 12/10/2018



Il Gruppo GF



Pionieri nell'industria da più di 200 anni

Quotati alla borsa di Zurigo dal 1931



Johann Conrad Fischer
1773-1854



Georg Fischer I
1804-1888



Georg Fischer II
1834-1887



Georg Fischer III
1864-1925

Key figures (2017)



Founded

1802

Headquartered

Switzerland

Employees worldwide

15 835

Sales CHF mil.

4 150

Three divisions



GF Piping Systems

GF Automotive

GF Machining Solutions

GF Machining Solutions: storia e innovazione

Headquartered

Switzerland

Employees worldwide

3 255

Sales CHF million

992

Key figures (2017)



Countries

+50

Sales Companies

33

Production plants

8

Centers of Competence

20

La nostra visione: essere il partner di riferimento nella meccanica di precisione **+GF+**

Aerospace



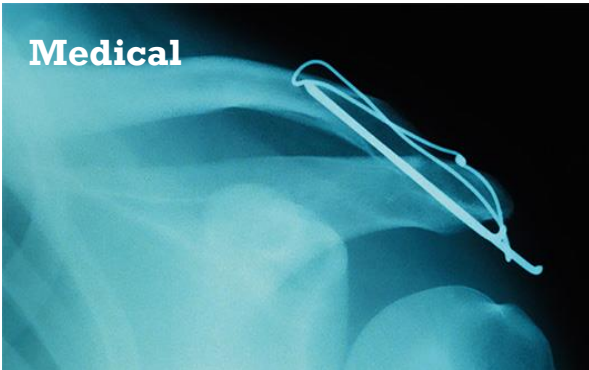
ICT



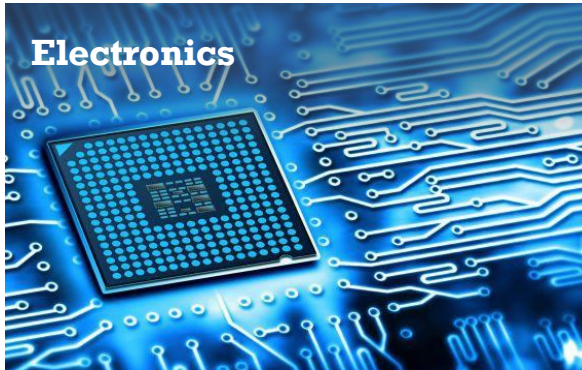
Automotive



Medical



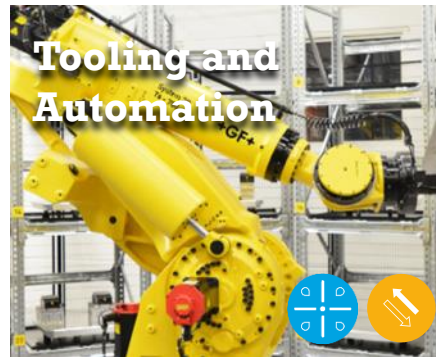
Electronics



Energy



Un portafoglio esteso di soluzioni per la meccanica di precisione **+GF+**



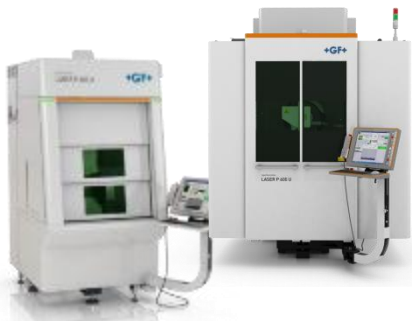


GF Advanced Manufacturing



Laser TSE

- Texturing
- Structuring
- Engraving



Microlution

- Laser Micro Cutting
- Laser Micro Drilling
- Laser Micro Turning



Additive Manufacturing

- Direct Metal Printing

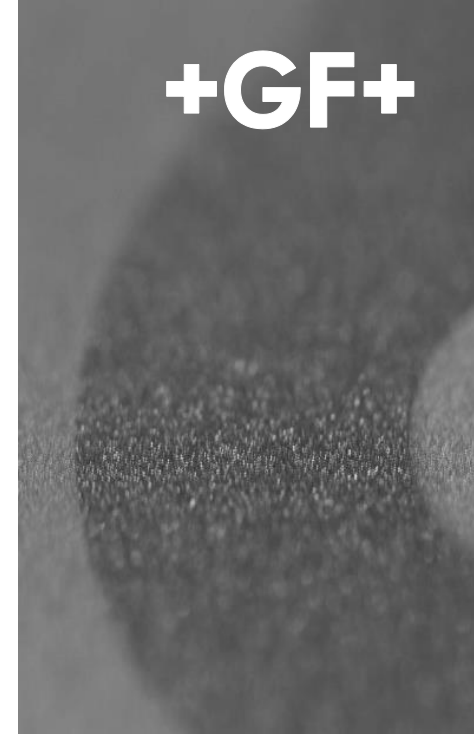
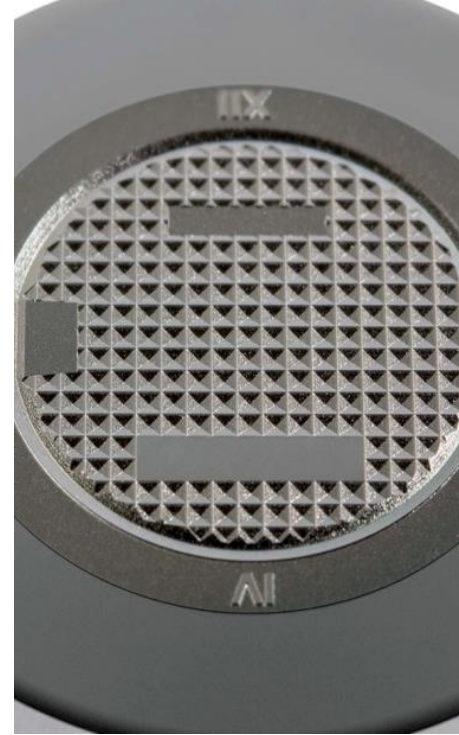
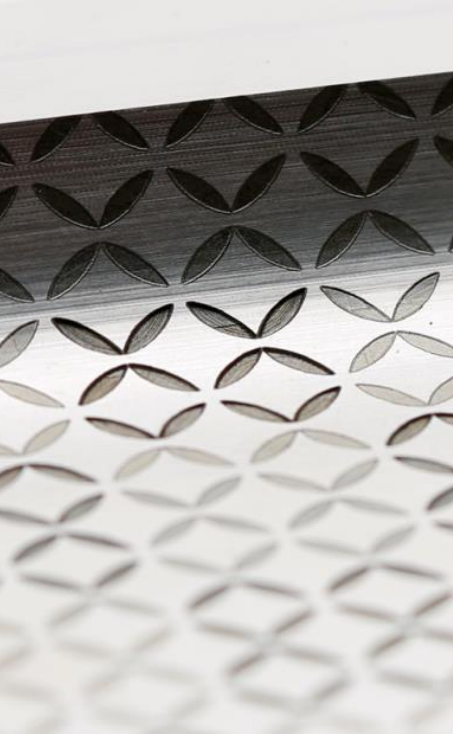




GF Advanced Manufacturing

Laser

Texturing/Structuring &
Engraving



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Texturing



Marking and labeling



Engraving



Structuring



LASER portfolio 2018



> 300 mc installed, since 2010.



LASER P 400 U



LASER P 600 U

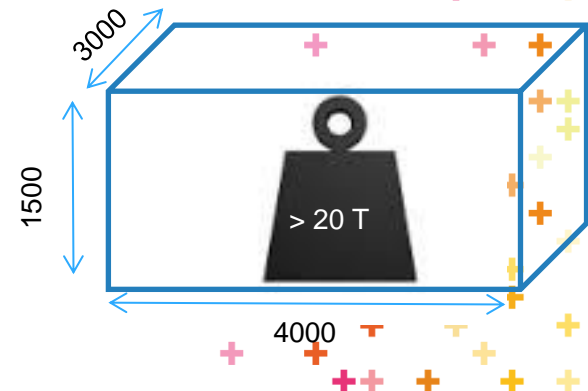
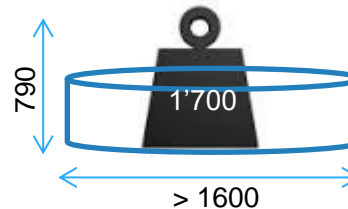
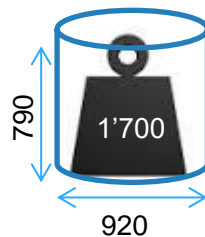
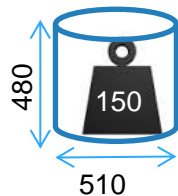
LASER P 1000 U

LASER P 1200 U

LASER P 1200 U Tire

LASER P 4000 U

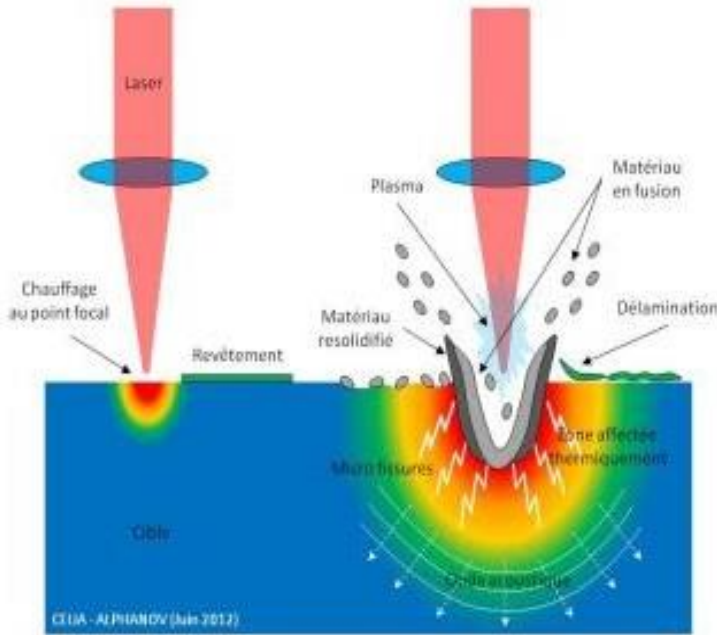
Max. work piece dimensions in 5-axis operation (mm)



DEFINITION & DIFFERENCES

NANO / FEMTO LASERS

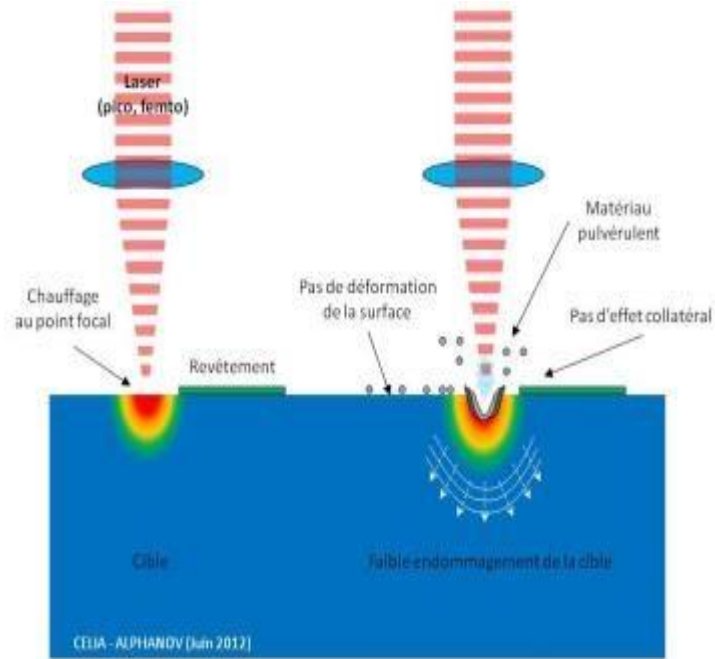
NANO
 10^{-9} second



THERMICAL PROCESS

Hot Ablation

FEMTO
 10^{-15} second

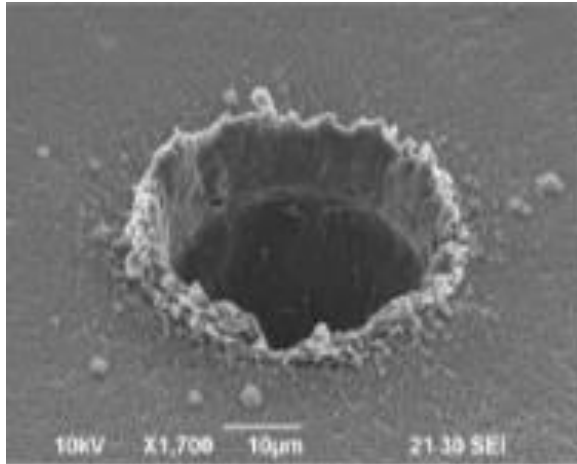


ULTRA SHORT PROCESS

Cold Ablation

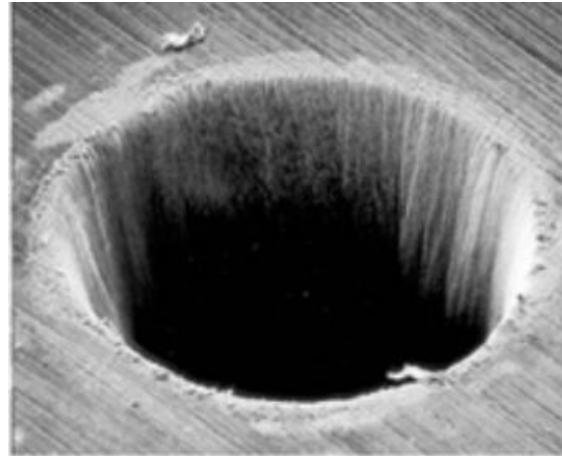


Results



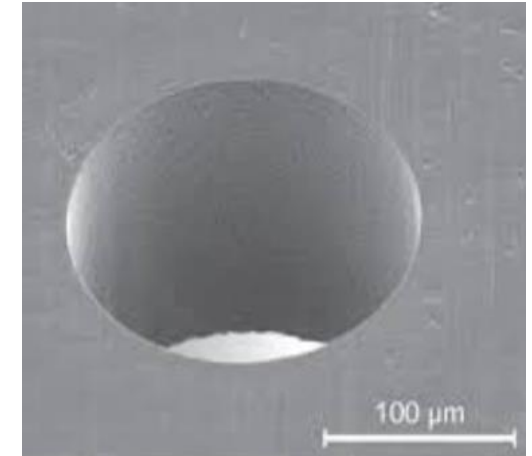
Nanosecond

HAZ (Heat Affected Zone)
Melt zone adds variability



Picosecond

Less HAZ
Rough surface adds variability



Femtosecond

No HAZ
Low variability

LASER P 400 (U) Dual Laser Head



Fiber Laser:

20 w Flexipulse
30 w Flexipulse
50 w



Femtosecond Laser
20 w / 40 μ J / > 400fs
Guided by flying optics



Positioning camera

Dust exhausting nozzle

Touch probe

Blowing nozzle

Fast mounting lens holder

Unique on the market & patented:
Dual Laser head



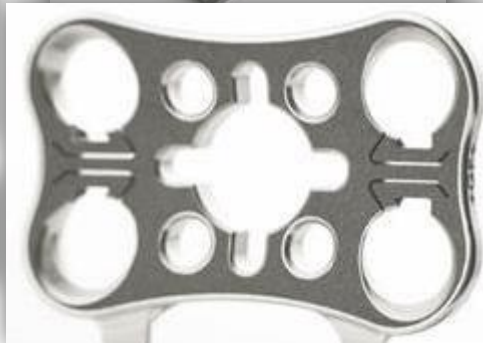
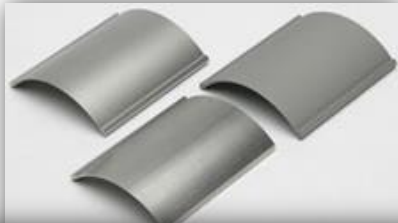
Applications

Medical/Dental

“Laser Blasting” is ideal for the following applications:

- Removing glare when under surgical lighting for medical and dental instruments
- Improving adhesion for medical devices
- Increasing implant surface area, which increases the percentage of bone attachment for medical and dental implants.
- Descaling (removal of heat-treat scale)
- Texturing for paint adhesion
- Texturing for mechanical function
- Producing a uniform cosmetic finish

Below are some photos to help identify Medical/Dental Manufactures :

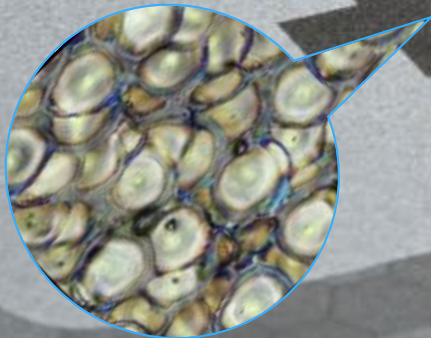
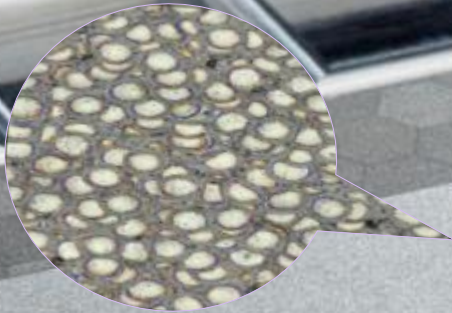


Different aspects

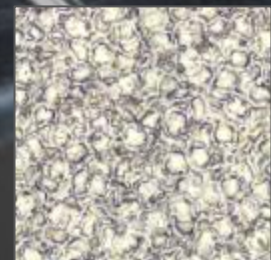
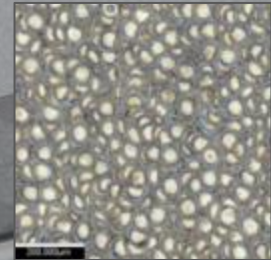
Texture as a coating

Few microns depth

Cleaning / finishing effect



- Power
- Frequency
- Density
- Duration of Laser emission



Packaging

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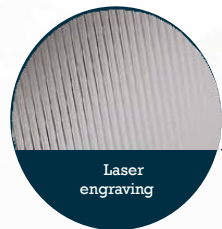
Master your manufacturing process

YOUR BENEFITS

Optimize manufacturing process—no subcontracted operations needed

Substitution for manual technologies to reduce cost of non-quality

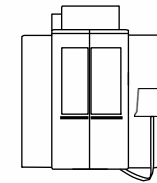
Frontlight
by Laser



APPLIED TECHNOLOGIES

AgieCharmilles LASER P 1200 U

Laser blasting combined with Laser engraving



PERFORMANCE RESULTS

Market segment **Automotive**

Material **Stainless steel**

Laser (Type/Power) **Nano IR 50 W**

Characteristics

Machining time **12h34**

Light guides **2h34**

Master geometrical surface for new lighting generation



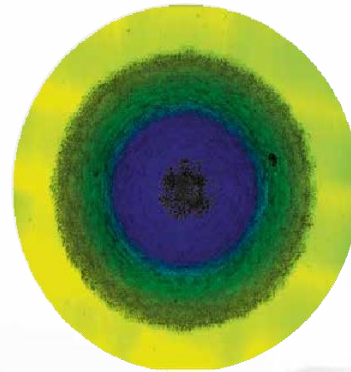
YOUR BENEFITS

Substitute manual operations to boost quality

Boost automotive R&D possibilities with Laser texturing's freedom of design

Digressive texture depth

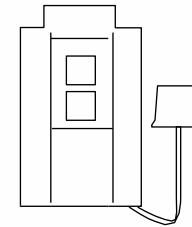
Automotive lighting lens



APPLIED TECHNOLOGIES

AgieCharmilles LASER P 400 U

No burr



PERFORMANCE RESULTS

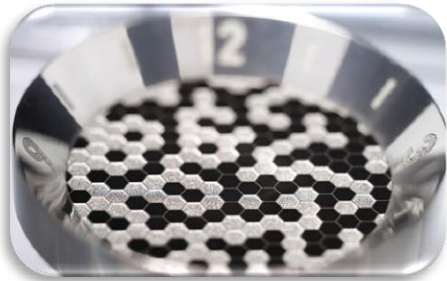
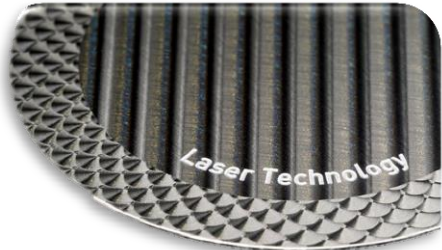
Market segment Automotive

Material Stainless steel

Laser (Type/Power) Femto IR 20 WFP

Characteristics Machining time 18 min
Max. texture depth 12 µm

Watch & Mint

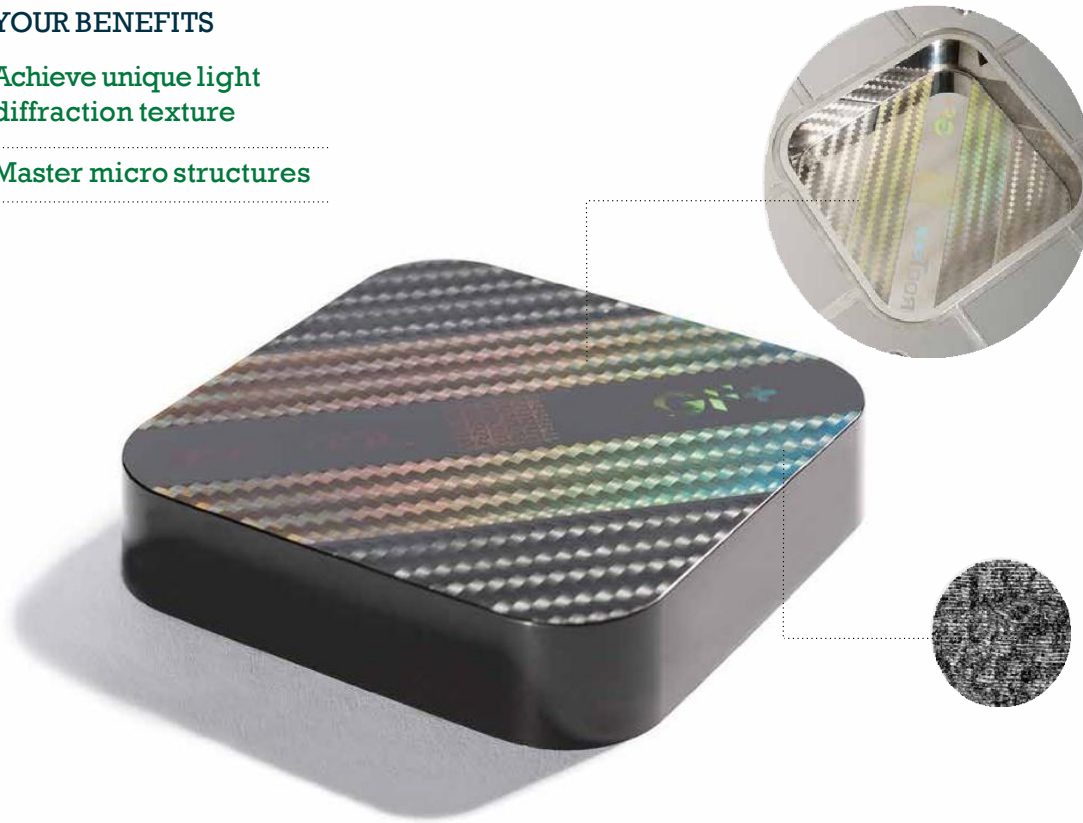


Dare to propose new design possibilities

YOUR BENEFITS

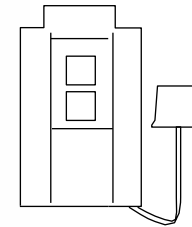
Achieve unique light diffraction texture

Master micro structures



APPLIED TECHNOLOGIES

AgieCharmilles LASER P 400



PERFORMANCE RESULTS

Market segment	ICT
Material	Steel
Laser (Type/Power)	Dual Laser femto IR 20 W FP and Nano IR 30 W FP in the same solution
Characteristics	Carbon 37 min Logo 9 min

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Achieve extraordinary
surface finish

Superfici Funzionali

Superfici funzionali

Proprietà



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Georg Fischer

Micromachining con laser femto



Market Segmentation & Applications

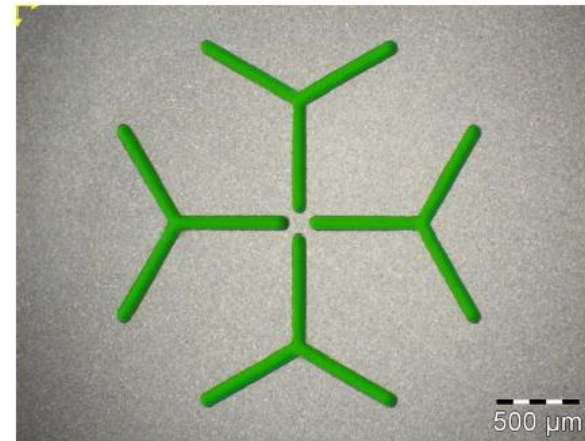
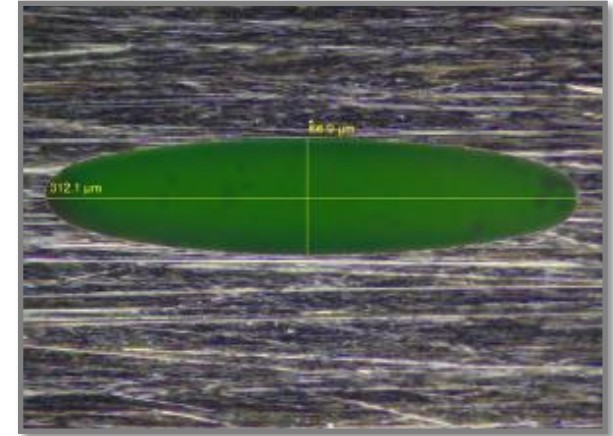
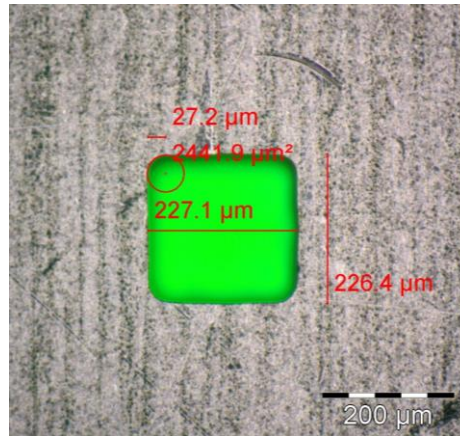


- Aerospace
 - Fuel systems
 - Turbine hole drilling
- Automotive
 - GDi fuel nozzles
 - Diesel fuel nozzles
- Medical device
 - Implantable Devices
 - Surgical Devices
 - Microfluidic Devices
- Semiconductor
 - Probe Card Drilling
 - Test Sockets & Devices
- Swiss Watch



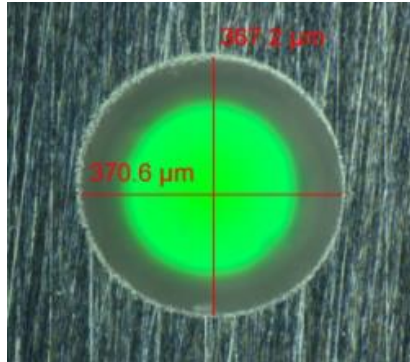
Special Shapes

- For these shapes the machine moves the part under the nozzle at the same time as the laser is drilling
- With this method many shapes are possible
 - Square
 - Oval
 - Triangle
 - Slots
 - Curved slots
 - Positive, Negative, and Straight Taper Holes

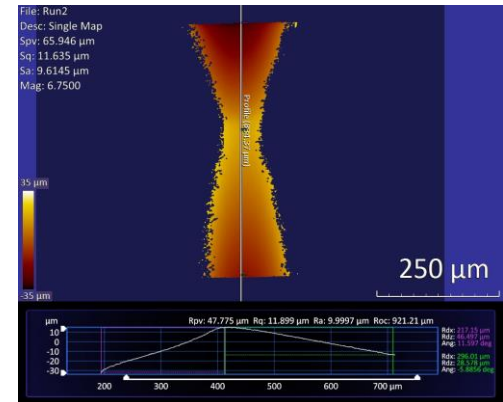
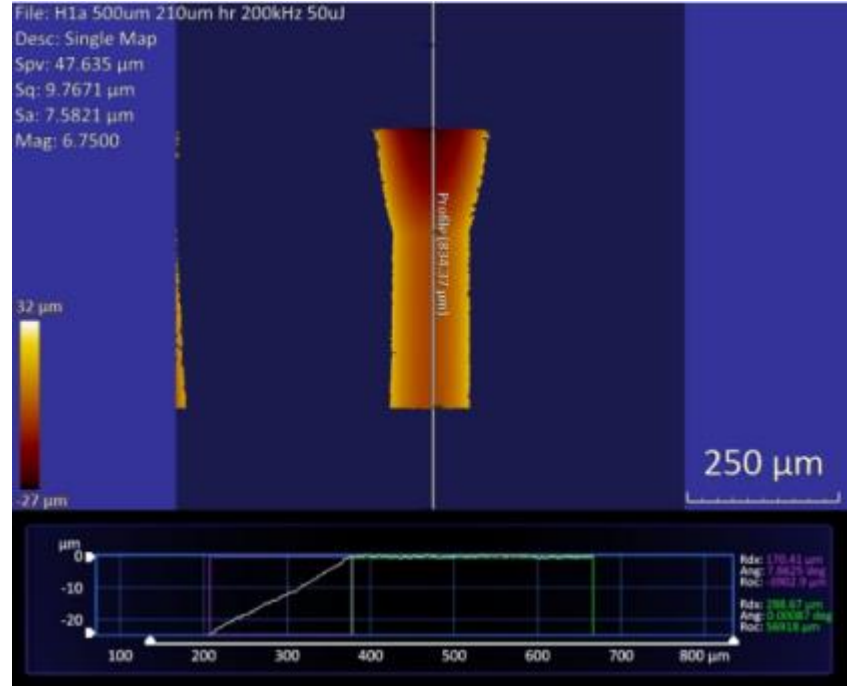
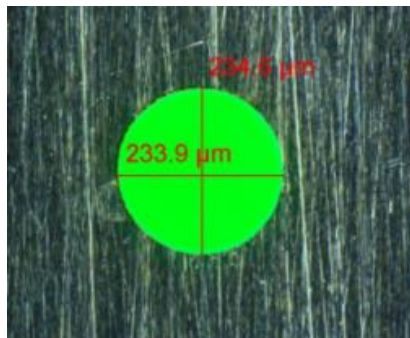


Special Shapes

Laser Entrance
(30 degree taper)

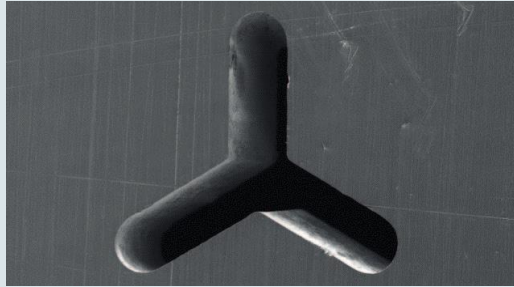


Laser Exit (zero taper)



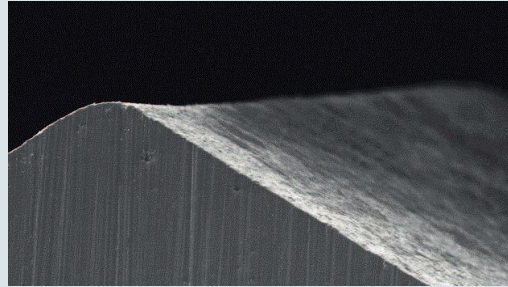
Very special shapes !

Drilling of Y-shapes with zero taper



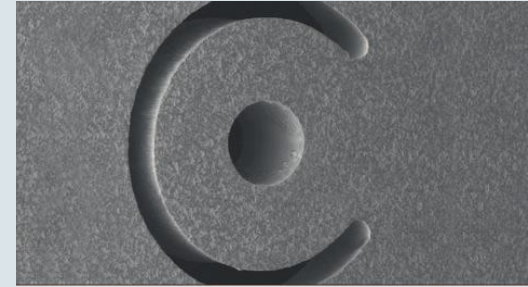
100 μm

- Material: stainless steel 0.3 mm



10 μm

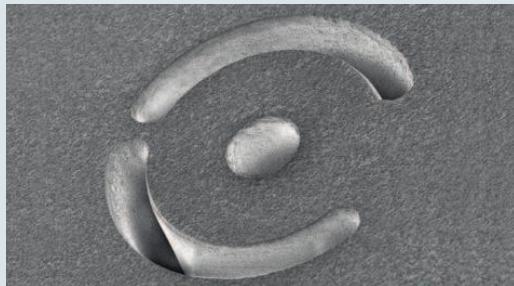
Cutting and drilling with zero taper



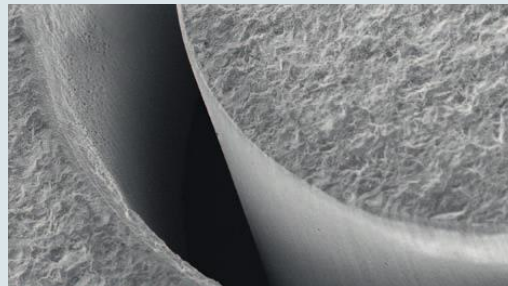
100 μm

- Material: sintered steel 0.5 mm

Burr-free cutting of spinneret nozzles



20 μm



20 μm

Cutting of connector-pins



100 μm

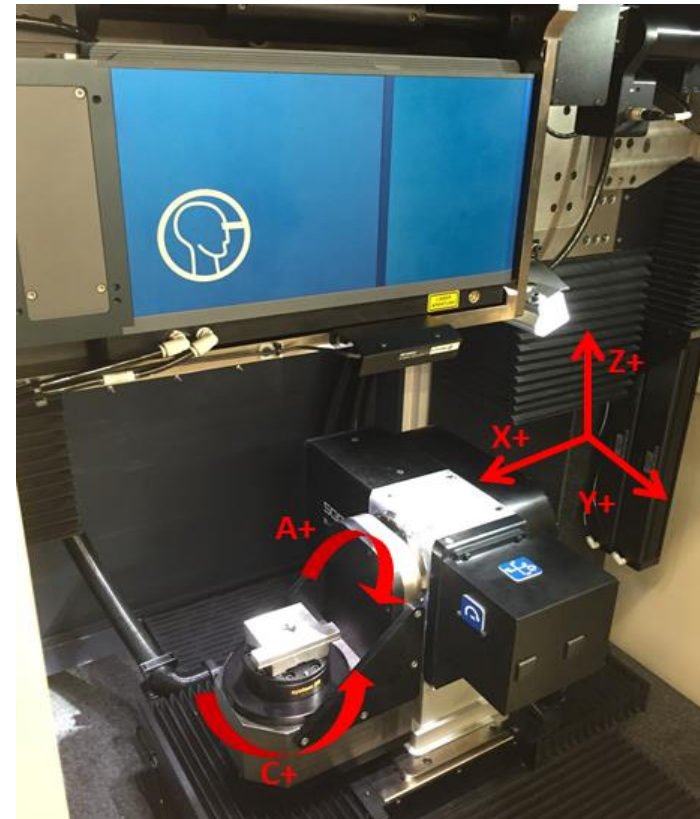
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ML-5

**(3 or 5 axis, femtosecond
cutting and drilling)**



ML-5 Kinematics



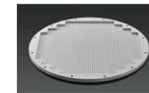
Technical data

ML-5

Machine dimension *	mm (in)	2310 x 1050 x 2260 (90.94 x 41.34 x 88.97)
Machine weight (machine only)	kg (lbs)	2730 (6018)
Travel X/Y/Z	mm (in)	305 x 330 x 305 (12 x 12.99 x 12)

Solution Approach

- Microlution targets the most cutting edge micro-scale applications
- By specializing in micro-scale applications, Microlution has the expertise to optimize the manufacturing machinery as well as the manufacturing process
- Microlution applies our system design philosophy & base platforms to deliver optimized, integrated solutions



Semiconductor



Automotive



Medical



Consumer

Core Platform



Integrated Solution



Finished Parts in Seconds

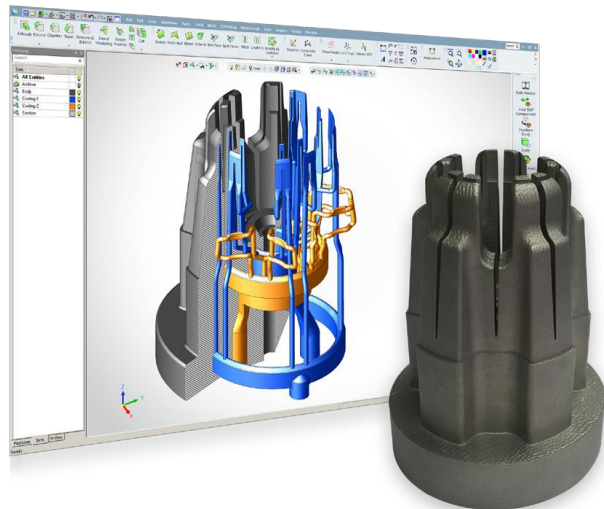
Direct Metal Printing



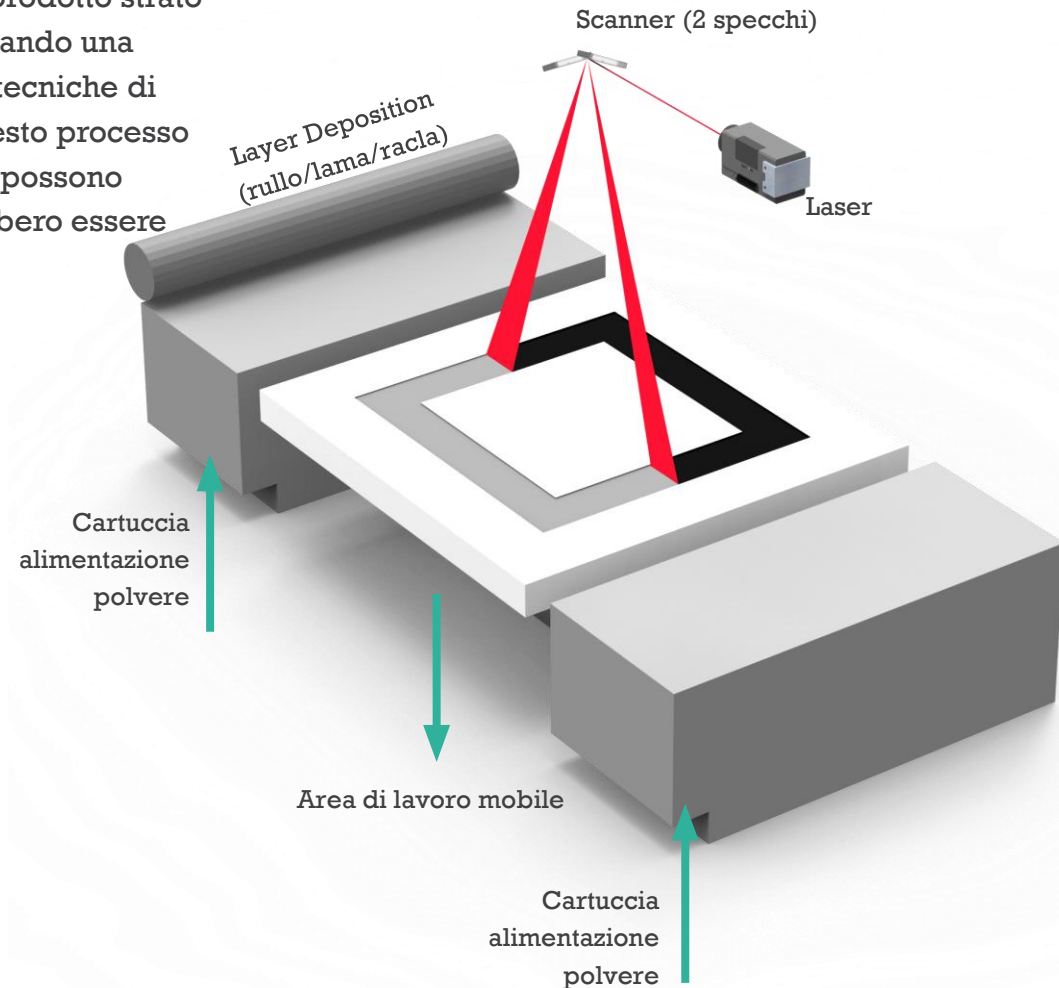
Direct Metal Printing (DMP)

Il Direct Metal Printing (DMP) è una tecnologia di produzione additiva che permette di produrre parti con un'ampia varietà di leghe metalliche.

A partire dalla polvere di metallo il prodotto viene prodotto strato per strato. Ogni strato viene fuso sul precedente creando una parte con densità (fino al 99,9%) paragonabile alle tecniche di produzione convenzionali (fresatura, fusione). In questo processo non viene creato quasi nessun materiale di scarto e possono essere create geometrie complesse che non potrebbero essere altrimenti prodotte.



La produzione di geometrie interne complesse "a forma libera" è ideale per il DMP



Vantaggi della stampa additiva

Riduzione di peso

e.g attraverso strutture reticolari o all'ottimizzazione topologica



Prodotti personalizzati

e.g strutture interne come canali di raffreddamento complessi, che altrimenti non potrebbero essere realizzati



Aumento della funzionalità delle parti

e.g funzionalità termiche, fluidodinamiche, strutturali e integrazione di più componenti in un'unica parte



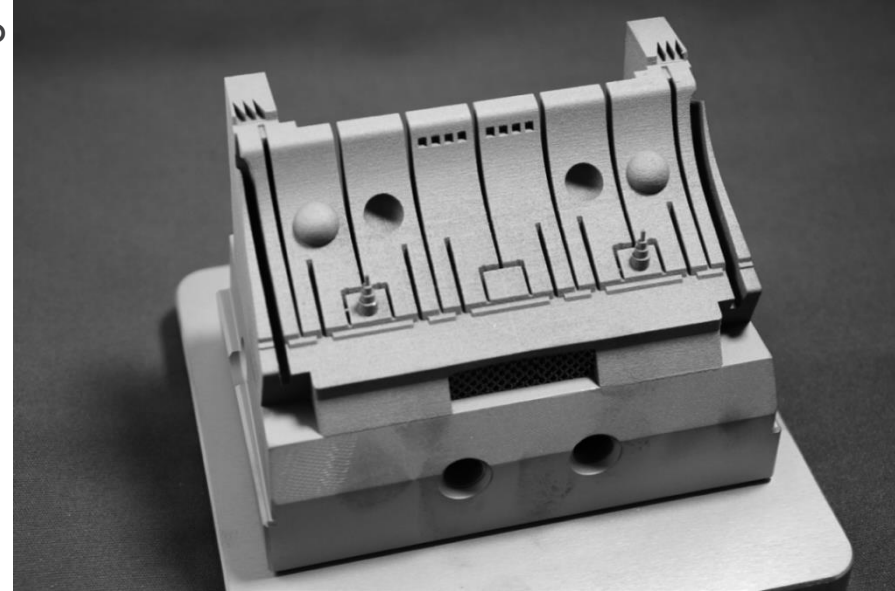
Produzione rapida

Non sono necessari utensili o un'ampia programmazione



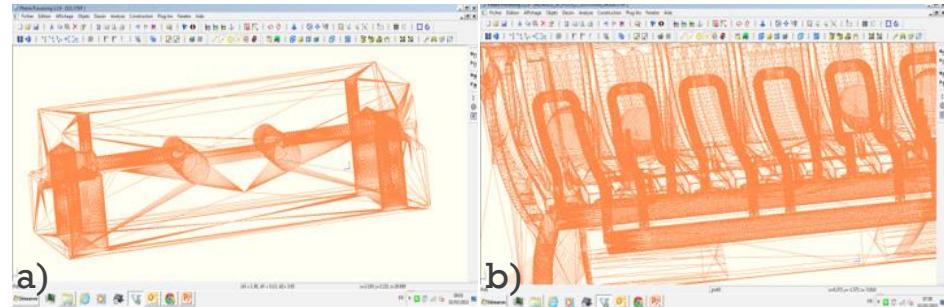
Parti massicce o di grandi dimensioni spesso non sono convenienti o addirittura irrealizzabili con le tecnologie additive. Un approccio ibrido può risultare estremamente vantaggioso sia a livello economico sia di performance:

1. Stampare strutture complesse su dei preformati realizzati con tecnologia CNC convenzionale.
2. Stampare parti complesse su basi massicce da fresare in un secondo momento



Stampo con canali conformali realizzato su un preformato CNC

- a) Parte dello stampo a complessità ridotta realizzata con tecnologie CNC convenzionali
- b) Canali di raffreddamento conformali complessi nella sezione stampata 3D dello stampo





Laser Additive DMP series



DMP Direct Metal Printers



DMP Factory 500

Print Volume:
500 x 500mm
(LxW)
500mm (H)

Laser Power:
3X 500 W



DMP Factory 350 DMP Flex 350

Print Volume:
275 x 275 mm
(LxW)
420 mm (H)

Laser Power:
500 W



DMP ProX 200

Print Volume:
140 x 140 mm
(LxW)
125 mm (H)

Laser Power:
300 W



DMP Flex 100

Print Volume:
100 x 100 mm
(LxW)
100 mm (H)

Laser Power:
100 W

Vi aspettiamo allo stand per approfondimenti!



PAD 9
D149



Grazie per l'attenzione!