



FL-Micro

Micromaching installation

New product



Application

- ▣ Ablative separation of thin films and layers in semiconductor manufacturing processes.

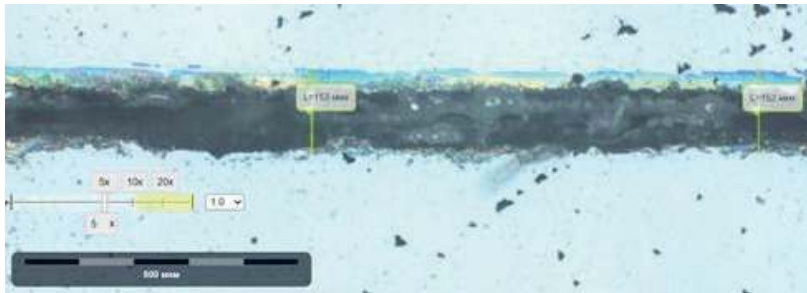


Key benefits

- ▣ Versatile platform supporting a wide range of technological operations on a single system.
- ▣ Stable and reliable processing ensured by an integrated height positioning system and real-time laser power monitoring.
- ▣ High throughput with significantly faster processing compared to traditional methods.
- ▣ Precision motion control, including an air-cushion rotation axis and a workpiece positioning system with accuracy of $\pm 5 \mu\text{m}$ (or better if required).
- ▣ Advanced automation, featuring proprietary control software and a machine vision system for precise trajectory guidance.
- ▣ Flexible laser sources, available in UV, green, and IR ranges (manufactured by VPG Laserone), suitable for diverse material processing tasks.

Laser processing workflow

Ablative sapphire separation



Cut track (top view)

Process requirements:

Sapphire thickness: 700 μm

Cutting width: 150–250 μm

Performance: 1.4 mm/s

Cutting taper: $\leq 1^\circ$



End view with taper measurement

Achieved results:

Cut width: 153 μm (within spec for complete separation)

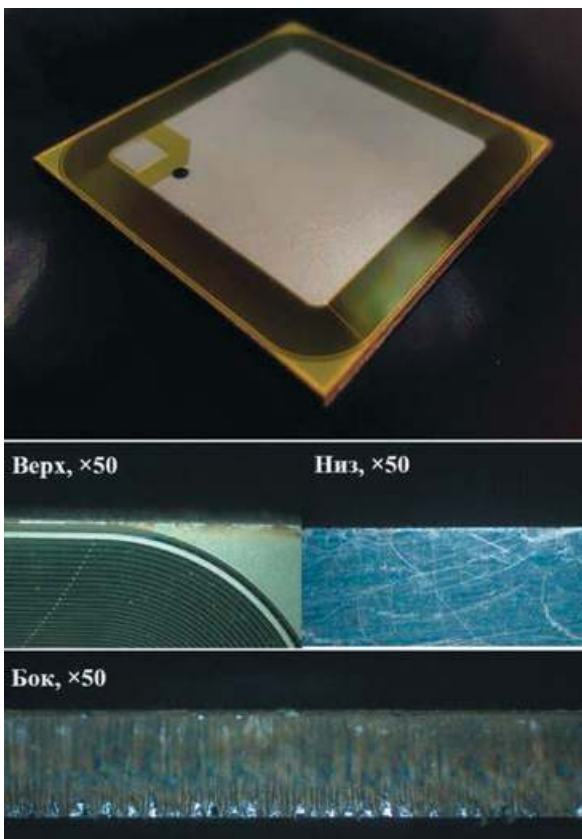
Cutting taper: 1°

Defects: $\leq 20 \mu\text{m}$

Performance: 2.5 mm/s (exceeding required speed)

Laser source type: UV

Ablative separation of silicon wafers



Crystal sample after laser cutting

Process requirements:

Wafer thickness: 400–650 μm

Wafer diameter: up to 200 mm

Cut width with defects: $\leq 100 \mu\text{m}$

Productivity: 30 mm/s

Cut taper: $< 10^\circ$

Achieved results:

Cut width with chips: $\leq 80 \mu\text{m}$ (meets requirement, complete separation depending on laser source)

Cut taper: 1° (significantly better than required $< 10^\circ$)

Productivity: up to 40 mm/s (exceeds requirement, depending on wafer thickness)

Laser source type: UV, green, or IR (flexibility for different applications)

Optional process enhancement: protective liquid can be used to reduce contamination from ablation products

Laser processing workflow

Ablative separation of silicon carbide wafers



Process requirements:

Wafer thickness: 150 μm

Cut width with defects: $\leq 100 \mu\text{m}$

Productivity: 10 mm/s

Cut taper: $\leq 10^\circ$

Achieved results:

Cut width with chips: $\leq 70 \mu\text{m}$ (better than requirement, ensuring complete separation depending on laser source)

Cut taper: 5° (well within required $\leq 10^\circ$)

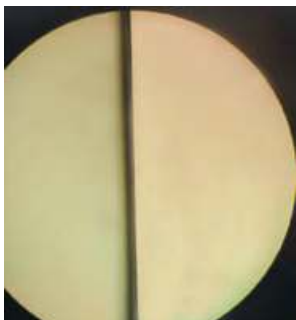
Cutting capacity: 12 mm/s (exceeds required productivity)

Laser source type: UV, green, IR (flexibility for different applications)

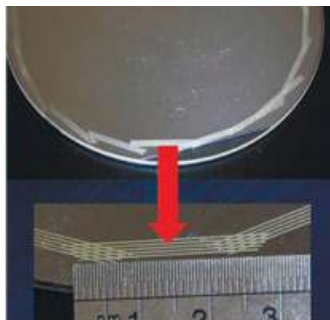
Optional process enhancement: protective liquid can be applied to reduce contamination from ablation products

Laser processing workflow

Laser welding of glass and silicon



Base cut on glass



Laser welding of glass and silicon

Base cut formation on borosilicate glass carrier plate and subsequent bonding

Process requirements:

Glass plate thickness: 2 mm

Diameter: 150–200 mm

Achieved results:

Successful laser cutting of borosilicate glass to form a base cut.

Laser welding of glass and silicon demonstrated for subsequent thinning applications.

Laser source type: IR

+7 (496) 255-74-46
mail@vpglaserone.ru
vpglaserone.ru

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Specifications

Maximum workpiece size	Ø8" (square 250 × 250 mm)
X-axis	
Maximum stroke	340 mm
Cutting range	250 mm
Travel speed	Adjustable processing speed: 0.1–100 mm/s Axis return speed: 100 mm/s
Y-axis	
Maximum stroke	340 mm
Cutting range	250 mm
Travel speed	Adjustable processing speed: 0.1 - 20 mm/s Axis return speed: 20 mm/s
Z-axis	
Lens height (laser focus) input range	Input range: 0–50 mm Step size: 0.005 mm
Travel speed	20 mm/s
Travel resolution	0,005 mm
θ-axis	
Maximum angle rotation	360°
Control panel	Touch screen
Interface	Graphical user interface with visualization of alignment process, process data, error messages, and other relevant information



GLOBAL LEADER IN THE LASER INDUSTRY

VPG LaserONE is a Russian company founded by the outstanding Soviet scientist Valentin Pavlovich Gapontsev, founder of the international science and technology corporation.

VPG LaserONE develops and serially produces high-efficiency fibre lasers and amplifiers, optical components, assemblies, modules, instruments, subsystems and systems for:

- Industrial laser cutting, welding, cladding, alloying, heat treatment, marking and cleaning systems.
- Scientific research.
- Fibre-optic, atmospheric and satellite optical communications, cable television.
- Surgery and biomedicine.
- Optical ranging and remote monitoring of industrial facilities and the atmosphere.
- Measurement and control systems, sensors.

In order to introduce innovative laser technologies into production, VPG LaserONE has for many years worked closely with leading domestic machine-building, metallurgical, railway and motor transport enterprises and supplies its customers with more than 600 types of ultra-high-technology laser equipment. Many devices and systems have no equivalents on the world high-tech market. All key components of fibre laser technology are manufactured in-house, which delivers:

- Fast product development.
- Efficient production methods.
- The industry's best product delivery times.
- More advanced and higher-quality solutions.
- The highest wall-plug efficiency, which reduces overall energy consumption and costs.



LASERNEXT



+91 8939521000



WWW.LASERNEXT.IN



SATISH.A@LASERNEXT.IN



KAPITALEASE SOLUTIONS, NEXUS 3.0
SITE 31/26, BOMMASANDRA INDUSTRIAL AREA,
4TH PHASE, JIGANI, BENGALURU, KA 560105, INDIA



1992

Foundation date



1,500+

employees



500+

R&D
specialists



>60 000 m²

facilities



100+

patents



90%

component
localization