Technology for micro processing of glass awarded

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LPKF Laser & Electronics AG receives the Productronica Innovation Award 2017 in the semi-conductor category for LIDE technology.

With the LPKF Induced Deep Etching (LIDE) laser from LPKF, the expert jury of Productronica honors a process that unlocks the full potential of glass for microsystems technology. The LIDE process is a combination of laser modification and wet chemical etching. The microstructures in the glass - through holes or cuts - that can be produced with this material are free of microcracks or thermal stress. The heart of the LIDE technology is the Vitrion 5000 laser system, newly developed by LPKF.

Glass is of great interest as a material due to its range of properties for a variety of applications in microsystems technology. In particular, recent developments in the direction of very thin and partly flexible glasses with a material thickness of 50 µm to 500 µm enable new areas of application for one of the oldest materials produced by man. The processing of the material is a major challenge, especially with thin glass. Conventional machining processes leave microcracks and thermal stress behind, leading to a relatively high probability of component failure. This fact has limited the use of glass in microsystems technology. LPKF Laser & Electronics AG is now meeting the challenge of effective thin glass processing with the development of the Laser Induced Deep Etching process.

High economic efficiency: Deep microstructures with only single Laser pulses possible

Laser Induced Deep Etching is a two-stage process. In the first step, the glass is laser modified locally according to the desired layout using the LPKF Vitrion 5000 laser machine. The modified glasses are then etched wet-chemically. The modified areas of the glass are removed much faster than the unmodified material, so that the desired microstructures are created.

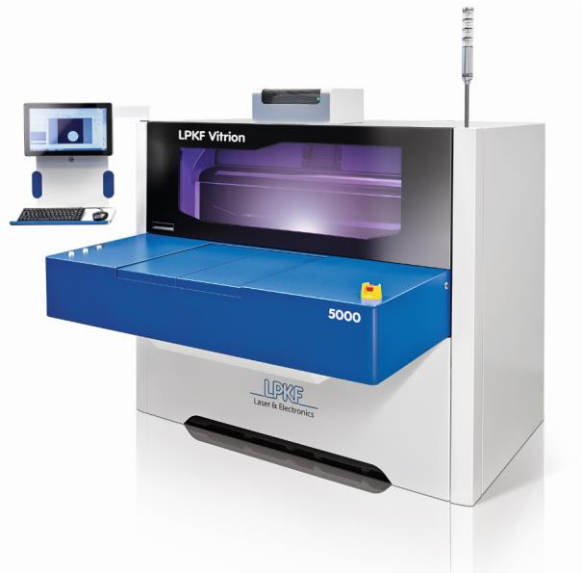
LIDE technology makes it possible for the first time to achieve modifications through the entire thickness of the glass with only single laser pulses. This is necessary to obtain deep structures such as through holes or micro-sections. The high-precision, mask-free laser machine can prepare more than 5000 micro-loops per second or cuts at speeds of up to 100 mm/second. Typical aspect ratios are in the range of >1:10 and smallest structure sizes > 10 µm can be realized.

Wide range of applications

Since the LIDE process sets new standards in quality and productivity, it may even become a new basic technology for a wide range of microsystems technology applications. It could thus transform entire process chains in production. For example, thin glass is an excellent starting material for high-density circuit carriers in microelectronics. In this case, the LIDE process can insert the micro holes for through-plating into the glass substrate.

At the same time, micromechanical components can also be produced with this process. Glass has excellent mechanical properties when processed without stress and micro-cracks. And this is what the LIDE process achieves. LIDE-treated glass also offers new options for microfluidics: In the future, filters or flow straighteners made of glass could also become reality.

Fig.1: LPKF_Vitrion_5000



LPKF Vitiron 5000

Fig. 2: LPKF_Micro_Cutting_of_Glass

Micro-Cutting of ultra-thin glass

About LPKF

LPKF Laser & Electronics AG manufactures machines and laser systems used in electronics fabrication, medical technology, the automotive sector, and the production of solar cells. Around 20 percent of the workforce is engaged in research and development.