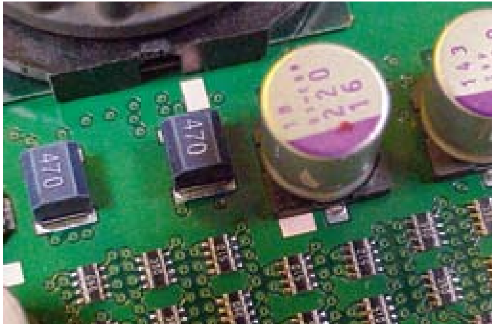
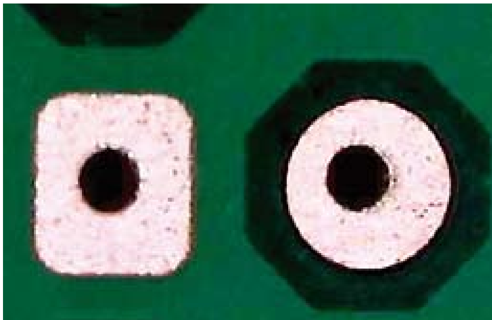
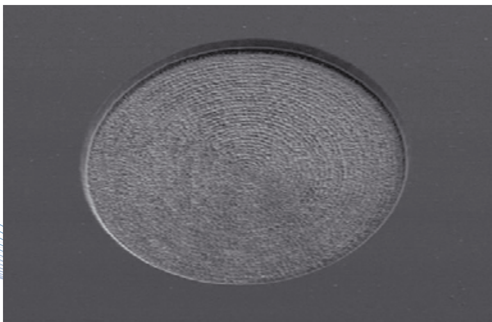
Application Report
LPKF MicroLine UV Laser Systems
Laser Repair and Rework of Bare and Assembled Boards







LPKF®
Laser & Electronics

The laser as a tool for the rework and repair of printed circuit boards

Solder-resist and polyimide cover foil material on copper base material can be efficiently removed using the laser to produce clean copper surfaces. As a result the laser can be used for the rework or repair of assembled and bare printed circuit boards. PCBs that would otherwise be scrapped due to design errors, process problems or design amendments can be reworked or repaired fast and cost-effectively using the laser. Furthermore, yields can be improved, and the time to get the product to the customer can be reduced in many cases, especially in the case of expensive multilayer boards.

Repair and rework of PCBs comprises the removal of solder-resist or cover foil material:

- to subsequently open pads which have been covered by mistake
- to create new pads for the subsequent assembly with SMD components
- to open larger conductive areas
- to clean through-holes

Furthermore, circuit tracks can be opened by removing the copper itself.

The Q-switched UV-laser used is characterized by extremely high-pulse peak powers due to very short pulse lengths making it possible to directly vaporize the dielectric without damaging the copper underneath. As a result, clean copper surfaces are produced which are suited for the rework without the necessity of additional cleaning processes.

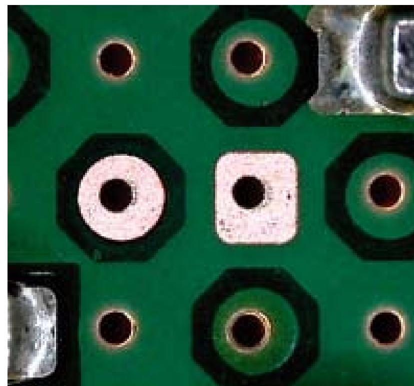
Advantages of laser repair with MicroLine UV systems

- Clean copper surface
- Selectivity of material processing, i.e. base copper is not damaged
- Processing of assembled circuit boards
- Contact-free material processing to prevent material distortion
- High precision and position accuracy of openings by automatic fiducial registration
- High flexibility
- Fast and cost-effective repair or rework

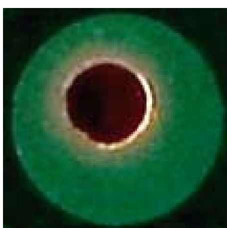
LPKF MicroLine UV Systems

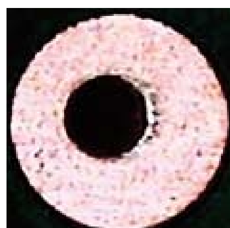
- Frequency-tripled Nd:YAG-laser operating at 355 nm wavelength for the production of ultra-fine structures
- Substrate dimensions up to 18“ x 24“
- Scanner system for highest structuring speeds
- Telecentric optics for vertical edges
- High-precision, highly dynamic x-y table
- Automatic substrate handling
- 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

Removal of solder-resist on an assembled PCB



Opened pads, d=900 µm, on an assembled PCB





Pad surface before and after laser processing

Polyimide cover foil opened on an assembled rigid-flex PCB

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