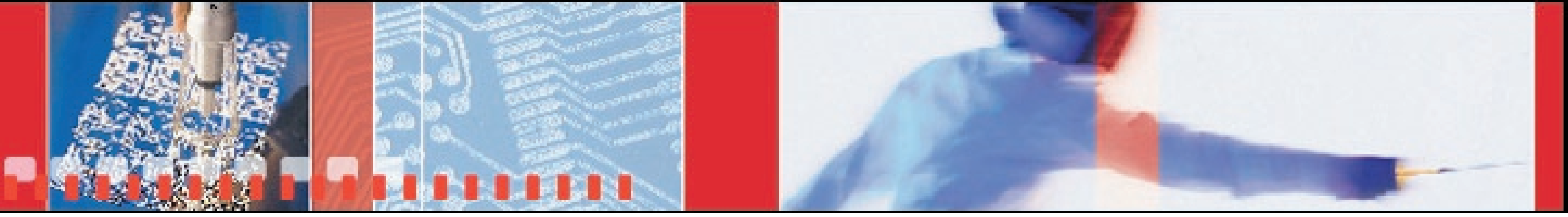
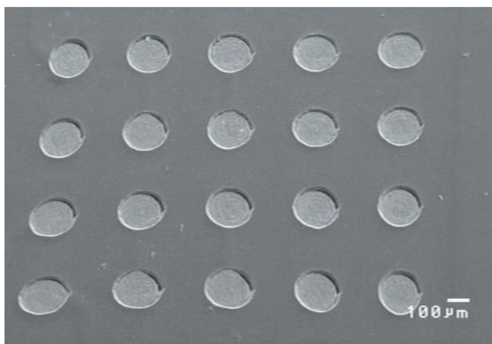
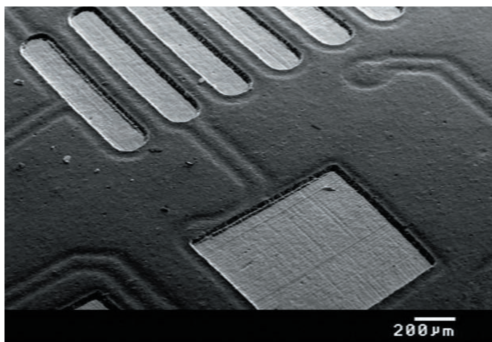
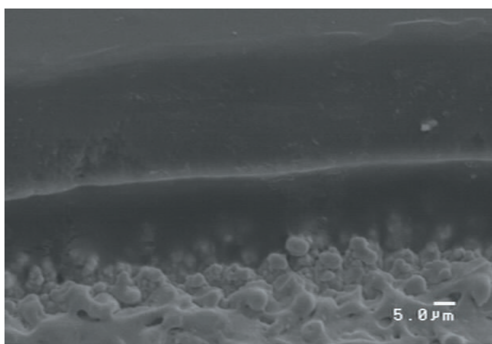


Application Report
Opening Solder-Resists and Cover Foils







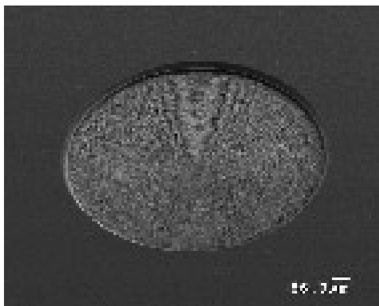
LaserMicronics

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

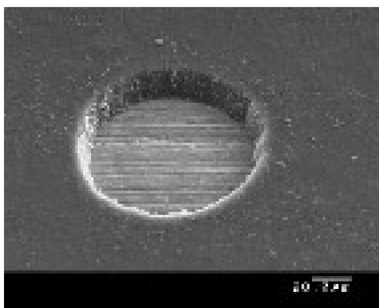
Opening solder-resist
Printed circuit boards generally have to be covered with solder-resists to improve mechanical soldering. The mask is usually applied using classic screen printing or modern photo techniques and is an important factor in preventing the formation of solder bridges and associated short 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 ±100 µm 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 µm.

Laser processing is suitable for the most ambitious solder-resists in the HDI range <50 µm. 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 µm. 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.



Opening in polyimide



Opening in solder-resist

LaserMicronics – your service partner
Benefit from the possibilities opened up by LaserMicronics: we produce small runs at attractive conditions for your applications. Our system engineers are happy to answer all questions regarding your specific application.

Advantages of laser processing
- Ultra-fine openings <50 µm 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

Opening cover foils on copper-laminated circuit boards
The sealing of conductor lines on flexible or rigid circuit boards with cover foils serves as a long-term protection against corrosive environmental conditions as well as a solder-resist mask. Cover foils are one-sided adhesive films, e.g. based on polyimide. The solder regions or orifices are manufactured mechanically before the coating process, i.e. drilled or punched out. However, using mechanical techniques it is not possible to create the finest openings in the cover foils. In addition, the accuracy of film positioning on the base material is also no longer adequate in this case.

Laser processing is based on the principle of ablating the cover foil material in the area of the desired opening. Because of the fineness and precision of the laser beam, it is possible to create ultra-fine openings with extremely high position accuracy and precision. Furthermore in case of small batches the costs for the punching tool can be avoided.

Our system: LPKF MicroLine Drill
- Frequency-tripled Nd:YAG laser operating at 355 nm wavelength for the production of ultra-fine structures
- Substrate dimensions up to 640 x 560 mm
- Scanner system for highest structuring speeds
- Telecentric optics
- High-precision, high 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
- Debris extract during processing

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