Cutting of Insulated Metal Substrates

LPKF develops depaneling process for insulated metal substrates with metal cores

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With a laser as the separation tool, cutting can be performed economically and with excellent results on many different types of materials. This now also applies to Insulated Metal Substrates (IMS), or metal core printed circuit boards. LPKF has developed a special solution for depaneling and IMS processing that involves cutting of the printed circuit boards by a powerful laser. The laser brings with it several advantages and is thus more than just an economically attractive alternative to mechanical depaneling processes.

With this solution, printed circuit boards with aluminum, copper, or stainless steel metal cores are cut and depaneled in a specially developed LPKF laser process. The laser source works with process parameters that have been optimized for the specific application. Due to the noncontact nature of the process, no mechanical stresses are induced in the material. The board and the components retain their stability and quality because the material in the vicinity of the cut is minimally affected by the process.

Due to the sensitive applications in which the technically challenging IMS circuit boards are used, the demands on the cutting quality are high. The laser impresses here, too: deposition of metal chips on the material is precluded by the process. It can, however, occur with milling and other mechanical machining methods and can trigger short circuits. Thanks to the LPKF laser technology, this danger is avoided. The reliability of the laser-cut printed circuit boards is just as high as before the cutting process.

Due to the high volumes used in the respective printed circuit board applications, the process speed is an important factor in production. To take this into account, the laser systems from LPKF allow very high effective cutting speeds, which vary depending on the desired cut quality as well as the printed circuit board material thickness and material composition.

Insulated Metal Substrates, also known as metal core printed circuit boards, can be found in a multitude of applications with strict heat dissipation requirements. Foremost among them are power electronics applications. Measuring transducers, transistor arrays, and motor drivers can all be equipped with IMS. Other important applications can be found in the automotive/transport sector, where those substrates are used in headlights/lights, GPS, and power modules. IMS are also indispensable in today's communications and consumer electronics, for example, in power amplifiers, transmitters, microstrip circuits, motor and voltage regulators, amplifiers, and equalizers. Compared with conventional printed circuit boards – made of FR4, for example – Insulated Metal Substrates offer a range of advantages for the above-mentioned applications: high thermal conductivity, savings resulting from the reduction in material thickness and the lowered need for heat sinks, and a reduced operating temperature.

Now that LPKF laser technology has made a reliable and fast cutting process available for these IMS circuit boards, the range of applications for them will be extended even further.

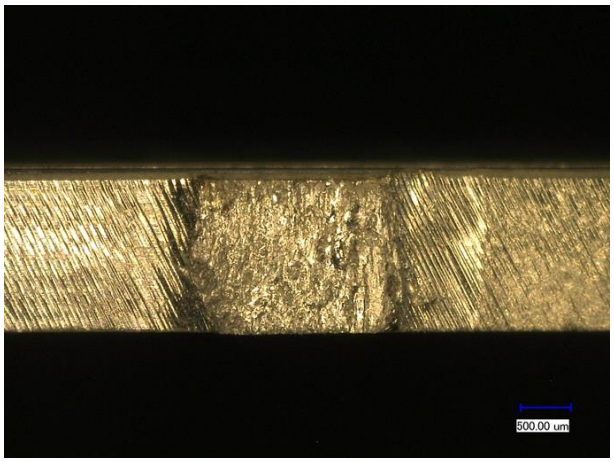

Fig. 1: With the LPKF solution, high-quality cut edges such as these can also be realized cost-efficiently with aluminum substrate materials.

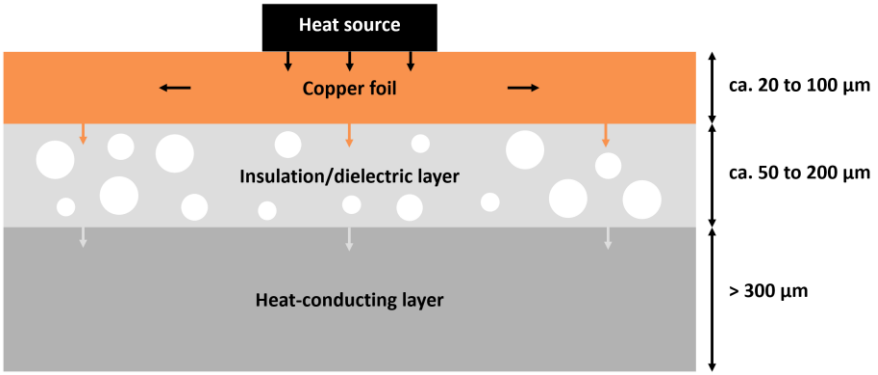

Fig. 2: Metal core printed circuit boards are essentially composed of three different layers of differing thickness. The individual thermally conductive materials are characterized by varying coefficients of thermal conductivity that qualify the materials for different applications.

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.