OPMT Machining Solutions for Indexable Cutter and Microstructure Processing Industry

Micro 3D L530V

5-Axis Femtosecond Laser Processing Centre

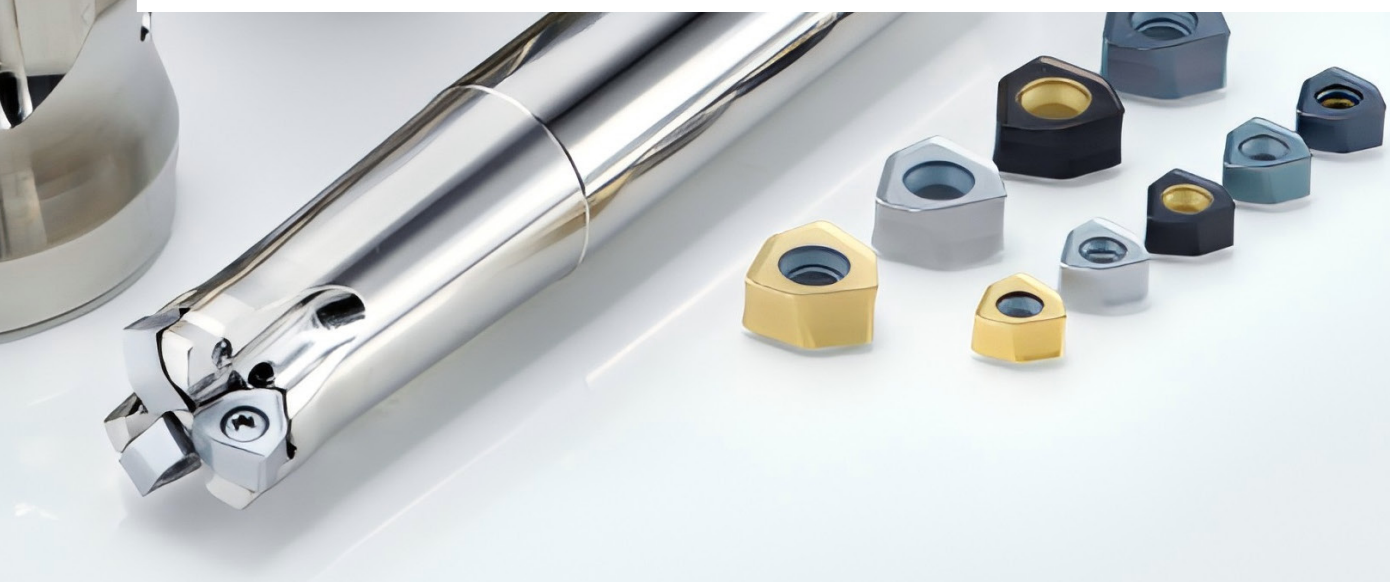
The future of indexable blades and blade textures

In the current production process of indexable carbide CNC inserts, after the sintering and compacting stage, precision machining is often required to achieve accurate and consistent geometry, tolerance and dimensional requirements.

Traditional fine processing relies on fine grinding machines and EDM machines to complete the tasks of grinding and engraving the texture of the blade grains. However, this not only generates a lot of dust, but also has an efficiency that is about 30% lower than laser processing.

Although traditional grinding methods still have advantages in creating chip breakers and processing superhard materials such as PCD, under technological innovation, the application of advanced femtosecond laser processing technology has not only significantly improved processing efficiency and economic benefits, but also optimized traditional processes such as grinding and EDM that generate a lot of dust and consumables, achieving true green manufacturing, safety and environmental protection.

At the same time, applying the same technology to the processing of microstructured workpieces and their microstructured mold textures, surface CNC tool processing chip breakers can realize free-form surface microstructure processing, truly realizing green manufacturing-because no consumables are required, greatly reducing the impact on the environment.



Widely used in a variety of materials

The Micro 3D L530V five-axis femtosecond laser machining center widely used in the machining of parts made from ultra-hard materials, hard metals, ultra-hard coatings, ceramic materials, CBN, PCD, diamonds, and more.

Combined with specialized machining software, it can handle various chip-breaker grooves, helical slots, slot shapes for hard metal inserts, and complex contours and surfaces, as well as blunting the edges of tools made from ultra-hard materials. It can also be used for creating laser-induced periodic surface structures (LIPSS).

Laser engraving of complex three-dimensional structures

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**

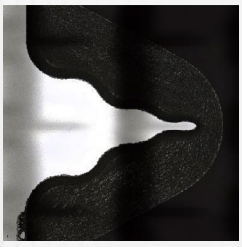
PCD chip breaker

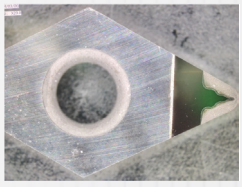
- Edge passivation **< 5μm**

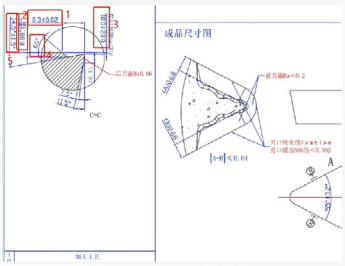
- Edge serration 500X **< 0.002**

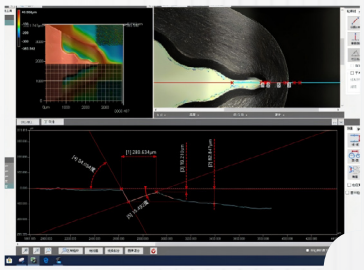
- Processing accuracy **≤ ± 10μm**

- Processing surface roughness **Ra ≤ 0.3μm**



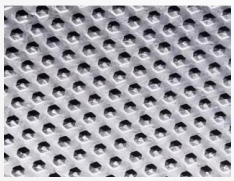


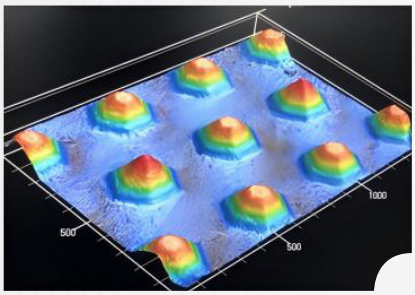


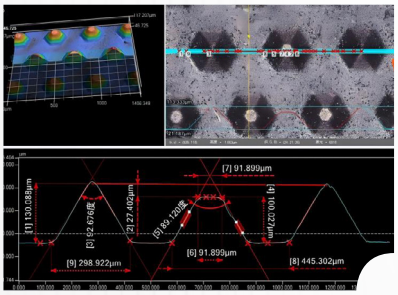


Surface microstructure

Microstructure processing of silicon carbide surface







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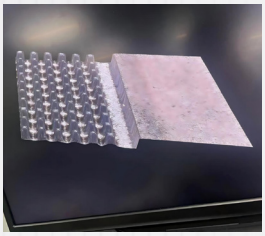
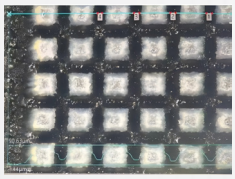
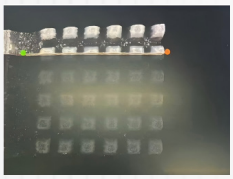
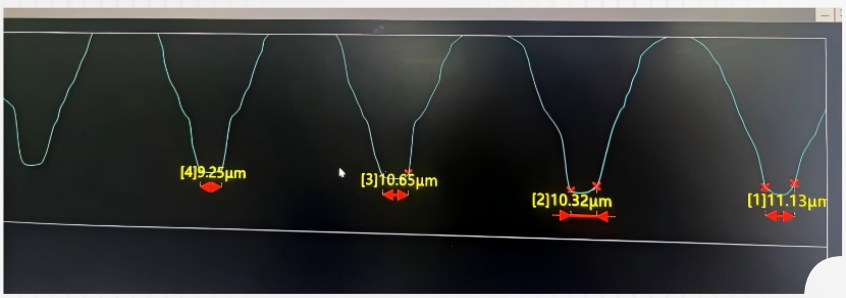






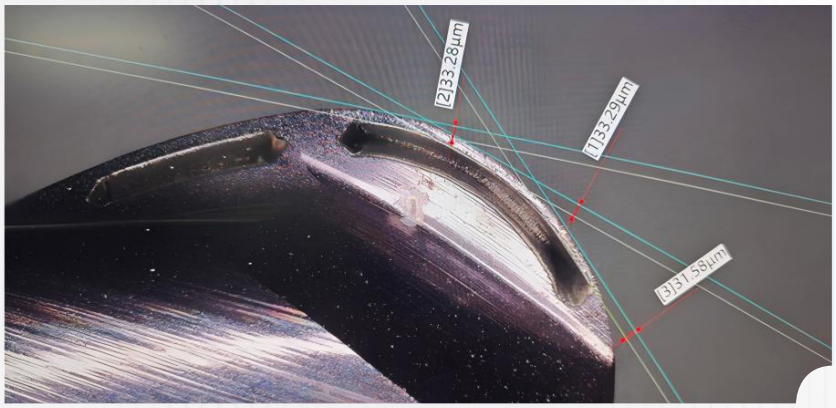


Free-form surface microstructure processing

- Material removal by layering

- Automatic calculation and optimization of processing paths

- Processing position and dimensional **accuracy ≤ ±10μm**



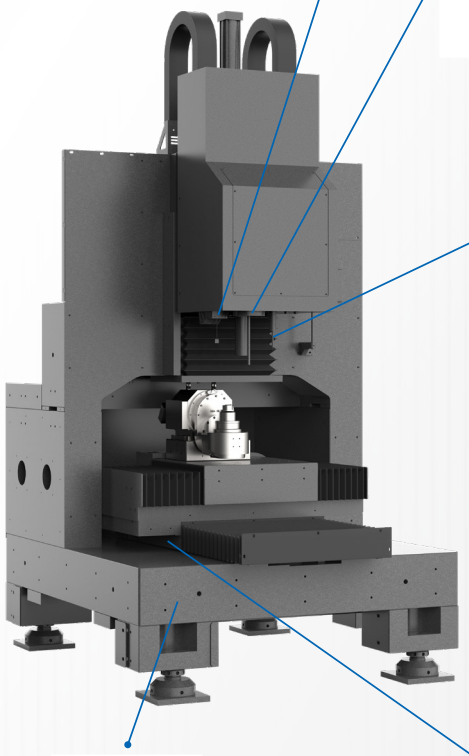
Surface micro-nano processing (LIPSS)

- LIPSS period can reach **500nm**

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

Make the difference your versatile solution

Deliver highly accurate and repeatable laser engraving, texturing and microstructural processing solution combines outstanding quality, efficiency, and femtosecond laser technology in the smallest possible footprint.



High-resolution positioning camera with no less than 20 million pixels

Supports adjustment of resolution and pixels through software settings

High-precision 3D scanning and focusing system:

Imported fused quartz telecentric F-theta Lens

High transmittance and low absorption, high uniformity within a large area, achieving a smaller focusing spot

High-precision 3D galvanometer

Ensures high repeatability and long-term stability, fast response speed and high efficiency

MP250 machine tool probe system

Quickly realize the calibration of the machine tool rotation center and the precise positioning and processing of various parts

- Both the linear axis and the rotary axis adopt closed-loop control, and the position detection and feedback resolution is **≤ 0.01μm**
- **X/Y/Z - axis: Adopt linear ball guide**
  Low friction coefficient and good stability
- **X/Y/Z - axis: Adopt linear motor**
  B/C - axis: Adopt torque motor
  Fast dynamic response and high positioning accuracy

Grating scale

Full closed-loop for fast dynamic response

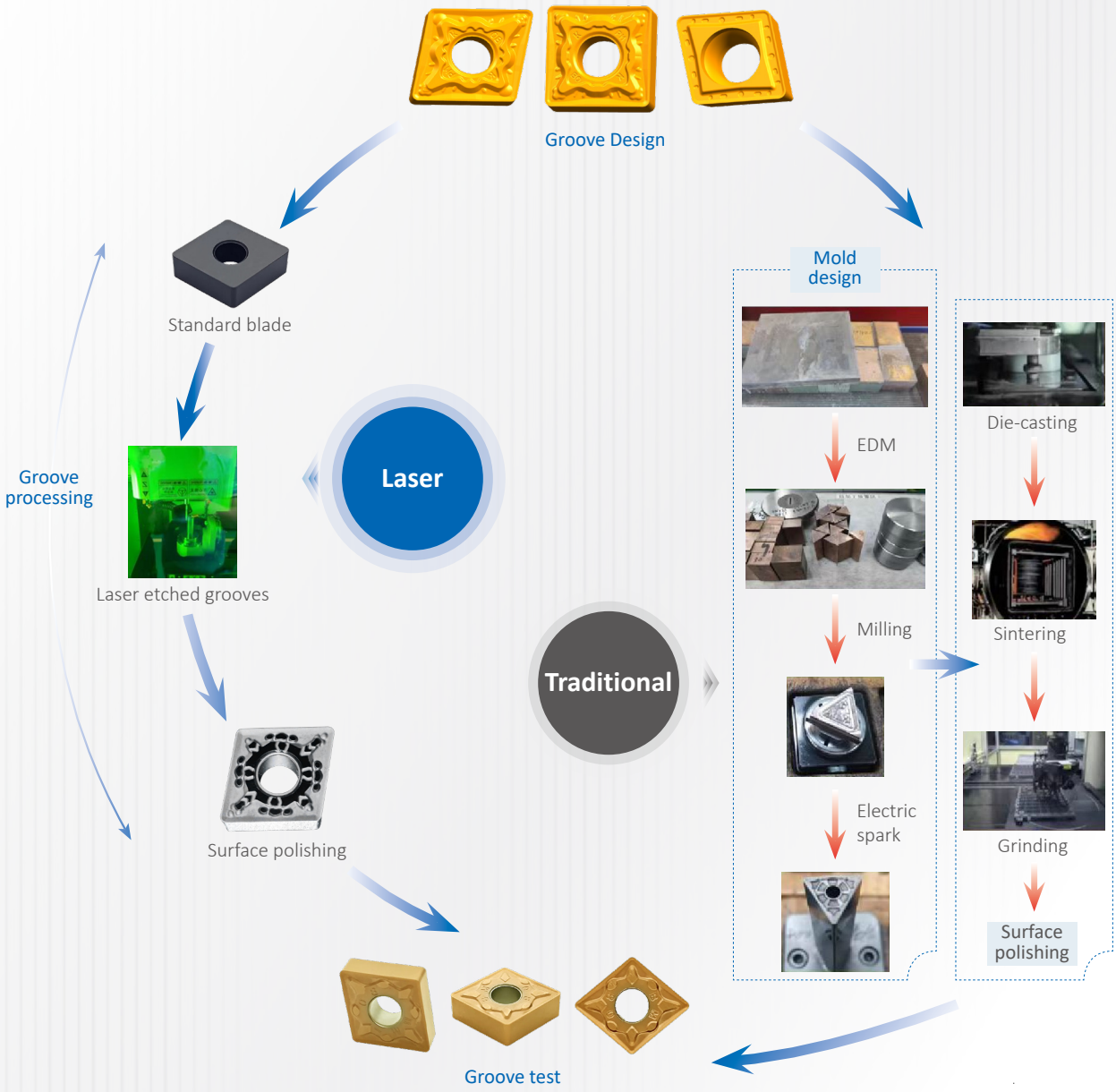
Long-term stability

Natural marble base

Configured with a **≥ 30W** power infrared femtosecond laser, based on an all-fiber femtosecond laser architecture, with a pulse width **≤ 400fs** and a repetition frequency **≥ 1MHz**. Modular design, optional green laser, achieve the best precision and highest production efficiency for different material applications, adapting to industrial 7×24 production needs.

Technology features for an optimized process and the highest flexibility

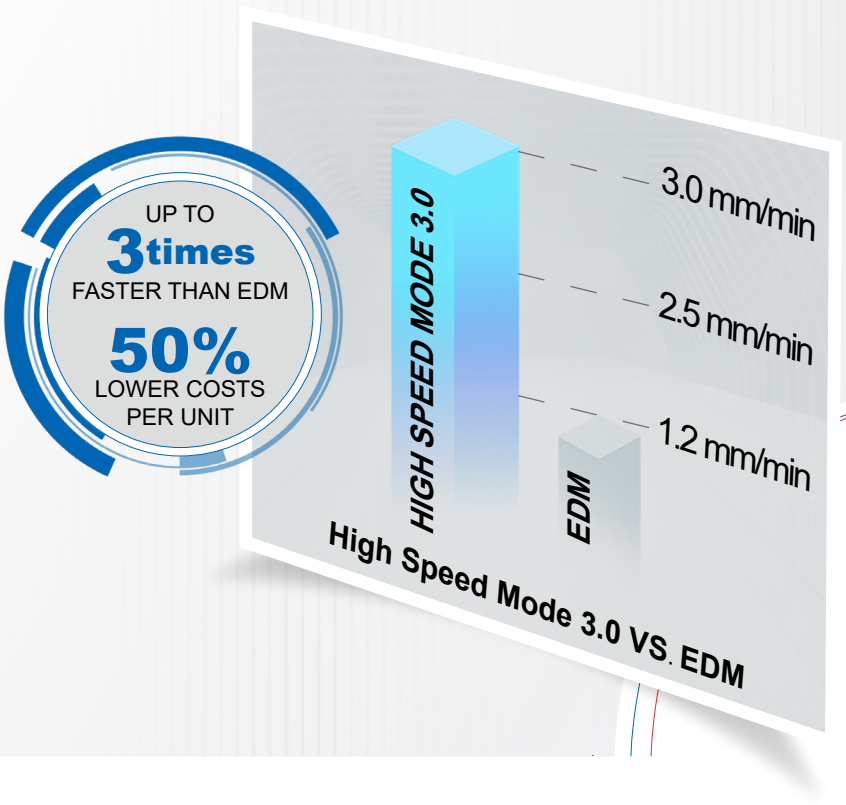
During the manufacturing process, the machining center measures and adjusts the ablation power of the laser beam in real-time, ensuring the highest precision in part machining. Additionally, the position of the laser beam within the scanning area and the laser power are automatically calibrated, ensuring outstanding repeatability and long-term stab.



Simplify your machining process, success in one setup

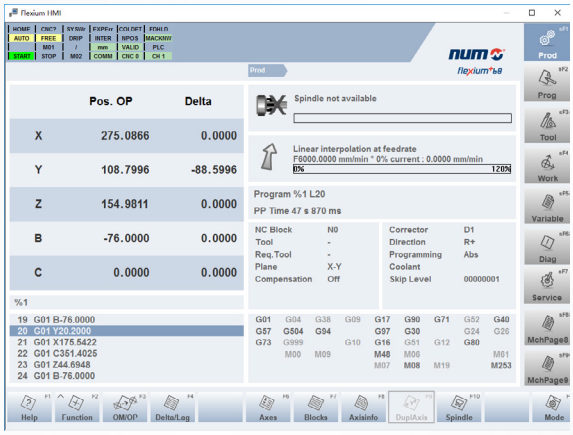
Limit human error, open new design possibilities and easily texture and engrave your parts, molds and dies—regardless of surface constraints—with our fully digital five-axis process. Fast, accurate and easy surface calculation is built into our Laser solutions to save you time and increase your productivity.

Traditional process		Laser process	
Procedure	Required equipment	Procedure	Required equipment
Slot design	Computer	Slot design	Computer
4 sets of mold substrate cutting (4-8H)	EDM wire cutting	Standard Light Plate Blade	Die casting and sintering equipment/polishing machine
4 sets of mold substrate polishing (2-4H)	Polishing machine		
2 sets of EDM mold processing (8-16H)	5 Axis milling processing center	Laser slotting (3-6H)	Five axis femtosecond laser machining center
Die casting mold processing 2 sets (12-20H)	EDM machine		
Die casting sintering forming (7-15D)	Die casting and sintering equipment		
Surface and blade treatment		Surface and blade treatment	
Blade slotting test		Blade slotting test	
Required duration: More than 15 days		**Required duration: More than 5 days**	



Powerful and user-friendly NUM CNC control system

Ensures maximum ease of operation and process reliability, combine high-tech performance with genuine customer benefits and ensure application-orientated, simple programming and operation



•The open universal CNC system can meet various machine tool applications such as turning, milling, planing, grinding, laser, water jet, etc.

•The core of the CNC system is NCK, each NUM® system composed of 8 NCKs, each NCK provides up to 32 axes/spindles, and provides up to more than 200 axes/spindles, and is compatible with RTCP.

Perfect surface microstructure processing

Complete texture processing of extremely hard materials, includingthree-dimensional complex structure surface texture engraving, freeform surface microstructure etching processing, chip breaker shapeprocessing.

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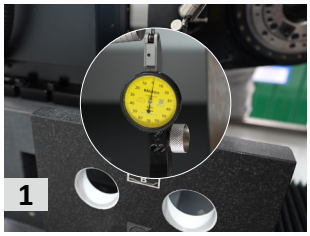
1 ZOLLER-Setting for tool presetting

2 ZOLLER-Presetting and Measuring Machine

3 Laser microscope

Undergoes rigorous testing and calibration to maintain high precision and reliability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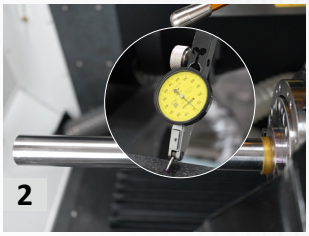
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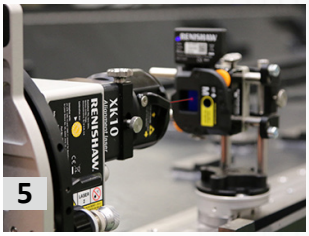

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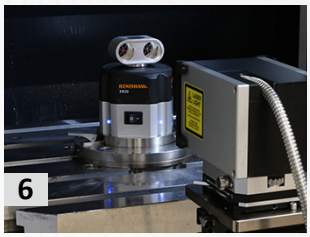
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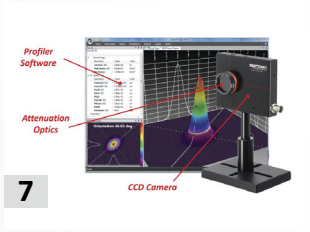

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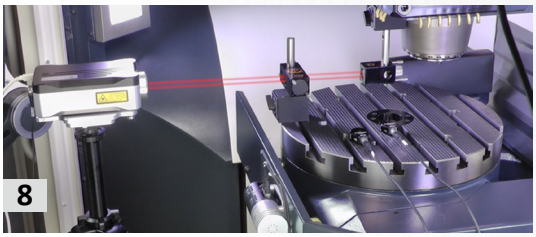
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1 X/Y/Z-axis parallelism accuracy detection

2 B/C-axis parallelism accuracy detection

3 Precision line parallelism accuracy detection

4 Ballbar

5 Alignment laser

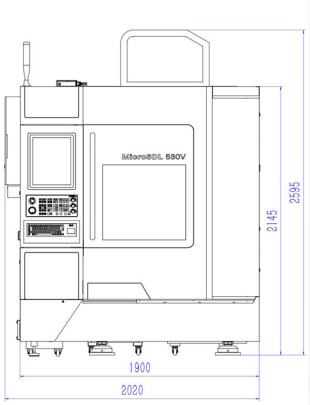
6 Rotary axis calibrator

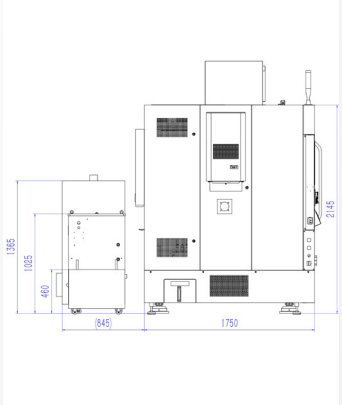
7 Laser beam profiler

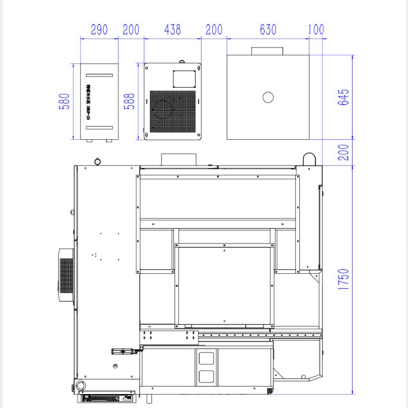
8 Laser interferometer

Travel	Unit	Micro 3D L530V
X-axis (before and after the workbench)	mm	300
Y-axis (forward and backward the workbench)	mm	300
Z-axis (up and down the laser head)	mm	260
B-axis (turntable tilt axis)	°	±120
C-axis (turntable rotation axis)	°	360
Feed speed		
X/Y/Z-axis cutting speed/rapid traverse speed	m/min	20/30
B-axis rated/max. speed	rpm	100/150
C-axis rated/max. speed	rpm	200/300
Accuracy		
X/Y/Z-axis positioning accuracy	mm	0.003
X/Y/Z-axis repeat positioning accuracy	mm	0.002
B/C-axis positioning accuracy	"	5
B/C-axis repeat positioning accuracy	"	3
Laser		
Pulse width	fs	≤400
Power	W	≥40
Repetition frequency	KHz	25-5000
Beam quality		M^2<1.2
Power		
Power supply voltage	V	AC380V±10%
Electric capacity	KVA	15
Air supply		
Air supply pressure	Mpa	≥0.7MPa
Air supply flow rate	L/min	≥500L/min

Machine dimensions	Unit	Micro 3D L530V
Floor space (L x W x H)	mm	1750 x 1900 x 2600 (incl. accessory 2680 x 2020)
Weight	kg	6000







Best ergonomic solution for your easy of use

Dedicated protective glass

The machine operation interface and the protective window are in the same direction which is convenient to operate. The protective window adopts special design to prevent burns from the laser light source and facilitate monitoring of the processing process.

Ergonomic structural design

The operator adjustment space is within 1.6m from the ground.

Laser CNC machine tool safety lock device

Effectively improve the safety of operators and maintenance personnel, reduce the risk of personal injury, and reduce facility maintenance costs.

Comfortable utilization

Doors open for easy loading and optimal workpiece access.
Doors closed: the large window provides an excellent view inside the machine for process monitoring.

Obtained RoHs certification, ISO14001 and ISO45001 management system certification

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.
62 invention patents,
147 utility model patents,
17 exterior design and
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

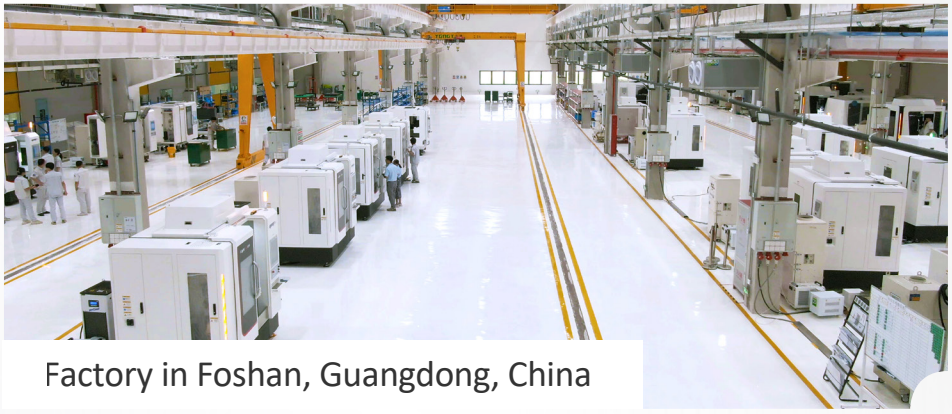
FLEXIBLE CUSTOMIZATION
Customized base on customer needs

TRAINING PROGRAM
Provide operation training

Turnkey provider with impressive technology expertise

Cover 30, 000 m², 210 employees, multi-axis CNC laser machine manufacturer, and provide smart factory manufacturing solution.

Factory in Foshan, Guangdong, China



Factory in Foshan, Guangdong, China

R&D Centers & Labs

Guangdong Original Point Intelligent Technology Co., Ltd.

To make manufacturing smarter and intelligent manufacturing easier

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From origin to infinity

2024 edition