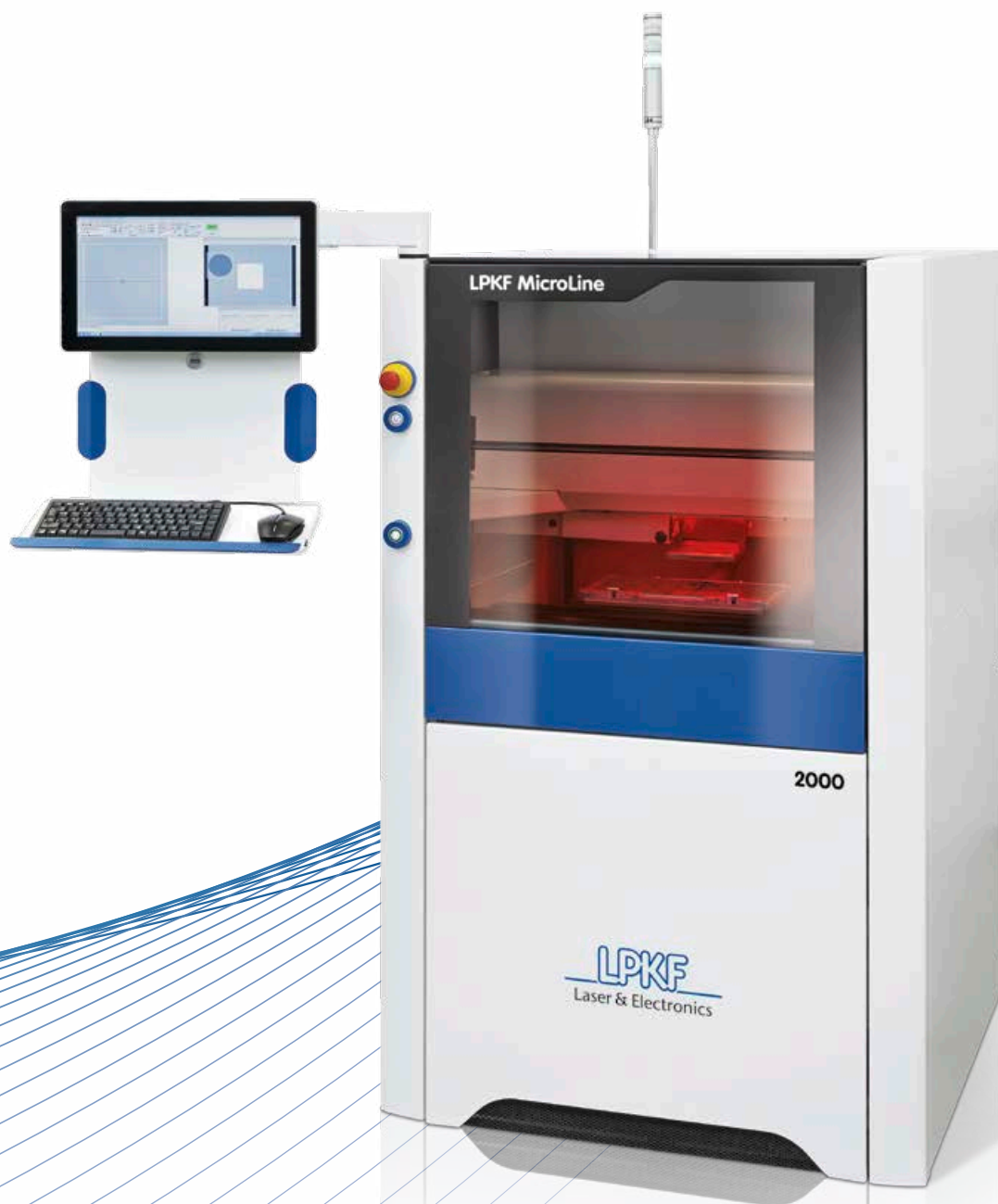


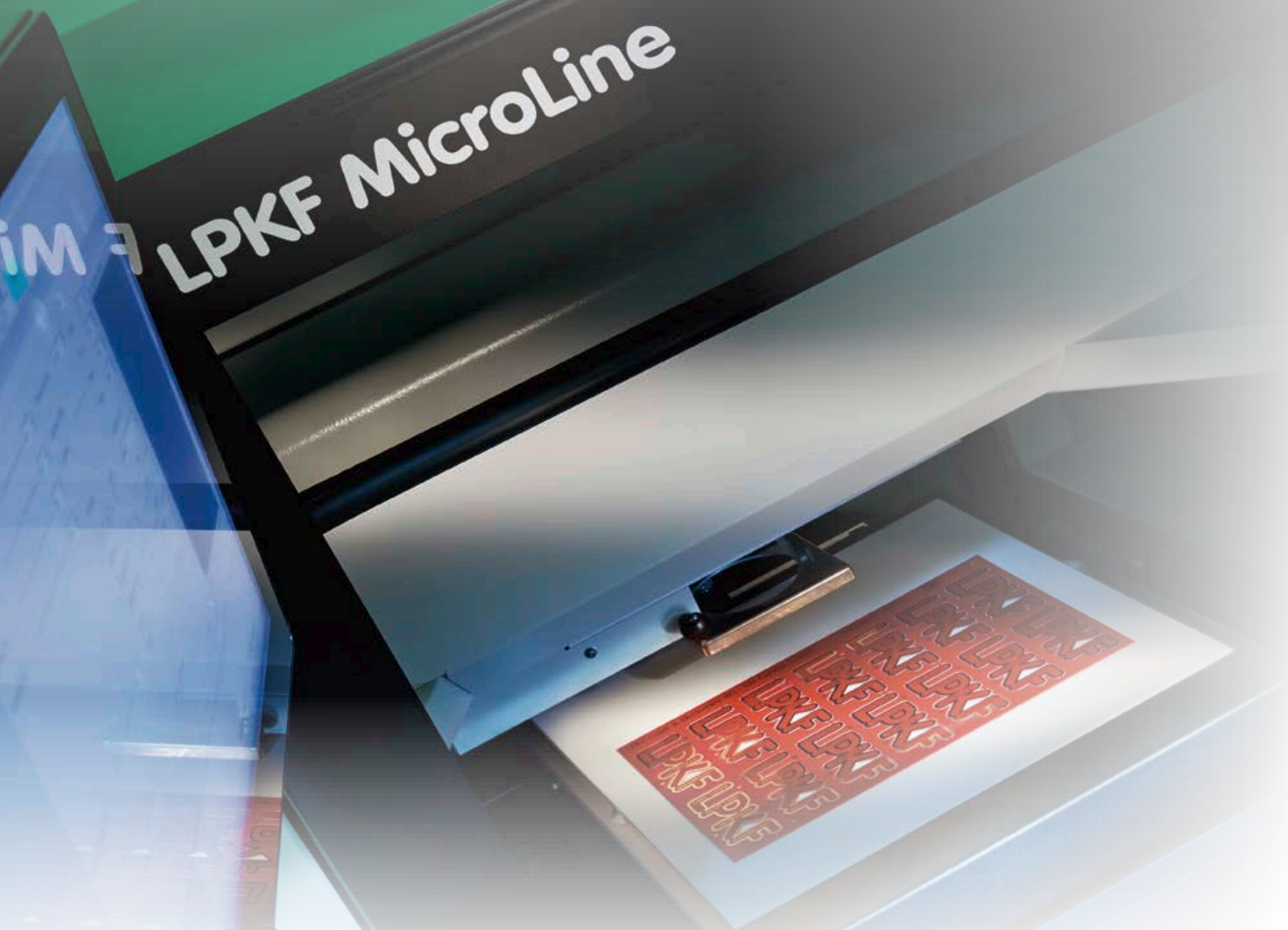
Precision Cutting of Printed Circuit Boards and Cover Layers

UV Laser Cutting with LPKF MicroLine 2000 Systems



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Beaming Cutting-Edge Technology

LPKF UV laser cutting systems quickly, cleanly, and precisely process even highly complicated tasks on printed circuit boards (PCBs). The new MicroLine systems are built on the solid track record of their successful predecessors. They are available in different configurations, customized for the cutting of populated and unpopulated PCBs, as well as flex circuits and cover layers.

No Stress, no Burrs, no Particles

The LPKF MicroLine 2000 systems incorporate advances in laser technology and mechanical engineering for precision cutting and separating of rigid, rigid-flex and flexible PCBs and cover layers.

The MicroLine 2000's UV laser source cuts even complex contours with minimal tolerances. Cutting data can be imported directly from your PCB layout software.

Laser cutting leaves virtually no burrs or particles and does not mechanically stress the material or components.

The Heat Affected Zone is very small, affecting only the edge of the material.

Particles from the laser cut are cleanly removed by the machine's exhaust system.

- Precision cutting of complex contours
- Working area of 350 mm x 350 mm (13.8" x 13.8")
- Low energy and space requirements
- Easy to operate
- Different laser sources available

Low Investment and Operating Costs

The MicroLine 2000 systems are designed to be an inexpensive solution for production depaneling. Laser cutting reduces the expense of the consumables typical with mechanical cutting solutions. Additionally, the systems have low energy consumption and take up minimal production floor space. Fixturing is also designed to be simple and economical either with the MicroLine 2000 P which is equipped with a vacuum table or with the S model, which is intended for inexpensive application-specific fixtures.

Flexible Production

If the cutting data changes in the circuit board layout, the new contour can be produced in a short time on the LPKF MicroLine 2000 systems. UV laser cutting creates new freedom in production planning, from prototypes to manufacturing – production on demand.

Easy Programming and Setup

The core of a laser cutting system is its software. The MicroLine 2000 systems include field-tested CAM software. Allowing you to import files directly from your design software and storing projects for easy access on the production floor, LPKF CircuitMaster software is optimized for processing speed and intuitive operation. CircuitMaster provides for various user levels, from one button operation to complete access to all process parameters.

All LPKF MicroLine 2000 systems incorporate a fully automated hood and viewing window. This provides a safety interlock to ensure operator safety and a full Laser Class 1 enclosure while the laser is on.



MicroLine 2000 P – For Flex, Cover Layers, and Unpopulated PCBs

Growing with the Tasks

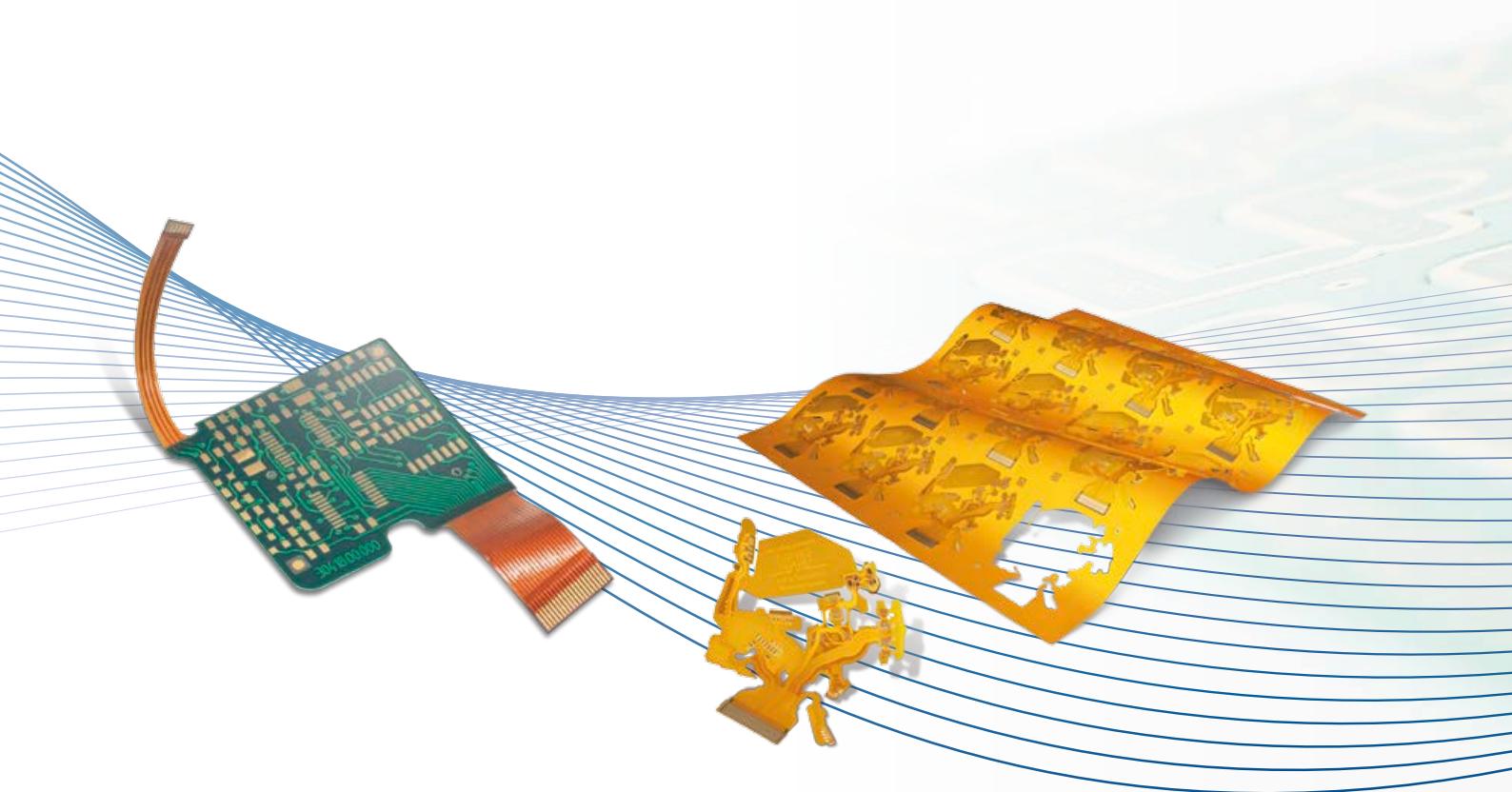
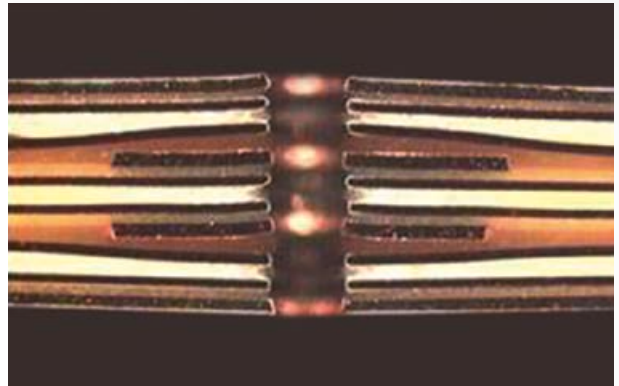
The LPKF MicroLine 2000 P is optimized for processing of unpopulated materials. The integrated vacuum table creates a simple and effective fixturing platform. The easy-to-use software and programmable tool path allows a quick setup and production for projects of all sizes. Such as:

- Separating or cutting of thin flexible substrates, with or without conductor networks (e. g., cover layers and flex circuits)
- Hole cutting in rigid or flex materials
- Pocket creation in various substrates

Precision is the main focus: UV laser cutting allows for maximum use of the base material and production time. The narrow beam width requires minimal space for tool paths and eliminates buffer zones for mechanical stress. Therefore resulting in the ability to place more boards per panel.

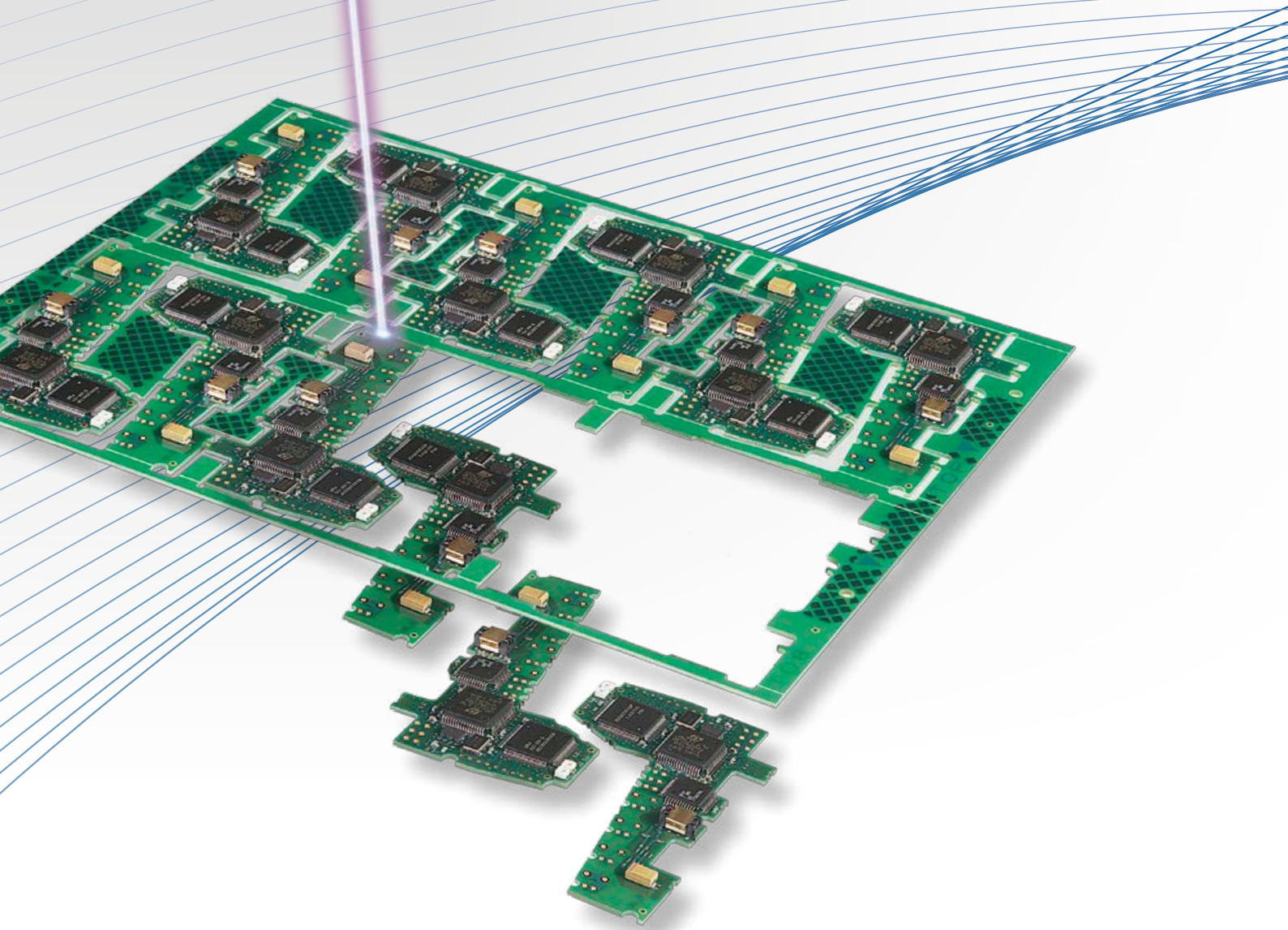
Drilling, Cutting and Ablation

In addition to cutting/drilling the laser can be programmed to ablate a defined amount of material to reach a desired depth. Furthermore, delicate operations such as skiving and decapping are also possible with this versatile tool.



- Complex contours
- Higher part density on substrate
- Drilling and ablation





MicroLine 2000 S – Cutting Assembled Circuit Boards

Stress Free Cutting

The UV laser cuts with minimal heat stress and no mechanical stress. Higher density arrays increase throughput while the lack of stress on the board works to increase yield.

Populated boards are easily processed with custom fixtures on the MicroLine 2000 S. Simple and inexpensive production fixtures can be made to depanel boards that have components on both sides of the substrate.

Laser Power Options

The LPKF MicroLine 2000 can be equipped with a 10 watt or a 15 watt UV laser source. The 10 watt source is most effective at cutting through flex, rigid flex, and rigid materials up to a thickness of around 0.8 mm. The 15 watt laser not only increases throughput on these materials, but can handle thicknesses of up to 1.6 mm or higher (depending on substrate).

- Stress-free cutting
- Close to strip conductors or components
- Optimal utilization of the substrate

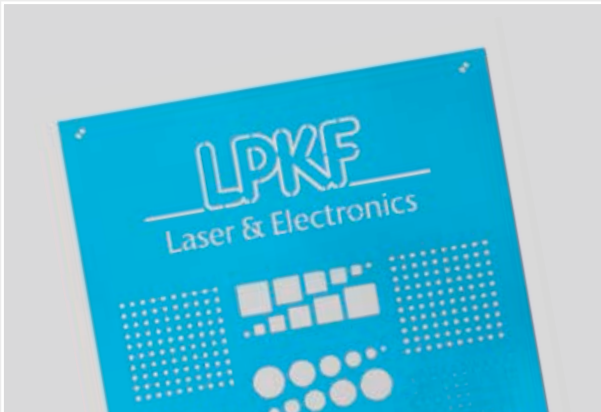
Vision System

An integrated vision system quickly aligns to programmed fiducial and alignment points. A variety of fiducial options can be used as well as edge detection of routed areas. Calculations can be performed on

fiducial data to mitigate rotation and distortion within the material and to even out tolerance differences thus increasing production yields. The high-speed table, coupled with the new fiducial recognition system, results in superior processing times.

Applications for UV Laser Systems

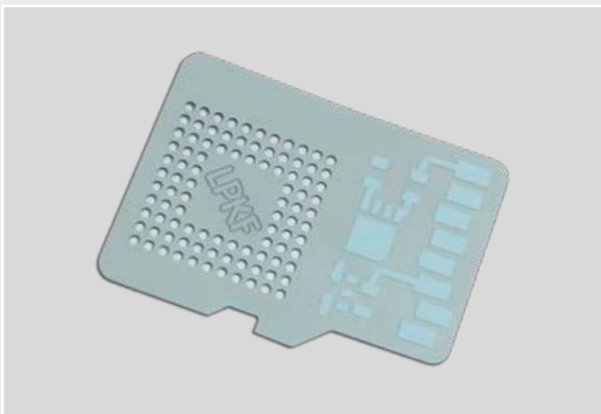
LPKF UV Laser cutting systems are used extensively in the cutting and dpaneling of PCB materials. Other applications include:



Scoring, drilling and cutting of fired ceramics



High-precision structuring of metal layers on ceramics



Cutting, drilling and engraving of unfired ceramic (green tape)



Processing of TCO/ITO layers without damaging the substrate

Laser Cutting with Worldwide Support

LPKF supports global users of its MicroLine UV laser systems from its application centers in Germany, the USA, Japan, Korea and China. Users have access to LPKF's many years of experience in laser material processing, including technical expertise, new processes and new applications. User training for technical employees and special consulting services complete the offer from the world market leader in PCB laser processing.

Technical Data: LPKF MicroLine	2000 P	2000 S
Laser class	1	
Max. working area (X x Y x Z)	350 mm x 350 mm x 11 mm (13.8" x 13.8" x 0.4")	
Max. recognition area (X x Y)	300 mm x 300 mm (11.8" x 11.8")	
Max. material size (X x Y)	350 mm x 350 mm (13.8" x 13.8")	
Data input formats	Gerber, X-Gerber, DXF, HPGL, Sieb & Meier, Excellon, ODB ++	
Max. structuring speed	Depends on application	
Positioning accuracy	± 25 µm (1 Mil)	
Diameter of focused laser beam	20 µm (0.8 Mil)	
Laser wavelength	355 nm	
System dimensions (W x H x D)	875 mm x 1530 mm x 1300 mm (34.5" x 60.2" x 51.2")*	
Weight	~ 450 kg (990 lbs)	
Operating conditions		
Power supply	230 VAC, 50 – 60 Hz, 3 kVA	
Cooling	Air-cooled (internal water-air cooling)	
Ambient temperature	22 °C ± 2 °C (68 °F ± 2 °F)	
Humidity	60 % (non-condensing)	
Required accessories	Exhaust unit	Exhaust unit, production fixture

* Height incl. StatusLight = 2020 mm (79.5")

MicroLine 2000 series systems feature multiple variations: MicroLine 2120 P (10 watt laser source) and MicroLine 2820 P (15 watt laser source), MicroLine 2120 S (10 watt laser source) and MicroLine 2820 S (15 watt laser source).

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