

Current Trend: LPKF Laser Technology for MIDs

Molded interconnect devices (MIDs) profit from laser direct structuring (LDS) – and electronics profit from MIDs.

LPKF Laser & Electronics AG's additive laser direct structuring process is one of the foremost techniques used for manufacturing molded interconnect devices. With it, conductive traces are generated on the surfaces of three-dimensional injection-molded parts. In this way, both mechanical and electronic functions can be integrated directly onto molded parts – even parts with complex geometries. This facilitates further miniaturization of electronic devices and drives costs down. These are just two reasons for the high demand for this technology.

Antennas, sensors, compressed and miniaturized integrated circuits – the applications for LDS-produced conductive traces are multitudinous. However, one thing is common to them all: the need to integrate electronics even more compactly into the given parts. To address this trend, LPKF is strengthening its LDS business unit and has brought in another proven expert with extensive experience in the MID field: Dirk Rettschlag has already helped make numerous optimizing modifications to the hardware and software used in the process and knows the technology inside out. He also has a vast amount of expertise in the industrial application of LDS.

Dirk Rettschlag is happy to explain what the advantages of this established process are: "Through 3D-MID, electronic components can be mounted directly on a three-dimensional base body, without circuit boards and connecting cables. The ingenious idea of replacing conventional printed circuit boards by using the original injection-molded material as a carrier for electronic and mechanical functions convinced me right from the start. Over the years, I have gained a wealth of experience with MID and LDS in the areas of development, application, and consulting. This reaffirms the advantages of the MIDs produced with LDS for the electronics of today and tomorrow."

Contact:

Cordula Krause-Widjaja
cordula.krause-
widjaja@lpkf.com
Tel. +49 (0)5131 7095-1327
Fax +49 (0)5131 7095-90

**LPKF
Laser & Electronics AG**
Osteriede 7
D-30827 Garbsen
www.lpkf.com

Board of Managing Directors:

Dr. Götz M. Bendele (CEO)
Christian Witt (CFO)

Shares:

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The LDS technology utilizes the properties of the laser and the perfected control software. The material provided with a special additive can be structured flexibly and extremely precisely with the laser. The other regions of the body remain unprocessed. The structured and subsequently chemically metallized traces and the spaces on the plastic part can be microfine if so required. The proven LDS process realizes traces with widths and spaces of 75 µm.

With Active Mold Packaging (AMP), the LDS technology is also found at the chip scale for integrated circuit packaging and interconnection technology. AMP enables RF applications including mmWave Antenna-on/in-Package. In chip scale packaging (CSP), the technology replaces wire bonds and improves thermal management of power ICs. The 25µm line and space width of AMP enables mid-range redistribution layers (RDLs) for space-saving multi-chip modules (MCMs).

Fields of application for LDS range from automotive engineering through industrial automation, telecommunications technology, and instrumentation and control engineering to medical technology. The process also finds application in air-conditioning and security technology. Another example, proven millions of times over, is the application of antenna structures to smartphone housings via LDS. In times of 5G, Industry 4.0, and the Internet of Things, MIDs are continuing to gather steam.

“LDS makes electronic assemblies with flexible geometrical forms possible. Thanks to this process, electronic products are becoming smaller and more powerful, even in quality-critical areas such as medical technology or in safety-relevant components in the automotive industry. Automated manufacturing processes also make the process more attractive economically. This leads to the higher demand,” Rettschlag is convinced.

More information:

- <https://www.lpkf.com/en/industries-technologies/electronics-manufacturing/3d-mids-with-laser-direct-structuring-lds>
- <https://youtu.be/NBEI9fedfn0>
- <https://www.lpkf.com/en/industries-technologies/active-mold-packaging/>



Fig. 1: Dirk Rettschlag of LPKF is an acknowledged expert on LDS, also with regard to the industrial application of the technology



Fig. 2: Artificial fingertips: For use in prosthetic or robotic hands, conductive circuits can be precisely applied inside and outside using LDS technology. This enables improved functionalization of the fingers.

About LPKF

LPKF Laser & Electronics AG is a leading provider of laser-based solutions for the technology industry. Laser systems from LPKF are of central importance for the manufacturing of printed circuit boards, microchips, automotive parts, solar modules and many other components. Founded in 1976, the company has its headquarters in Garbsen near Hanover and operates worldwide through subsidiaries and agencies. Around 20 percent of the workforce is engaged in research and development.