

## Sustainability starts with development In-house PCB prototyping offers wealth of opportunities

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There are many good reasons to produce PCB prototypes and component assemblies in-house. For a start, sensitive data and circuit layouts don't need to leave your own lab. Secondly, the production period, time-to-market and costs can all be substantially reduced if off-site express manufacturing jobs can be avoided thanks to in-house prototyping capabilities. Generally, developers with their own prototype production can have a direct influence on the entire process. This also applies to issues of environmental compatibility and sustainability.

Fabrication in your own laboratory avoids unnecessary transport, which alongside the reduced delivery time also has a positive impact on the environment. This is a significant factor, especially in the event of a larger number of iterations. Unlike outsourcing to a service provider, the material in your own laboratory can often be used more sparingly, for example when only a part of the substrate is needed for an application and remaining material can then be used for another. Less material means fewer costs and less impact on the environment.

The production method is also more manageable than is the case at external service providers. In your own factory, the conductive pattern is produced with an LPKF circuit board plotter or LPKF laser system without needing to use environmentally harmful etching chemicals. For the mechanical patterning, a high-frequency spindle mills conductive traces out of a fully coated board. A milling tool mills the insulation channels; the conductive trace itself is retained. LPKF circuit board plotters with speeds of up to 100,000 rpm can also accurately machine delicate substrates - even double-sided - and produce conductive traces with widths of just 100 µm.

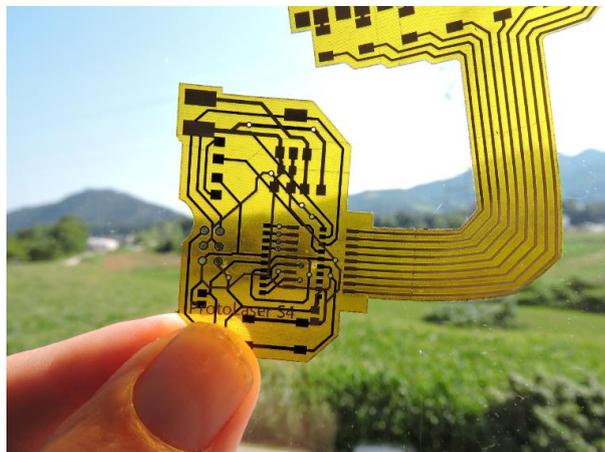
The structuring process with an LPKF ProtoLaser system is done in a similar way and is also chemical-free. In this case, a laser beam with high pulse energy removes material in the insulation channels next to the conductive traces with pinpoint precision. Depending on the particular laser system used, structures with a pitch of 75 µm – which means 25 µm space and 50 µm trace - or even finer are possible.

There is another advantage to the non-contact operation of the laser beam: The process is gentle on the material, preventing subsequent failures due to fabrication-induced excessive material stresses.

The sophisticated systems from LPKF enable the gentle yet precise machining of a wide range of materials, including special materials used in electronics: RF material, flexible materials like PI or PET, fired ceramics, LTCC, metal foils and coatings like TCO/ITO. Multilayer PCBs with six layers can be produced with in-house PCB prototyping; under certain circumstances, eight layers are also possible.

The completion of the conductor structures is followed by through-hole plating using a special coating paste, which makes this process chemical-free as well. Solder masks and legend printing can also be realized using a lithographic process.

To sum up: In-house PCB prototyping does not need to use etching chemicals, saves materials and transport distances, and shortens the time-to-market almost incidentally. This all makes in-house prototyping a sustainable concept.



**Fig.:** LPKF prototyping equipment can be used in laboratories to produce double-sided PCBs in flexible materials like the one shown in this photo, for example. But multilayer PCBs consisting of six or more layers can also be realized using in-house PCB prototyping.

### **About LPKF**

LPKF Laser & Electronics AG is a leading provider of laser-based solutions for the technology industry. Laser systems from LPKF are key elements in the manufacturing of printed circuit boards, microchips, automotive parts, solar modules, and many other components. Founded in 1976,

the company is headquartered in Garbsen, near Hannover, Germany, and has subsidiaries and representative offices throughout the world. Around 20 percent of the workforce is engaged in research and development.