Flexible solutions for printed circuit board cutting

LPKF MicroLine UV laser systems

- Eliminates tooling – no stress, no burr
- Same day production – directly from data
- Superior accuracy – no die misalignment

LPKF® Laser & Electronics

Laser cutting for flex circuits and coverlayers with LPKF MicroLine UV laser systems

When time to market is the driving force, fast alterations to pilot production runs can be the key to success.

LPKF MicroLine UV laser systems provide the flexibility, reliability and high precision that customers demand. By reducing product changeover time, increasing accuracy and eliminating tooling costs these systems simply produce a better product at a lower cost.

Laser cutting for flex circuits

There are many issues to be considered in the manufacture of state of the art products. The ability to cut complex shapes with a stress free process allows for more circuits on a single panel. Increasing the accuracy and reducing the burr formation are important factors in the manufacturing of sophisticated products. The flexibility of the LPKF Microline UV laser production systems allow a large number of designs to be processed in a short time.

Coverlayer cutting

The complex products of today and the future require the kind of higher density and finer detail possible with laser technology, including the ability to cut arbitrary shapes and smaller apertures. Coverlayer cutting in particular is much more precise with a laser than with conventional methods. Mechanical stress on the foil, die misalignment, and contamination of the work piece are all issues virtually eliminated by a laser process. Design changes are easy – modifying cutting instructions via programming is much simpler than rebuilding tooling.

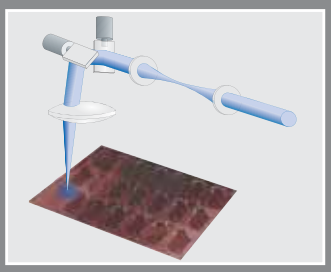
The advantages:

- Stress-free cutting
- Fast changeover
- No shape limitations
- Reduction of tool costs

Economical

The LPKF MicroLine UV laser systems work directely from CAD data and do require no specific tooling. In many cases, the amount of tooling costs that can be saved by using LPKF's laser covers the original investment for the new system very quickly. The UV laser systems of the LPKF MicroLine Series can pay for themselves in less than 10 months - depending on the tools needed per year. With easy handling and short changeover times, the LPKF MicroLine UV laser systems offer economical solutions to compete in the on-demand world of today.

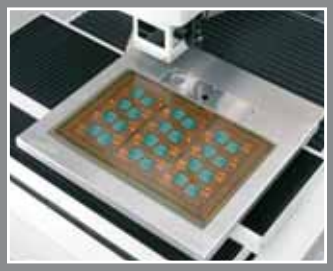
LPKF MicroLine Series – an investment in the future



Scanner/Optics/Laser
The combination of advanced scanning, optics, new state-of-the-art lasers and a novel table concept result in the highest quality, speed and accuracy over the entire working area.

LPKF CircuitMaster/CircuitCam
LPKF CircuitMaster software supplied with the MicroLine Series provides easy to understand, flexible and intuitive system control. The software controls all process parameters, easily accommodating new materials and processing techniques. In combination with LPKF's CircuitCam software, data handling becomes very convenient and reduces changeover times to a minimum.

Positioning/Power sensor
Automatic calibration removes the effects of thermally induced drift of the scanner and eliminates laser power variations.



Vacuum table
A honeycomb vacuum table holds material of arbitrary shape and variable thickness. This table will hold either flex or rigid material in place. Changing the workpiece is easy; no fixtures are needed.

Exhaust unit
The MicroLine Series uses an optimized central exhaust unit, including advanced dust, particle extraction and filtering, to prevent contamination of the workpiece and the environment.

Motion system
LPKF's motion system is proven in more than 300 installations world-wide. The combination of state of art control technology and granite-mounted linear drives provides the best precision combined with outstanding speed. With it's recent stage of extension the performance became even higher.

15 years of laser cutting experience

LPKF customers profit from 15 years of experience in laser cutting of flex and rigid substrates for the electronics industries. The combination of LPKF's expertise in laser technology and motion control technology results in systems with the highest accuracy, optimum throughput, maximum up-time and minimum maintenance requirements. The modular system architecture of the MicroLine Series allows LPKF and customers to keep pace with technological changes. This increases the useful life of the systems and safeguards the investment. LPKF, founded in 1976 in Germany, has specialized in the production of laser systems for the electronics industry since 1990. LPKF's team of dedicated employees provides worldwide service and support.

LPKF MicroLine 600D

- Full size PCB format
  Table size 640 mm x 560 mm (25” x 22”)
- High power laser source

Field-Proven Technology

Operating in Asia, Europe and North America

The LPKF MicroLine 600D has the largest cutting area of the MicroLine UV laser systems and one of the most advanced positioning system available today. Positioning uses linear motors on a polished granite table. In addition, high speed, precise cutting is done with a high dynamic beam deflector. This, in combination with the large table size, provides a production system for your fabrication. The flexibility needed to cut coverlayers, or process flex boards is supplied by the diode pumped UV laser.

Made in Germany

Different types of UV laser sources are available on request.

LPKF MicroLine UV 3000 systems

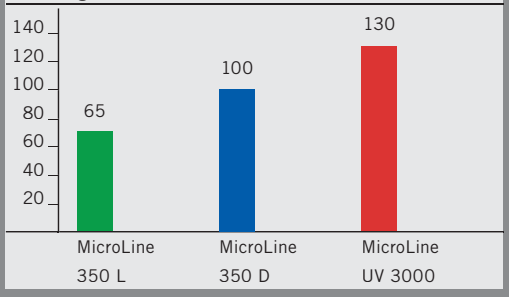
- Standard FPC format
  Table size 460 mm x 310 mm (18” x 12”)
- Small footprint

Field-Proven Technology

Operating in Asia, Europe and North America

The LPKF MicroLine UV 3000, a compact successor to LPKF‘s popular 350L and 350D systems, is designed to cut precise openings in polyimide coverlayer foils, and to cut flexible PCBs, providing the flexibility, reliability, and high precision that customers demand. Featuring a new high-speed linear table concept and state-of-the-art lasers, the MicroLine 3000 reduces product changeover time dramatically, making it an efficient component of any FPC fabrication process, especially where physical space is a premium.

Cutting Performance in % - CL / FPC Benchmark



Made in Germany

Different types of UV laser sources are available on request.

LPKF MicroLine UV 3000i systems

- Industrial standard housing
  Table size 460 mm x 310 mm (18” x 12”)
- Suitable for depaneling of populated boards
- Panel-to-board and panel-to-panel handling

The MicroLine UV 3000i systems are based on the MicroLine 3000 systems. With a sealed housing and a small footprint, the system can be easily integrated into an existing production line. The systems are optimized for cutting double-sided, populated circuits with high SMD components. As the MicroLine 3000i uses a unique exhaust and cutting configuration processing, PCB’s with components mounted up to 30 mm height is possible. This non-contact cutting process protects sensitive electronics. Furthermore the system is equipped with a SMEMA conformal handling interface and can be adapted to all kinds of handling options.

Made in Germany

Different types of UV laser sources are available on request.

Integrated solutions

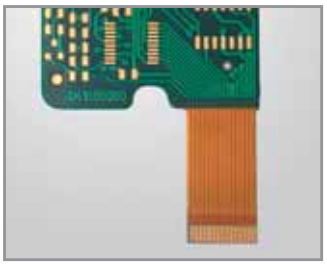
The LPKF MicroLine Series includes systems specifically suited for integrated production environments. Robust housings meeting rigorous industrial requirements cover the whole unit including the workpiece. The compact systems provide especially easy connectivity to a range of standard handling systems and custom handling solutions. Please ask for assistance to find the appropriate solution for your needs.

Standard Inline Handling:
Automatic handling system designed for integration in Conveyor-Lines or loading/unloading stations.
SMEMA compatible, flexible design with two-hand gripper (loading/unloading) for short cycle times.

More applications for LPKF MicroLine UV laser systems

Rigid-flex material

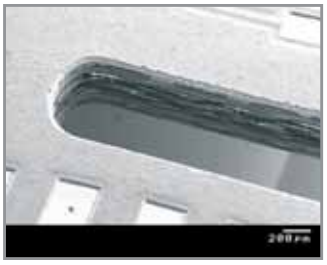
The LPKF MicroLine UV laser systems cleanly cut any circuit board material normally used for manufacturing circuits or parts. The combination of flex and rigid material is especially easy in one job. Registration problems and burr formation are eliminated.



Depaneling of a rigid-flex PCB

Cutting of rigid PCB material

The LPKF MicroLine UV laser systems are suitable for material thickness up to 1 mm (0.040 inch). Since LPKF uses a new generation of UV laser sources in combination with special designed laser optics, the burr formation is reduced to a minimum. The result is a precise cut with smooth, vertical edges.



Inner contour cut in FR4-Multilayer

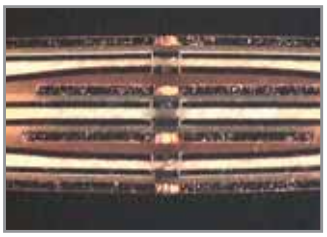
Drilling micro-vias in various PCB materials

High Density Interconnects (HDI) require accurately placed holes with diameters of 50 µm or less. The short pulses used by the LPKF MicroLine system evaporate the material. This technique avoids delamination due to thermal effects. The Microline System produces superior hole quality combined with high throughput.

60 µm micro-via in RCC

Drilling flex material

The LPKF MicroLine UV laser systems precisely drill 75 µm through-holes with perfect geometry in flexible multilayer material.



75 µm through-hole in multilayer flex circuit

Embedding chips

The LPKF MicroLine UV laser systems provide excellent pocket registration. Small pockets can be produced with virtually no radii in the edge floor to wall and with a depth tolerance of less than +/- 25 microns.

100 µm deep pockets in copper plated FR4

Structuring / repair of solder-resists

The LPKF MicroLine UV laser systems are suitable for the most ambitious opening of solder-resists in the HDI range <50 µm. Solder mask defects can be easily fixed by laser exposing of pads or traces.

Opening of solder-resist on a rigid PCB

Technical Data LPKF MicroLine 600D	
Working area	640 mm x 560 mm x 40 mm (25” x 22” x 1.6”)
Accuracy	±15 µm (0.6 mil)
Data input	Gerber, HPGL, Sieb & Meier, Excellon, ODB++
Laser wavelength	355 nm, diode-pumped solid-state laser
Repetition rate	10-100 kHz
System dimensions (W/H/D)	1,650 mm x 1,500 mm x 2,300 mm (65” x 59” x 91”)
Controller dimensions (W/H/D)	750 mm x 1,250 mm x 960 mm (30” x 50” x 38.4”)
Weight	ca. 3,500 kg (7,800 lb.)
Operating conditions	
Electricity	400 V, 3 phase, 4 kW
Compressed air	130 psi (9 bar), 50 l/min. (1.76 cfm)

Technical Data LPKF MicroLine UV 3000 systems	
Working area	460 mm x 310 mm x 40 mm (18” x 12” x 1.6”)
Accuracy	±20 µm (0.8 mil)
Data input	Gerber, HPGL, Sieb & Meier, Excellon, ODB++
Laser wavelength	355 nm, diode-pumped solid-state laser
Repetition rate	10-100 kHz
System dimensions (W/H/D)	1,200 mm x 1,770 mm x 2,000 mm (47” x 70” x 79”)
Weight	ca. 1,600 kg (3,550 lb.)
Operating conditions	
Electricity	400 V, 3 phase, 4 kW

Technical Data LPKF MicroLine UV 3000i systems	
Working area	460 mm x 310 mm x 40 mm (18” x 12” x 1.6”)
Accuracy	±20 µm (0.8 mil)
Data input	Gerber, HPGL, Sieb & Meier, Excellon, ODB++
Laser wavelength	355 nm, diode-pumped solid-state laser
Repetition rate	10-100 kHz
System dimensions (W/H/D)	1,200 mm x 1,700 mm x 2,150 mm (47” x 67” x 85”)
Weight	ca. 1,800 kg (4,000 lb.)
Operating conditions	
Electricity	400 V, 3 phase, 4 KW
Compressed air	minimum 90 psi (6 bar)

The LPKF MicroLine Series also includes:

- The LPKF MicroLine CO_2 laser systems such as the **LPKF MicroLine 350Ci**, is especially well suited for high performance depaneling tasks on rigid circuit boards. The superior cutting speed provides better overall productivity than traditional depaneling methods, especially with thinner materials.
- The **LPKF MicroLine 3D** is a laser system specially developed for the volume production of 3D molded interconnected devices (MIDs). MicroLine 3D users benefit from a system designed for cost-effective production of MIDs with the LPKF-LDS® process.

Please ask for detailed information on these systems.
Contact an applications engineer for custom solutions!

The application of the front page is courtesy of straschu Leiterplatten GmbH.

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