

High Volume Production
with Multiple Laser Heads
LPKF Fusion3D 6000





Designed for High Volume

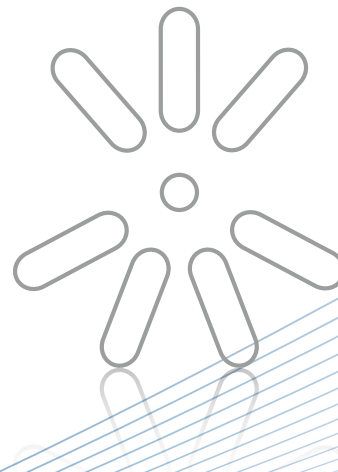
Modern 3D components are ultra-compact and complex in function. They combine mechanical and electrical functions, reduce weight and assembly times and can easily fit into tight spaces. LPKF's Laser Direct Structuring method (LPKF-LDS) has enormous innovation potential for 3D components. The LPKF Fusion3D 6000 laser system is highly economical, taking full advantage of the LDS production method.

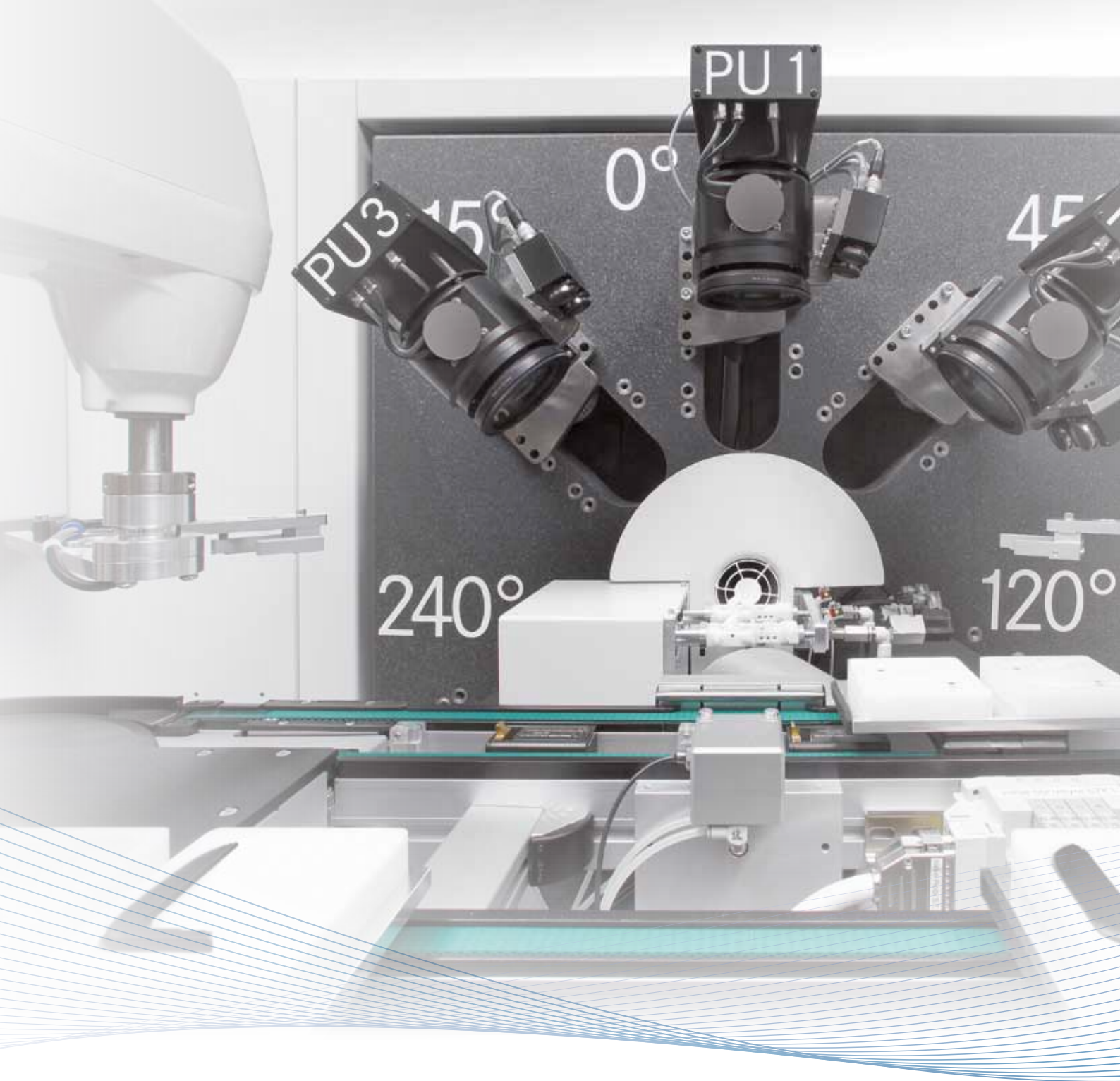
New Design Options, New Product Options

Smaller, lighter, more functionality, better performance. These are just some of the benefits electronic designers gain when they use molded interconnect devices (MIDs). They gain access to new dimensions for optimized production processes and new products that would not be possible without the innovative LPKF-LDS technology. Three-dimensionality maximizes space utilization, simplifies assembly and enables higher functional density. The LPKF Fusion3D 6000 provides a level of productivity that is unmatched, increasing MID production efficiency

Boosting Efficiency

Innovation and profitable production are both key to effective technical development. The LDS method enables both, and the latest generation LPKF Fusion3D 6000 laser system further increases economic advantages. Complex three-dimensional components have to be structured from multiple sides. LPKF's Fusion3D 6000 structures components simultaneously with as many as four laser heads, reducing the time required for laser structuring and eliminating the time required for rotating components. The LPKF Fusion3D 6000 cost-effectively handles high quantity production runs for all kinds of applications.





Maximum Efficiency

High Throughput

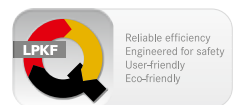
Efficiency was the key driver behind the development of LPKF's successful MID laser structuring system. The LPKF Fusion3D 6000 is the most advanced system for laser-structuring MIDs. The solid granite structure holds up to 4 laser heads that can be positioned around the part to be structured.

Simplified Handling

With the LPKF Fusion3D 6000, set-up and part changeover are quick and easy. The production data is stored with all parameters, for easy access at any time. The machine software automatically distributes the processing data to each individual head, optimizing the cycle time. The robotic parts handling ensures speed, accuracy and repeatability while keeping personnel cost to a minimum.



- Up to four laser-heads in seven positions
- Highest productivity
- Designed for 24/7 production
- Includes high performance machine software



Greater Precision

Absolute accuracy is the ultimate goal. Avoiding movements during structuring, and mounting the structuring mechanism to solid granite guarantees even higher precision.

Designed for 24/7 operation, the LPKF Fusion3D 6000 is fully equipped down to the last detail to produce high quality components.

Flexibility Wins

Since the LPKF Fusion3D 6000 is a software-based production system, tuning the pattern only requires changing the artwork file. The system is also very flexible: the modular design simplifies production and service with rapid implementation of laser sources and low setup cost. Additionally, plug & play components keep service cost and downtime to a minimum.

Sophisticated Technology for Future Markets

Hundreds of application examples in the LPKF mini and medium series provide valuable experience for ramping up innovative technology ready for industrial mass production.

MID components offer many benefits as an alternative to conventional electronic parts assembled from multiple components. Considering the third dimension during the design phase results in an exponential increase in advantages related to integration and miniaturization.

Saving a few printed circuit boards here and a few assembly steps there can drastically reduce costs per unit. On an industrial scale, these small economies equate to major financial savings. 3D-MID components combine mechanical and electronic functions in an easily manufactured component.

Examples of Innovative Solutions:



Mobile telephones are becoming smaller and more powerful. LDS antennas increasingly handle communications in a wide range of frequency bands.



A pressure sensor can be produced directly on the inside of the housing in one processing step.



A premium segment carmaker equips its steering wheels with MID technology switches.

The LPKF-LDS Process at a Glance

Four simple steps take your product from polymer granulate to molded interconnect device.

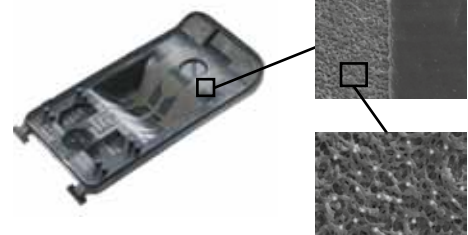
1. Injection Molding

The parts to be laser structured are produced using 1-shot injection molding of commercially available doped thermoplastic. Compared to 2-shot molding, only a simple tool is needed and the molding process is faster and more efficient.



2. Laser Activation

The laser-activatable thermoplastic is doped with a special additive. It is activated by the laser beam, where a physical-chemical reaction forms metallic nuclei. These act as a catalyst for reductive copper plating. In addition to activation, the laser creates a microscopically rough surface in which the copper is firmly anchored.

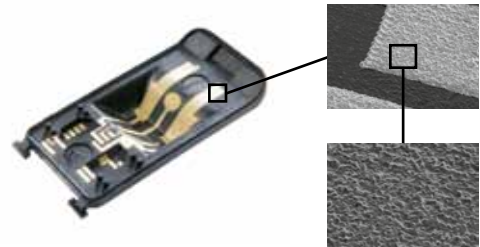


Surface after laser structuring.

3. Metallization

Metallization of the LPKF-LDS parts starts with a cleaning step. Then follows an additive build-up of the tracks, typically 8 - 15 μm with the help of electroless copper baths. Plating follows with currentless nickel and flash gold, if required.

Application-specific coatings such as Sn, Ag, Pd/Au, OSP, etc. can also be created.



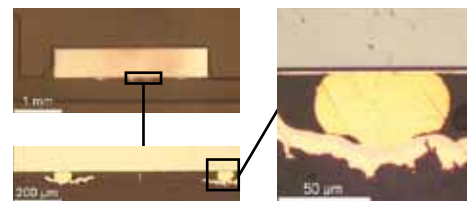
Surface after metallization.

4. Assembling

A number of laser-activated plastics with high degrees of thermal stability, such as LCP, PA 6/6T or PBT/PET blend are reflow solderable and therefore compatible with standard SMT processes. Dispensing is commonly the process for applying solder paste on different heights of assembling levels. Reliable technical solutions for 3D assembly operations are available today.



Bond foot on an electroless plated pad with Cu/Ni/Au.



Stud bonding on an electroless plated pad with Cu/Ni/Au.

Worldwide Support

LPKF-LDS users enjoy optimal support from our service centers in Europe, the USA and Asia. Experts in the Application Center in Germany provide advice on process rollout, and use their many years of practical experience to assist with sample production.

Technical Data: LPKF Fusion3D 6000	
Structuring area (X/Y/Z)	120 mm x 120 mm x 50 mm (4.7" x 4.7" x 2.0")
Number of nests	1 to 2
Accuracy*	± 25 µm (± 1 mil)
Max. structuring speed	4,000 mm/s (157" per second)
Input data formats	IGES, STEP
Laser wavelength	1,064 nm
Laser pulse frequency	10 kHz – 200 kHz
Machine dimensions (W x H x D)	Without handling: 4,400 mm x 1,830 mm x 800 mm (173" x 72" x 31")** With handling: 4,400 mm x 1,830 mm x 3,000 mm (173" x 72" x 118")** Basic: 3,086 mm x 1,830 mm x 800 mm (173" x 72" x 31")**
Machine weight	Approx. 2,000 kg (4,400 lbs)
Optional part handling	
Robots	2
Belt conveyer	2
Tray dimensions (W x H x D)	Single tray: 80 mm x 38 mm x 80 mm (3.15" x 1.49" x 3.15") Double tray: 190 mm x 41 mm x 80 mm (7.48" x 1.61" x 3.15")
Operating conditions	
Electric supply	3 x 400 V + N + PE, 50/60 Hz, ~ 15 kVA, 32 A CEE Plug
Cooling	Air-cooled
Ambient temperature	22.5° C ± 2.5° C (72.5° F ± 4° F)
Humidity	Max. 60 %
Software	CircuitPro 3D
Exhaust unit	
Volume flow	Up to 600 m ³ /h, max. suction 21,000 PA
Filter	Active charcoal filter and F8 fine filter

* Positioning accuracy of each process unit.

** 800 mm (31") more space in width and length are needed to open the doors.



Made in Germany

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