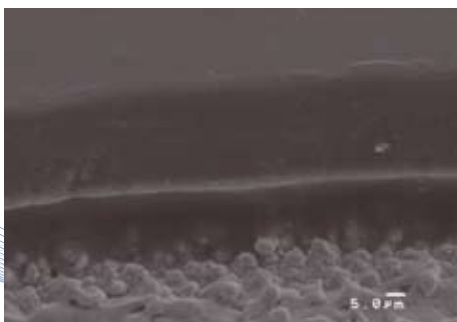
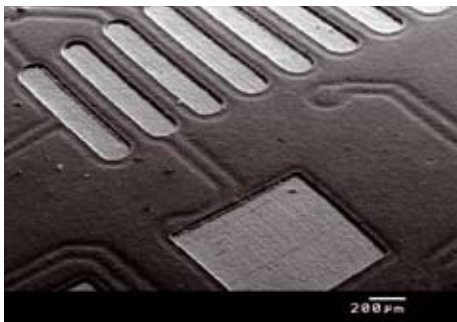
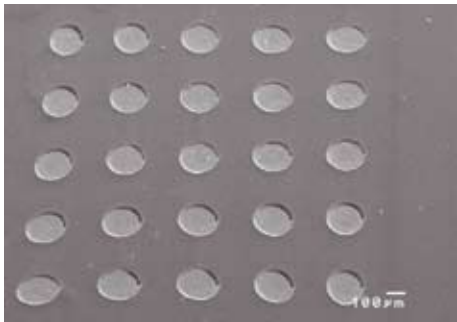


Application Report
LPKF MicroLine UV Laser Systems
Opening Solder-Resists



Ultra-fine structuring of solder-resists

Laser beams are ideal for opening solder-resists to a degree of fineness no longer achievable using conventional printing or exposure techniques.

Opening solder-resist

Printed circuit boards generally have to be covered with solder-resists to improve mechanical soldering. The mask is usually applied using classic screen printing or modern photo techniques and is an important factor in preventing the formation of solder bridges and associated short circuiting.

The handling of screens is, however, complex. In addition, the positioning accuracy of the solder-resist printing with respect to the circuit layout is low at $\pm 100 \mu\text{m}$ due to the elasticity of the screen and problems in adjusting the screen image to the circuit layout. For the creation of finer structures, solder-resist is exposed using photo techniques. Exposure gives an accuracy of approx. $50 \mu\text{m}$.

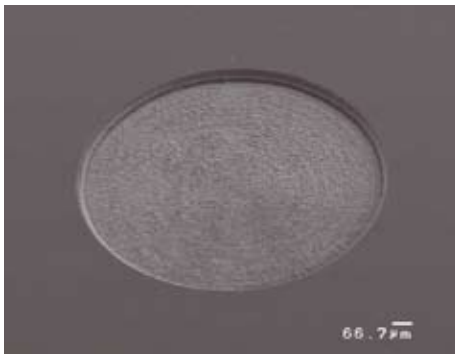
Laser processing is suitable for the most ambitious solder-resists in the HDI range $< 50 \mu\text{m}$. The solder-resist is ablated in the area of the openings to leave a residue-free copper surface. Laser processing enables openings to be created with diameters down to $30 \mu\text{m}$. Moreover, online scaling makes it possible for distortions, as well as positioning errors, to be corrected during processing. Laser processing therefore guarantees maximum positioning accuracy and throughput rates.

Advantages of laser processing

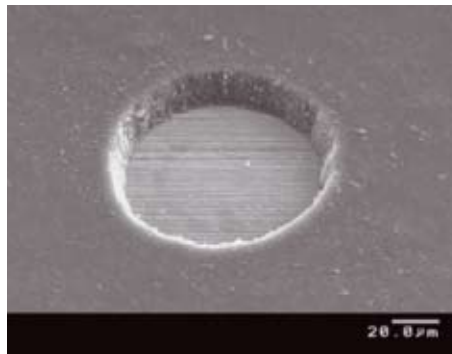
- Ultra-fine openings $< 50 \mu\text{m}$ for HDI achievable in solder-resists
- Ultra-fine openings in cover foils, e.g. Polyimide
- Residue-free copper surface
- No film or screen production, direct CAD data conversion
- Automatic registration of fiducials
- Automatic correction of position and material distortion by online scaling
- High precision and positioning accuracy of the openings

LPKF MicroLine UV Systems

- Frequency-tripled Nd:YAG-laser operating at 355 nm wavelength for the production of ultra-fine structures
- Substrate dimensions up to $18" \times 24"$
- Scanner system for highest structuring speeds
- Telecentric optics for vertical edges
- High-precision, highly dynamic x-y table
- Automatic substrate handling
- Automatic alignment: camera-based vision system for fiducial identification and online scaling
- Automatic system calibration
- Input data formats: Gerber, HP-GL™, Excellon, DXF, etc.
- Debris extraction during processing



Opening in polyimide



Opening in solder-resist

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