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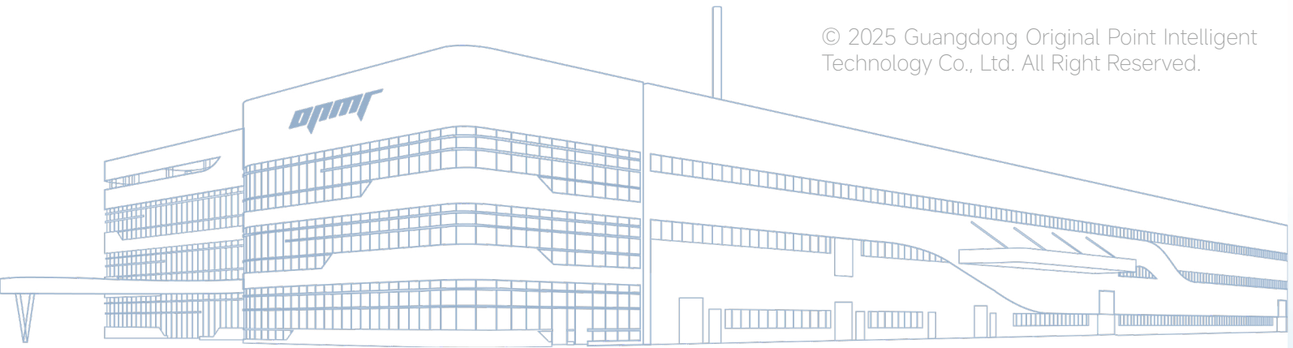


Product Manual | 2025

Laser Processing Machine Tool

Light 5X Series
Micro3D Series
Dia Series
Water-jet Series
Helical Drilling Series

Contents

LIGHT 5X SERIES

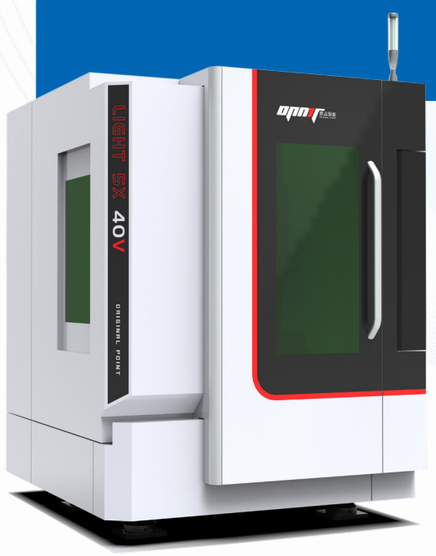
PCD cutting tools laser processing solutions

Light 5X 40V

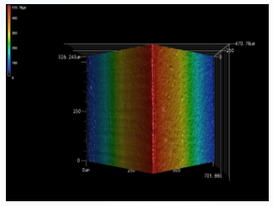
Vertical 5-Axis Laser Machining Center

Travel	
X-axis	400mm
Y-axis	250mm
Z-axis	300mm
B-axis	±125°
C-axis	n x 360°

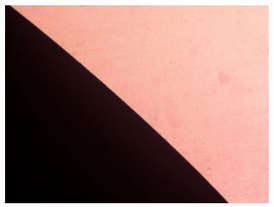
- Its bed is made of natural marble with stable structure, good rigidity, high accuracy and strong reliability;
- All the three linear axes use linear motors, thus having fast dynamic response and high positioning accuracy;
- The two rotation axes use high-precision torque motors;
- The linear axes and rotation axes adopt the closed-loop control;
- The linear axes use linear rolling guide rails, which have low friction coefficient and fast response;
- The modularized beam pathis equipped with a CCD positioning camera and a high-precision probe;
- The self-developed high-end universal CNC system is used.

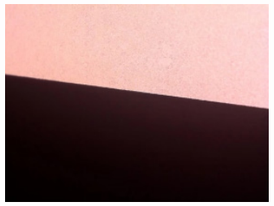


- It's suitable for high-precision machining of workpieces with large-curvature surfaces and complex contours.
- It can be applied in areas such as 3C, mold, automobile, education, and scientific research.
- It's widely used for machining of PCD, CBN, hard alloys, ceramics, metal and other materials, and can machine complex contours and profiles of welded-edge milling cutter, micro-edge tool, and thinwalled metal parts, etc. when it is used with the dedicated machining software.



Cutting edge (magnified 200x): Smooth transition, without ablation or overcut in arc; sharp cutting edge, flat and smooth flank surface





Work area

Machining range

Max. tool weight: 8kg

200mm

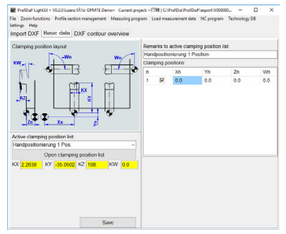
φ100mm (φ200 in special shape of tools)

Processing Accuracy

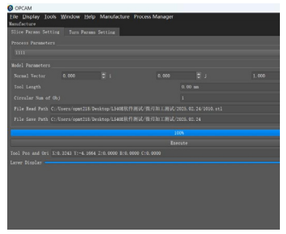
Cutting edge	500X Chipping < 3x3μm
Contours	≤ 0.005mm
Edge corner radius	≤ 0.004mm
Run-out	≤ 0.005mm
Relief angle roughness	≤ Ra0.2μm
Minimum inner radius	≤ 0.04mm

Customized double arm cradle turntable with water-cooled system

Customized laser source



CAM software



Specialized micro-edge cutting tool machining software

Travel	
X-axis	450mm
Y-axis	450mm
Z-axis	350mm
A-axis	±125°
C-axis	n x 360°

500X Chipping <3x3μm

Light 5X 40V-I

Vertical 5-Axis Laser Machining Center

All-in-one and High-efficiency Laser Processing Solution

- Its bed is made of natural marble with stable structure, good rigidity, high accuracy and strong reliability;
- All the three linear axes use linear motors, thus having fast dynamic response and high positioning accuracy;
- The two rotation axes use high-precision torque motors;
- The linear axes and rotation axes adopt the closed-loop control;
- The linear axes use linear rolling guide rails, which have low friction coefficient and fast response;
- The euqipment is equipped with built-in a CCD positioning camera and a high-precision probe.

PCD cutting tools laser processing solutions

Light 5X 40V

Vertical 5-Axis Laser Machining Center

PCD molding milling cutter

PCD corn milling cutter

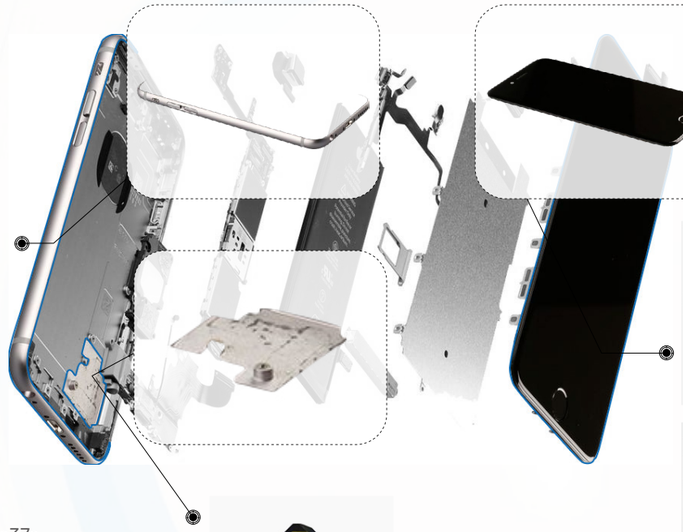
PCD corner radius end mill

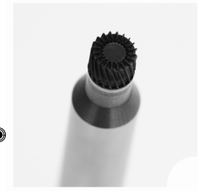
PCD molding milling cutter

PCD T-shaped molding milling cutter

PCD Contour Cutter

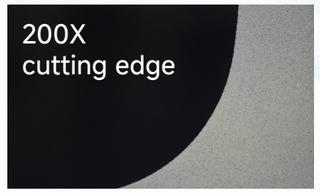
Processing time: 51min37s
Processing accuracy: ±0.005mm
Blade width: 0.2mm
Relief angle: 12°
Profile: 0.007mm
Passivation value: 0.00465mm

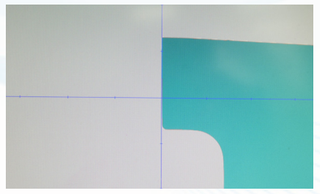




PCD Micro Blade

Monocrystalline Blade

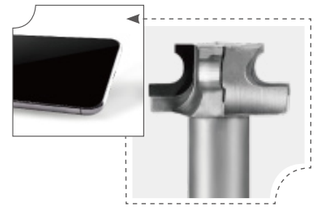




Light 5X 40V-I

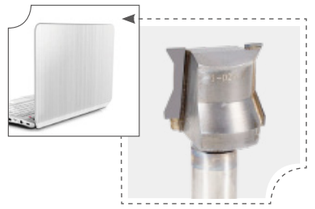
Vertical 5-Axis Laser Machining Center

Mobile phone contour processing



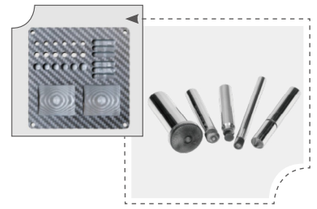
PCD contour cutter

Brushed finish



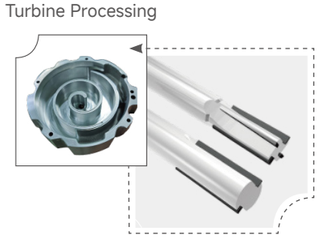
PCD wire drawing milling cutter

Sapphire / Carbon fiber processing



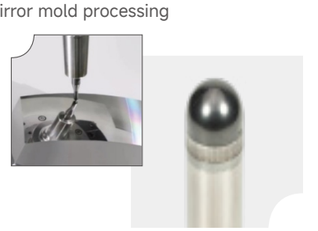
PCD integral multi-edge cutter

Turbine Processing



PCD vortex tool

Mirror mold processing

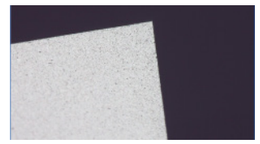


Ball end mill

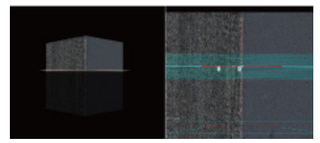
PCD contour milling cutter

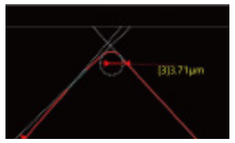
Suitable for

Cutting edge (magnified 300X)



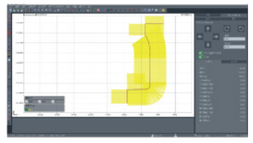
Edge passivation (magnified 1500X) **≤0.004mm**





Flank (magnified 200X)

Profile **≤0.005mm**



Over view of

Light 5X 40V

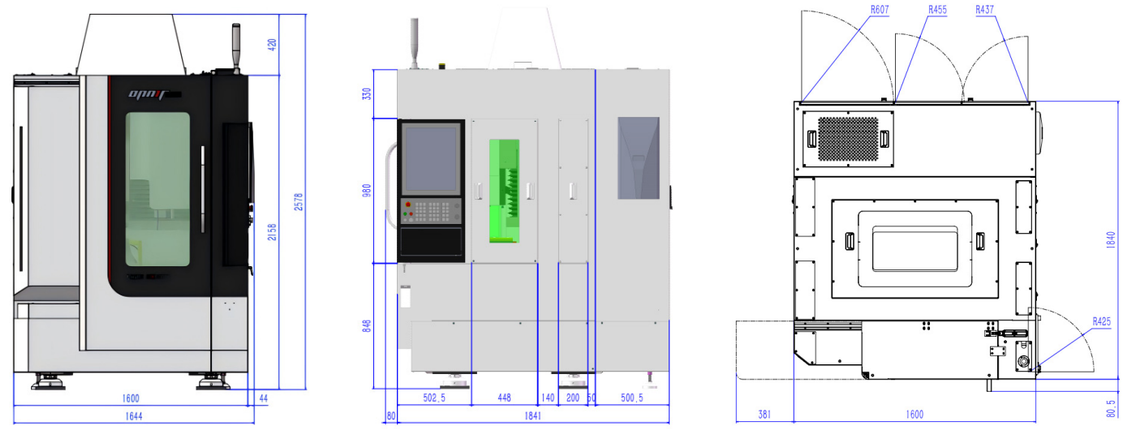
Light 5X 40V-I

Vertical 5-Axis Laser Machining Center

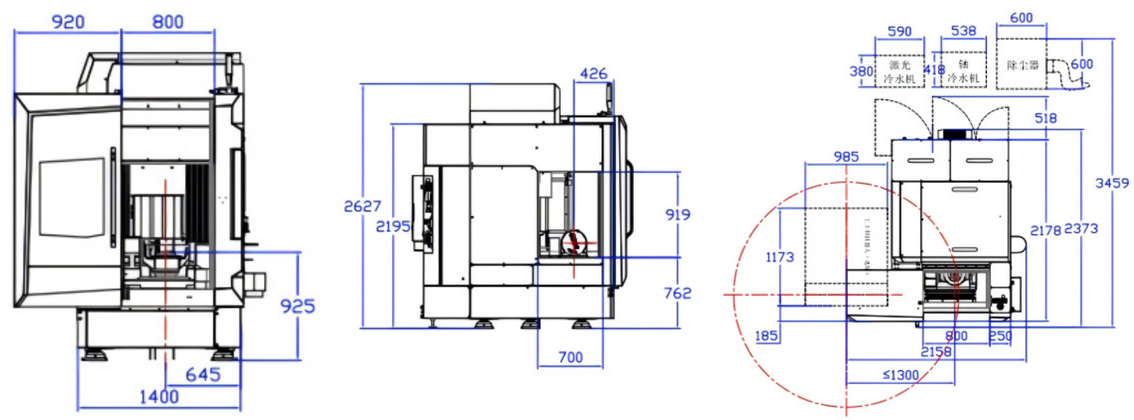
Travel	Unit	Light 5X 40V	Light 5X 40V-I
X-axis (left and right along the sliding plate)	mm	400	450
Y-axis (forward and backward the workbench)	mm	250	450
Z-axis (up and down the laser head)	mm	300	350
Workbench			
Dimensions of the horizontal workbench	mm	500 x 500	620 x 500
Load capacity of the horizontal workbench	kg	100	300
Dimensions of the C-axis workbench	mm	φ110	φ260
B(A)-axis swing angle	°	±120°	±125°
Max. load capacity of the C-axis workbench	kg	10	25
Feed rate			
B(A)-axis rated/max. speed	rpm	100/150	200/250
C-axis rated/max. speed	rpm	200/300	200/240
Cutting speed	m/min	20	20
X/Y/Z-axis rapid traverse speed	m/min	30	30
Accuracy			
X/Y/Z-axis positioning accuracy	mm	0.005	0.005
X/Y/Z-axis repeat positioning accuracy	mm	0.003	0.003
B(A)/C-axis positioning accuracy	"	10	8
B(A)/C-axis repeat positioning accuracy	"	5	4
Laser			
Pulse width	//	ns	ns
Power	W	100	100
Machining range			
Max. tool diameter	mm	φ100mm(φ200 in special shape)	φ200mm(non-circular)
Max. tool length	mm	200	350
Max. tool weight	kg	8	25
Clamping interface of workpiece		HSK-A63 manual clamping interface	BT-50/HSK-A63
Power			
Power supply voltage	V	AC380V±10%	AC380V±10%
Electric capacity	KVA	23	25
Air supply			
Air supply pressure	Mpa	≥0.7MPa	≥0.7MPa
Air supply flow rate	L/min	≥500L/min	≥500L/min

Machine dimensions	Unit	Light 5X 40V	Light 5X 40V-I
Floor space (L x W x H)	mm	1700 x 1900 x 2600	2400 x 1600 x 2600
Weight	kg	3500	4500

Light 5X 40V



Light 5X 40V-I



MICRO 3D SERIES

Mold texturing laser micro machining solutions

Micro3D L530V

5-Axis Femtosecond Laser Processing Center

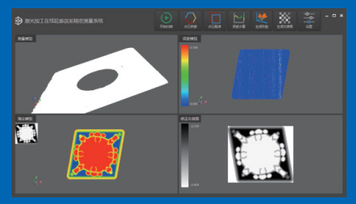
Machining precision	
Max. clamping workpiece weight	10kg
Depth inaccuracy	±0.01mm
Position deviation	±0.01mm
Angle inaccuracy	±1°
Roughness Ra	< 0.3μm

Machining range	
Blades	
Max. processing range and depth	45x45x5mm
Cutting tools	
Max. length	100mm
Max. diameter	100mm

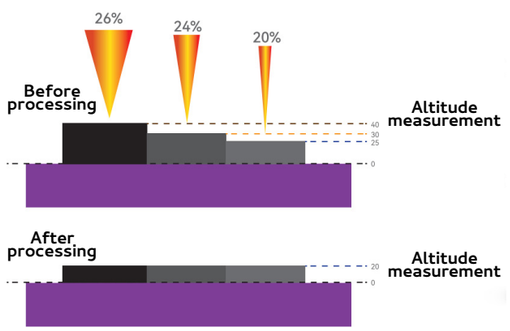
- No contact processing, no tool wear, no consumables loss;
- Ultra-fast laser with minimal thermal effect, especially suitable for micro-nano structure and other ultra-high precision processing requirements;
- Ultra-high peak power, which can directly process variety of ultra-hard materials, brittle materials with high productivity;
- High-precision 3D graphic scanning and processing technology, which can be directly processed free-form structures without molds;
- Self-developed software control system, fully digitalized process without human intervention, high stability.

High-precision adaptive machining

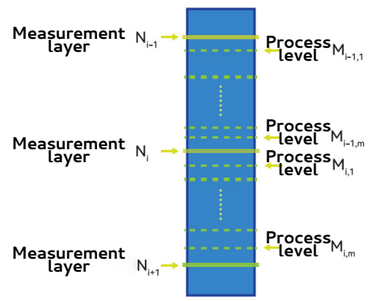
Self-developed and high-precision three-dimensional on-line measurement and control system, on-line measurement of the machined surface of the parts during the manufacturing process and on-line adjustment and optimization of the laser power and machining path based on the measurement results.

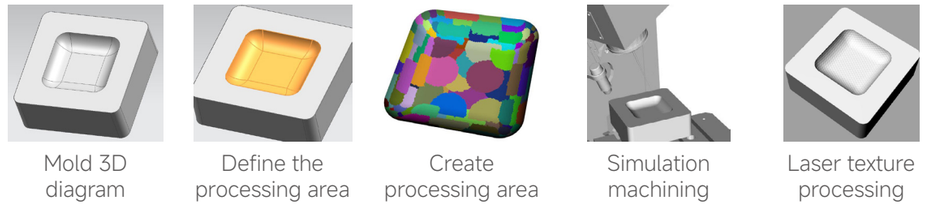


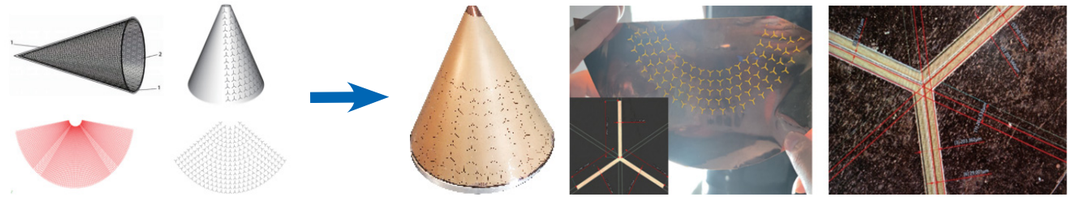
Laser Power Adjustment Schematic



Machining Path Optimization Schematic



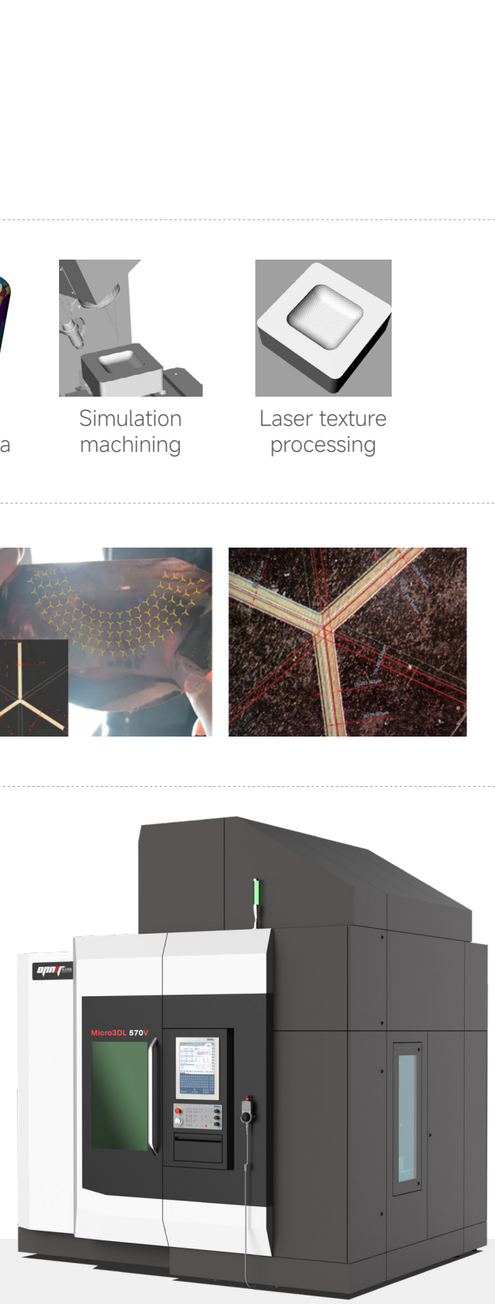




Micro3D L570V

5-Axis Mold Texture Laser Processing Center

Combined with the self-developed free-form surface laser processing software can realize the precision etching processing of free-form surfaces in three-dimensional space.



Machining range	
Max. processing diameter	φ600mm
Max. processing height	350mm
Max. processing weight	350kg
Worktable diameter	φ500mm
Max. worktable capacity	300kg

Nanosecond laser (femtosecond compatible)

- The whole machine adopts one-piece casting, with stable structure, good rigidity, high precision and strong reliability;
- has the function of three-dimensional model archive, which can be 3D simulation simulation;
- customized machining area, automatic planning and generation of machining blocks;
- arbitrary layered design, intelligent generation of splicing machining program linkage machining and other special features.

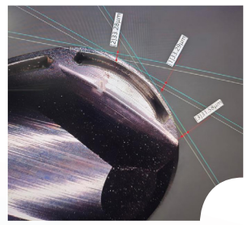
Mold texturing laser micro machining solutions

Micro3D L530V

5-Axis Femtosecond Laser Processing Center





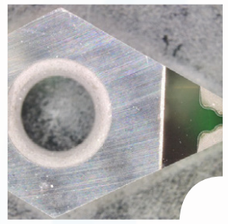
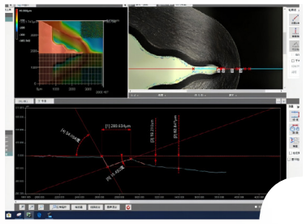


Carbide blade geometry

- Through layered material removal, 3D complex structure precision machining is achieved, with the minimum single layer material removal thickness < 1μm
- Used for carbide blades, small precision mold processing, etc.
- Machining depth and dimensional accuracy ≤ ±10μm
- Machining surface roughness Ra ≤ 0.3μm

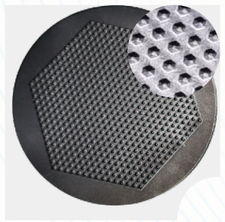
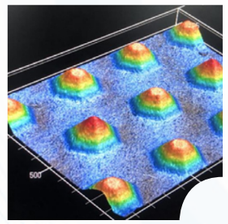
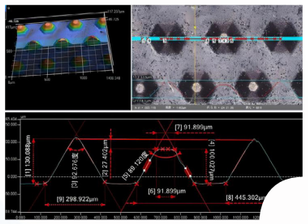
Free-form surface microstructure processing

- Material removal by layering
- Automatic calculation and optimization of processing paths
- Processing position and dimensional accuracy ≤ ±10μm

PCD chip breaker

- Edge passivation < 5μm
- Edge serration 500X < 0.002
- Processing accuracy ≤ ± 10μm
- Processing surface roughness Ra ≤ 0.3μm

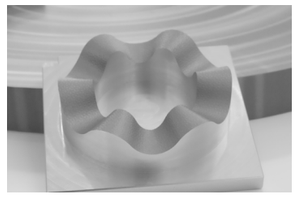
Microstructure processing of silicon carbide surface


Surface micro-nano processing (LIPSS)

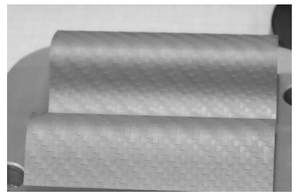
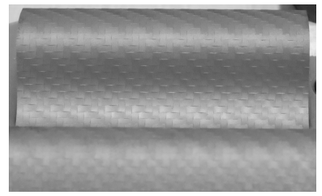
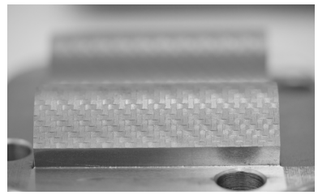
- LIPSS period can reach 500nm
- Combined with the etching process of free-form surface, surface micro-nano composite texture processing can be achieved.

Micro3D L570V

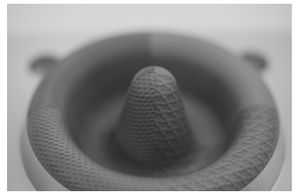
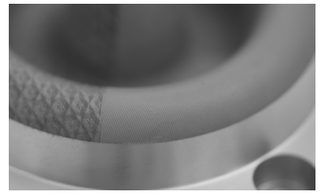
5-Axis Mold Texture Laser Processing Center



Material: Aluminum Alloy
Dimension: 90 x 90 x 50mm
Texture Depth: 0.08mm
Texture Type: Diamond 3D Texture
Processing advantages: 3D surface high repeatability precision etching processing

Material: NO.45 Steel
Dimension: 90 x 90 x 30mm
Texture Depth: 0.08mm
Texture Type: Carbon Fiber Texture
Processing advantages: 3D surface high repeatability precision etching processing


Material: Aluminum Alloy
Dimension: 90 x 90 x 50mm
Texture Depth: 0.08mm
Texture Type: Geometric Texture
Processing advantages: 3D surface high repeatability precision etching processing

Over view of

Micro3D L530V

5-Axis Femtosecond Laser Processing Center

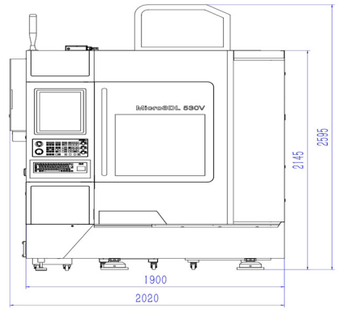
Micro3D L570V

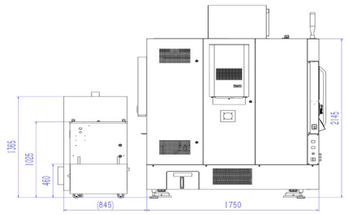
5-Axis Mold Texture Laser Processing Center

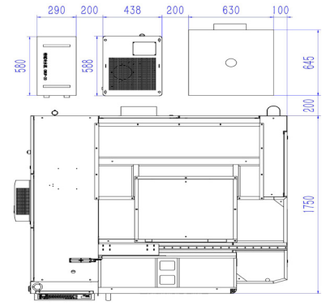
Travel	Unit	Micro3D L530V	Micro3D L570V
X-axis (left and right along the sliding plate)	mm	300	700
Y-axis (forward and backward the workbench)	mm	300	600
Z-axis (up and down the laser head)	mm	260	500
B-axis (turntable tilt axis)	°	±110	±110
C-axis (turntable rotation axis)	°	360	360
Feed speed			
X/Y/Z-axis cutting speed/rapid traverse speed	m/min	20/30	30/30/30
B-axis rated/max. speed	rpm	100/150	
C-axis rated/max. speed	rpm	200/300	
A-axis max. rotation speed	rpm		60
C-axis max. rotation speed	rpm		90
Accuracy			
X/Y/Z-axis positioning accuracy	mm	0.003	0.008
X/Y/Z-axis repeat positioning accuracy	mm	0.002	0.006
B(A)/C-axis positioning accuracy	"	5	10
B(A)/C-axis repeat positioning accuracy	"	3	6
Workbench			
Table diameter	mm		φ500
Processing diameter	mm		φ600
Processing height	mm		350
Maximum load capacity	kg		350
Acceleration			
X/Y/Z	m/s^2		0.5
Laser			
Pulse width		⩽400 fs	20-200ns
Power	W	⩾30	100
Repetition frequency	KHz	25-5000	
Beam quality		M^2<1.2	
Power			
Power supply voltage	V	AC380V±10%	AC380V±10%
Electric capacity	KVA	15	40
Air supply			
Air supply pressure	Mpa	⩾0.7MPa	⩾0.7MPa
Air supply flow rate	L/min	⩾500L/min	⩾500L/min

Machine dimensions	Unit	Micro3D L530V	Micro3D L570V
Floor space (L x W x H)	mm	1750 x 1900 x 2600	3100 x 2800 x 3300
Weight	kg	6000	8000

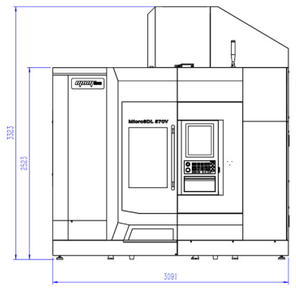
Micro3D L530V

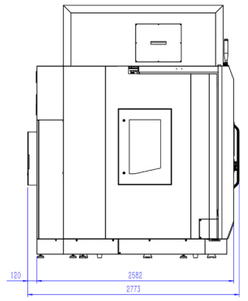


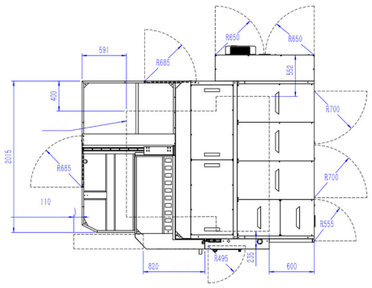




Micro3D L570V



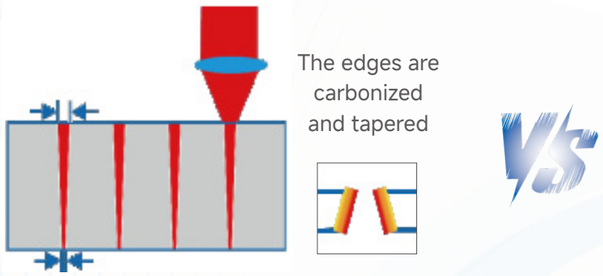




WJL 5X SERIES

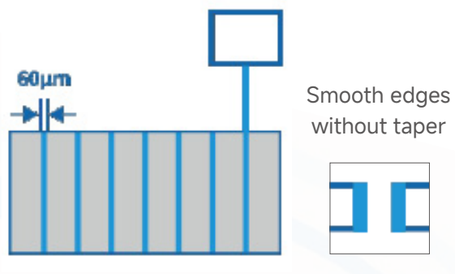
Water-jet guided 5-axis laser machining center

Conventional Laser Cutting

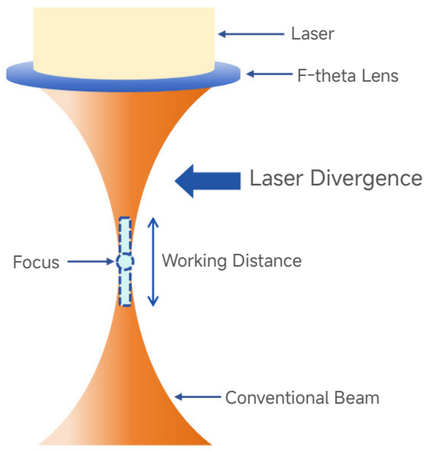


- Laser divergence does not result in a flat slit;
- Output depends on the slit;
- Requires more post-slice grinding.

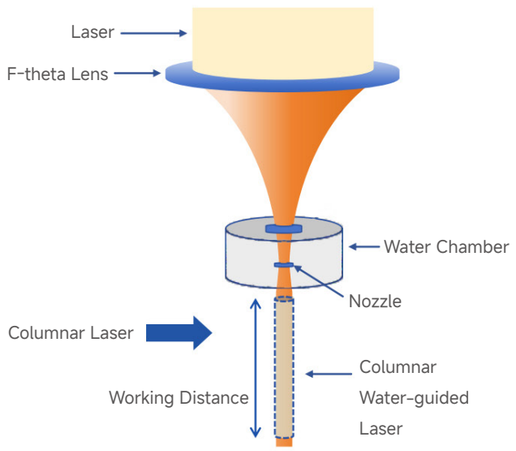
Water-jet guided Laser Cutting



- Parallel cut seams;
- Higher output (lower loss rate);
- Possibility of slit widths as small as a conventional laser ⅕.

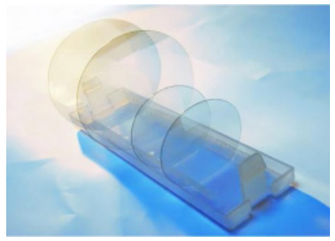


- The effective processing range of conventional lasers is very small;
- The higher the energy density, the smaller the focal point diameter and the faster the divergence;
- The cut is more likely to have a taper.



- No need to refocus or re-control the distance after changing the height of the processing surface;
- Constant laser density;
- High quality hole wall;
- Deeper machining lengths.

Processing materials

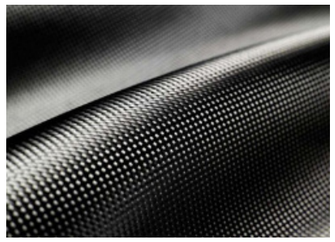


Compound Semiconductor

Metal

Ceramic Materials / Hard Alloy

Various Gemstones



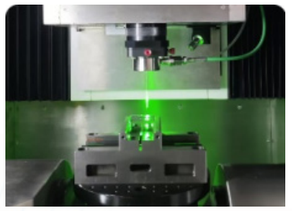
Composite Materials

Water-jet guided 5-axis laser machining center

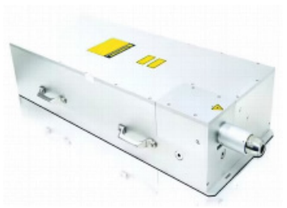
It can realize water-jet guided laser cutting and drilling of flat workpieces and complex special-shaped parts.

- Couple 50W-100W laser into 50-100μm nozzle to achieve high-power laser and water column coupling;
- Perform drilling and cutting of ultra-hard materials and difficult-to-process materials without taper;
- Excellent surface quality of the processed area, almost free of slag, recast layers and heat affected zones;
- Cutting depth-to-width ratios of up to 100:1;
- Processing depth-to-diameter ratios of up to 30:1;
- Maximum accuracy up to ±3μm, surface quality up to Ra0.8μm.

Core components



Water-jet guided laser cutting head

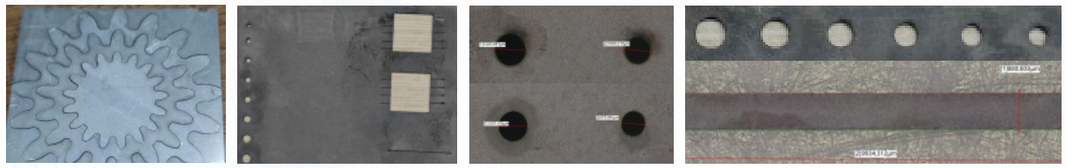


Water-jet guided laser 532nm-100W

High-pressure water treatment system

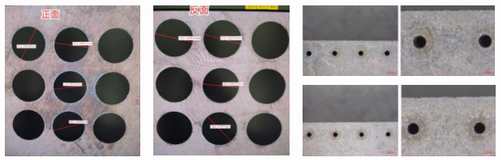
Material Titanium Alloy

Required aperture	Thickness	Measured aperture
2mm	0.8mm	0.809mm
2mm	1mm	0.98mm
5mm	1.2mm	1.207mm
5mm	2.4mm	2.415mm



Material SiC Silicon Carbide

Thickness	Aperture
10mm	2.4mm
5mm	0.5mm

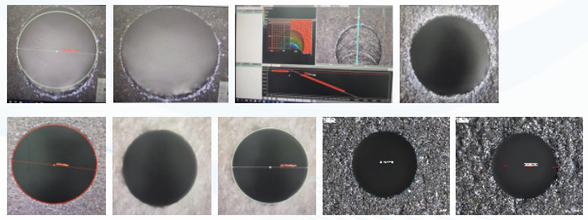


The front of the hole at different magnifications

The back of the hole at different magnifications

Material CMC

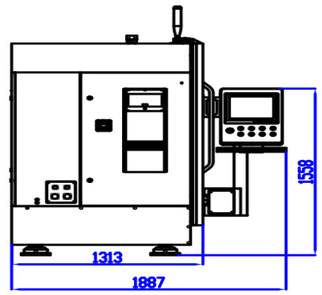
Thickness	Aperture
8mm	1.9mm
5mm	90° / 0.8mm
5mm	30° / 0.8mm
5mm	45° / 0.8mm

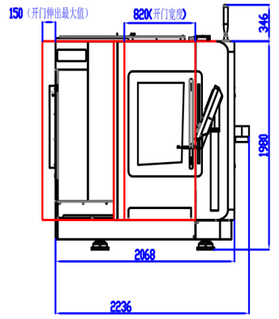


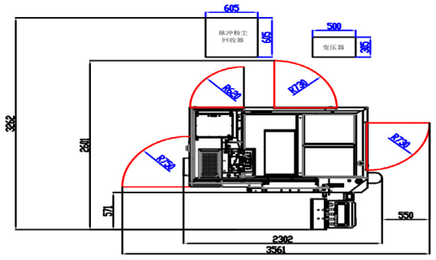
Over view of WJL 5X SERIES

Travel	Unit	WJL 5X Series
X-axis	mm	420
Y-axis	mm	580
Z-axis	mm	380
A-axis	°	-120°~+30°
C-axis	°	360
Feed speed		
A-axis max. rotation speed	rpm	100
C-axis max. rotation speed	rpm	150
X/Y/Z-axis rapid traverse speed	rpm	30/30/30
X/Y/Z-axis max. feed speed	rpm	20/20/20
Accuracy		
X/Y/Z-axis positioning accuracy	mm	0.005
X/Y/Z-axis repeat positioning accuracy	mm	0.003
A/C-axis positioning accuracy	"	5
A/C-axis repeat positioning accuracy	"	3
Workbench		
Working table dimension	mm	200
Maximum load capacity	kg	20
CNC System		
NUM		
Laser		
Laser (Optional)-Wavelength	"	532
Water-jet diameter	μm	30-100

Machine dimensions	Unit	
Floor space (L x W x H)	mm	2704 x 3897 x 2561
Weight	kg	6500

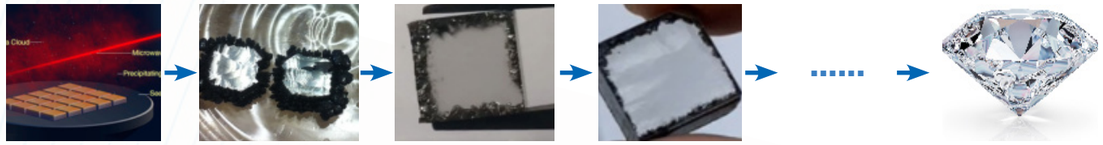






Dia SERIES

Diamond Laser Processing Solutions



- After the seed crystal grows for a cycle in the CVD generator, the polycrystal will adhere to the surface of the single crystal and needs to be trimmed regularly;
- The impurities will be on the top of the growth surface, with a thickness of about 0.05-0.3;
- After the CVD diamond is separated by the trimming machine, the polycrystals around it are further removed, and then the growth surface is cut and trimmed.

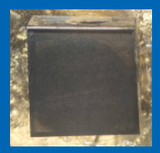
DiaCUT L315V

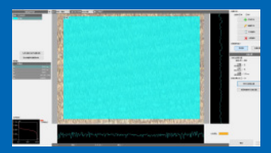
CVD Laser Diamond Surface Grinding Machine

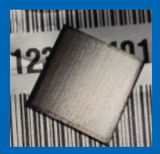
- It has the industry-standard trimming and scanning processes, which can trim the diamond growth surface;
- The scanning process has optimized the processing path and greatly improved the efficiency;
- The laser optical path adopts a modular design and has been optimized to improve the processing quality and reduce the defect rate.

- The whole equipment adopts marble structure + linear motor module, with high rigidity. The bed, beam, and other basic support parts have been aged, and the whole machine has good precision retention;
- This machine is mainly composed of base, beam, linear module, laser optical path components, etc. The base is made of steel welded castings with high vibration resistance, and the platform is made of marble with good thermal stability and high precision;
- X/Y axis is driven by linear axis: Z axis adopts precision KK screw module with high feed accuracy;
- Laser optical path components adopt modular design, which is easy to install and debug. At the same time, the optical path components are fully enclosed to protect the optical path components from pollution, and the operation is stable and reliable.

Comparison of machined surface roughness

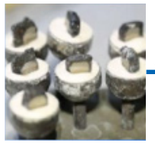




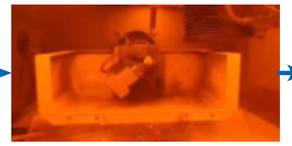


Machining roughness ≈ Sa 0.4 on comparative equipment and processes.

Traditional Crafts



Plaster fixing blanks



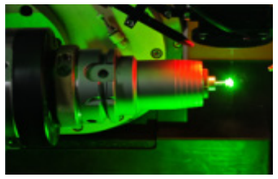
4P process

Manual roughing

Manual polishing

Finished loose diamonds

Laser Process



Laser Processing

DiaShape 510-I

Diamond | 5-Axis Laser Machining Center

Independent R&D can achieve efficient and high-precision laser processing of round drills and conventional special-shaped drills.

Product Showcase

Circle

Emerald

Square

Ellipse

- 32 surfaces (rough grinding) or 57 surfaces (fine grinding) are available on request;
- Machining accuracy up to EX grade cutting;
- Surface grain and carbonisation depth not exceeding 0.02mm;
- No need for 4P, edging, rough grinding and other processes;
- Can be polished according to the equipment processing carving, reducing the dependence of workers;
- Support the development of processing software packages for customised models.

Over view of

DiaCUT L315V

CVD Laser Diamond Surface Grinding Machine

DiaShape 510-I

Diamond 5-Axis Laser Machining Center

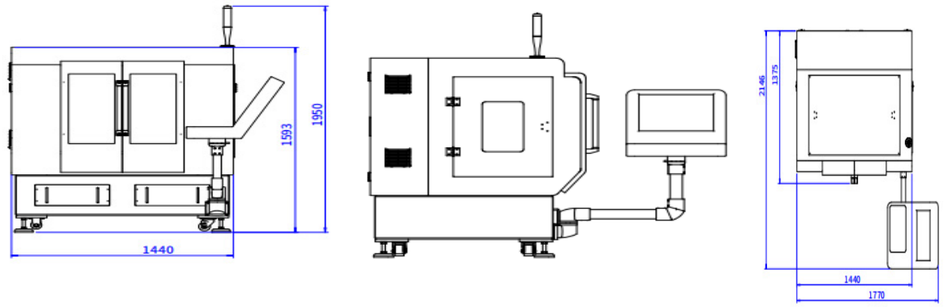
Travel	Unit	DiaCUT L315V	DiaShape 510-I
X-axis	mm	150	100
Y-axis	mm	150	120
Z-axis	mm	150	150
B-axis	°		±120
C-axis	°		360
Accuracy			
X/Y/Z-axis positioning accuracy	mm	0.01	0.01
X/Y/Z-axis repeat positioning accuracy	mm	0.01	0.008
A/C-axis positioning accuracy	"		20
A/C-axis repeat positioning accuracy	"		10

Rotary table for workpieces		DiaCUT L315V
Range	°	-20°~20°
Minimum scale	"	1
Drive (vehicle wheel)		Worm-gear
Guide rail form		Dovetail guide rails
Speed		
X/Y/Z-axis acceleration	m/s^2	1
X/Y/Z-axis max. movement speed	m/s	0.5
Structural		
Substrate		Natural marble
Clamping method		Paste / Vacuum adhesion
Main structural		L-shaped fixed beam

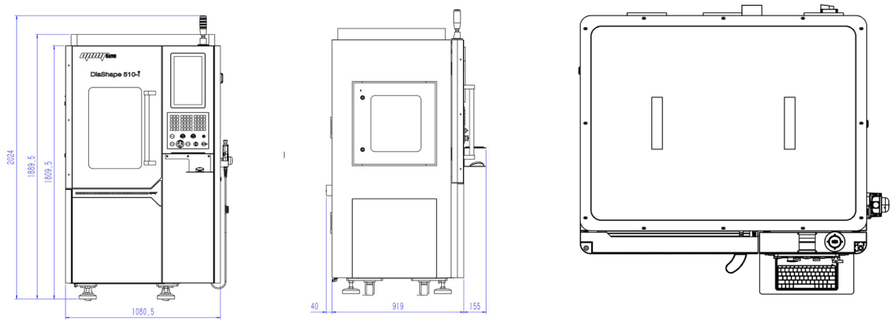
Feed drive mode		DiaShape 510-I
X/Y-axis		Linear motor module
z-axis		Screw module
A/C-axis		DD-motor
Speed		
Max. feed speed	m/min	15/15/15
A-axis max. rotary speed of rotary table	r/min	150
C-axis max. rotary speed of rotary table	r/min	300
Turntable Accuracy		
Radial runout at the distal end of a 100-long check rod	mm	0.02
Proximal end runout	mm	0.005
Processing Size		
Max. processing size	mm	φ50x50

Machine dimensions	Unit	DiaCUT L315V	DiaShape 510-I
Floor space (L x W x H)	mm	1000 x 950 x 1800	1030 x 959 x 1870
Weight	kg	1200	850

DiaCUT L315V



DiaShape 510-I



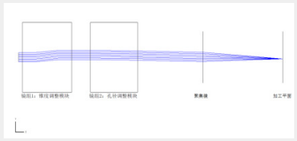
LP550V

Five-axis Ultra-fast Helical Drilling Laser Processing Center

Laser Selection

The laser adopts the core light source of a well-known domestic ultrafast laser brand, and is equipped with the OPMT helical drilling system. The structure and optical parameters are customized according to the index requirements proposed by OPMT, including the light outlet structure, spot roundness, polarization direction, etc.

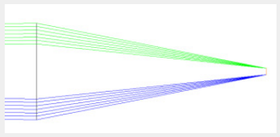
Helical Drilling Optical Module



The helical drilling optical module is independently developed by OPMT and consists of a beam deflection part and a light beam translation part, which are used to adjust the aperture and taper of the drilling respectively.

Helical Drilling Parameter simulation

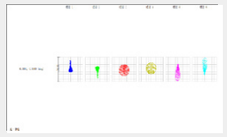
Simulated Drilling Radius R=0.5mm



R=0.5mm，θ=+6°

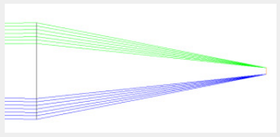
R=0.5mm，θ=+6°

R=0.5mm，θ=0°



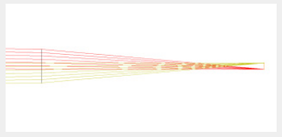
Light spot diagram

Simulated Drilling Radius R=0.1mm

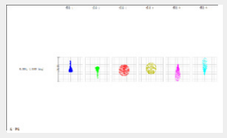


R=0.1mm，θ=+6°

R=0.1mm，θ=-6°

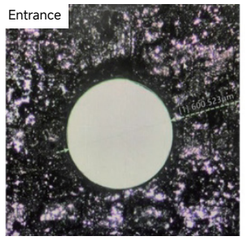


R=0.1mm，θ=0°

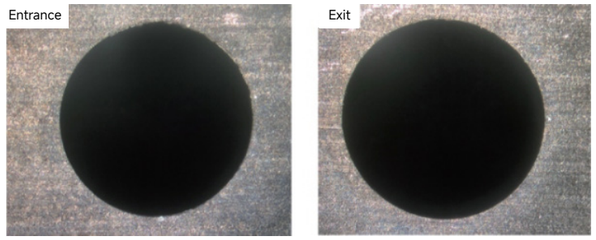


Light spot diagram

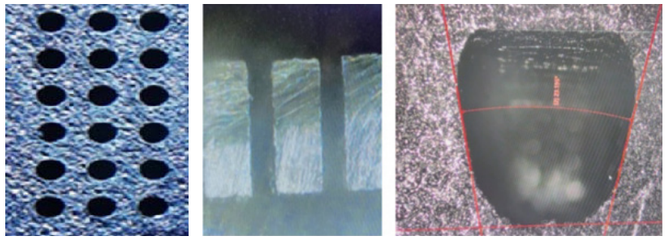
Laser Selection



Femtosecond hole cutting of silicon carbide ceramics, hole diameter 1.4mm, mechanical axis and helical drilling system linked processing.



Composite ceramic femtosecond drilling, thickness 2.6mm, hole diameter 0.6mm, mechanical axis and helical drilling system linkage processing.



High temperature alloy drilling, 2mm thickness, 0.3mm diameter, femtosecond laser.

LP550V

5-Axis Ultra-fast Helical Drilling Laser Processing Center

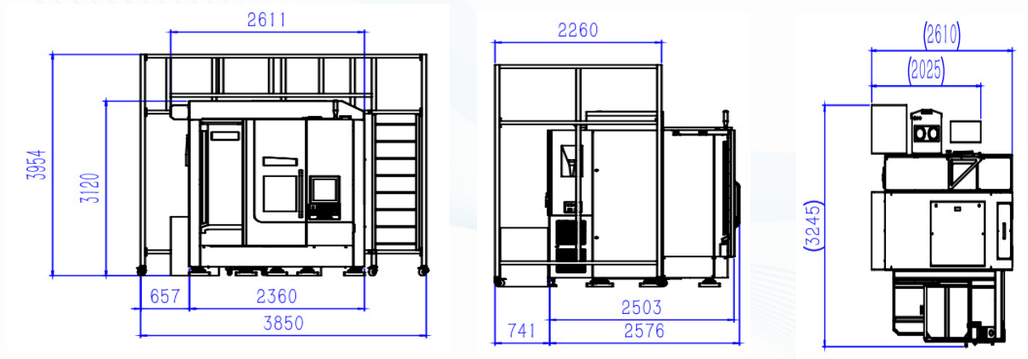
- The bed and column are made of high-rigidity cast iron, integrally formed, and have high overall rigidity. The column adopts a "wall" structure with stable support;
- The overall center of gravity of the machine tool is low, the stability is good, and the vibration of the whole machine is small;
- The A-axis and C-axis adopt modular design, which is easy to install and maintain. At the same time, they adopt a direct-drive indexing structure with high precision and good dynamic response characteristics;
- The laser galvanometer adopts modular design, which is easy to assemble, debug and maintain;
- The equipment has functional expansion and software upgrade.

Over view of LP550V

5-Axis Ultra-fast Helical Drilling Laser Processing Center

Travel	Unit	LP550V
X-axis	mm	520
Y-axis	mm	640
Z-axis	mm	680
B-axis	°	(-110)~(+30)
C-axis	°	nx360
Accuracy		
X/Y/Z-axis positioning accuracy	mm	0.008
X/Y/Z-axis repeat positioning accuracy	mm	0.005
A/C-axis positioning accuracy	"	10/10
A/C-axis repeat positioning accuracy	"	5/5
Workbench		
Max. workpiece size (diameter*height)	mm	φ400*310(including fixture size)
Turntable load capacity	kg	20
Working table diameter	mm	φ320
Helical Drilling Optical Module		
Entrance diameter	m/s^2	≤4.5
Focus distance	m/s	50~60(Customizable)
Diameter range	m/s	0.1-1
Taper range	°	+6
Aspect ratio		＞15：1
Max. feed speed		
X/Y/Z-axis	°	20/20/20
Power		
Power	V,KVA	380+10%,25

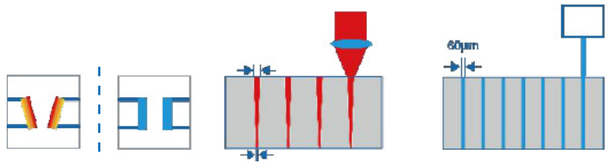
Machine dimensions		
Floor space (L x W x H)	mm	3600 x 2610 x 3120
Weight	t	10



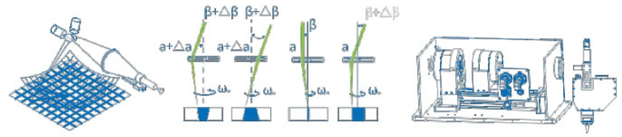
R&D and Innovation

Optical System

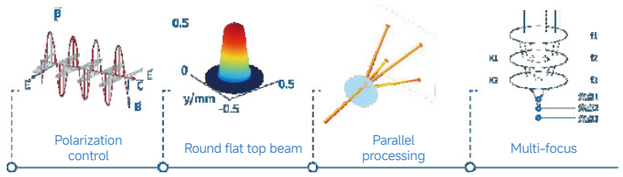
Water-jet Guided Laser



Multi-axis Optical Synchronization Control

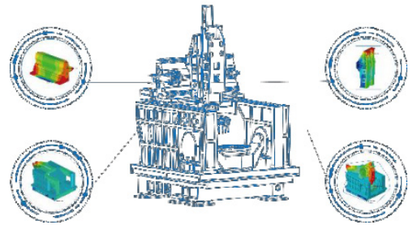


Beam Shaping



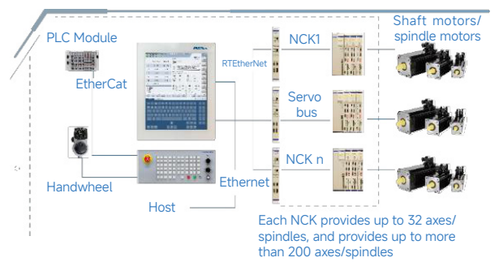
Machine tool design

Structural Design & Simulation



CNC system

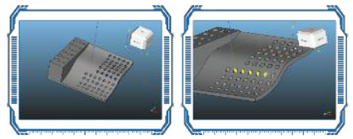
Operating Panel with Integrated IPC



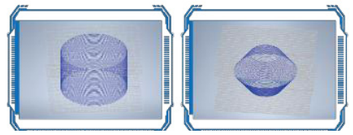
The core components are independently produced and compatible with domestic and foreign brand motors.

CAM Software

Five-axis cutting/drilling

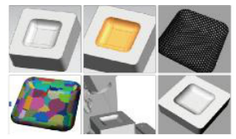


- 3D Model Display & Editing
- Feature Recognition and Process Design
- Path planning and post-processing

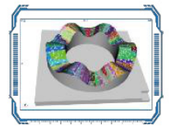


- Helical drilling process and path

Texture Mould

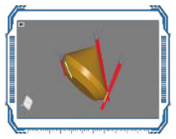


- Mould texture pre-processing
- Path planning and post-processing

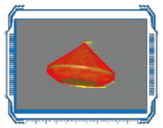


- Typical surface texture

Diamond Forming Process

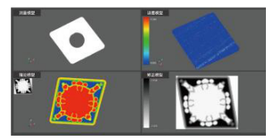


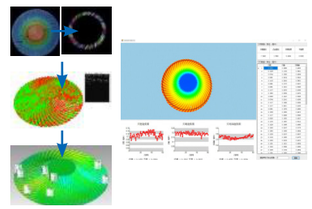
- Cutting path planning for loose diamonds



- Machining path display and inspection

3D Visual Inspection





Authoritative Certification

Building Industry Benchmark

RoHs certification,ISO14001 and ISO45001 management system certification

About OPMT

1,000 sets/year
Full production capacity

113 R&D Employees
54% total employees
7 PH.Ds
7 Masters,
65 Undergraduates,
Covering talents in various fields such as Laser application, Mechanics, Electrics and Software

300+ Patents
302 patents for inventions, utility models, etc.
128 invention patents,
183 utility model patents,
24 exterior design,
9 software

5 R&D Centers & Labs
Provincial Manufacturing Innovation Center,
Engineering Technology Research Center,
Ultrafast Laser Processing Joint Laboratory,
Foshan Postdoctoral Workstation,
Graduate Student Joint Training Demonstration Site

EASY MAINTENANCE
Use high-end international universal accessories

FLEXIBLE CUSTOMIZATION
Customized base on customer needs

TRAINING PROGRAM
Provide operation training

Turnkey Provider

with impressive technology expertise

Cover 30, 000 m^2, 210 employees, multi-axis CNC laser machine manufacturer, and provide smart factory manufacturing solution.

Modern facility


Constant temperature and humidity workshop


Dust-free laboratory