TECHNICAL PAPER

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Removal of Residual Solder

Accurate residual solder removal is a key success element of most rework applications. Soldering irons and strands are often used, however the quality of the residual solder removal depends strongly on the skills of the operator. Often pads are torn off or the solder resist is damaged. A look into the future reveals that assemblies are becoming smaller and smaller and the assembly density continues to increase. With higher packing densities and shrinking component sizes, access to the working surface becomes increasingly difficult. Finetech provides contactless solder removal solutions for virtually all commercially available SMD components – from large BGAs to small passive components.

WHAT ARE THE CHALLENGES?

- Consistent residual solder removal across all pads
- Protect surrounding components, pads and solder resist
- Avoid mechanical stress on the metallic surface layer and the solder resist
- Removal of residual solder from surfaces that are difficult to access or small (miniaturization)
- Distance control between nozzle and PCB for contactless residual solder removal
- Minimize thermal stress on component and PCB
- Reduction of oxidation for better results and longer service life of the solder removal heads

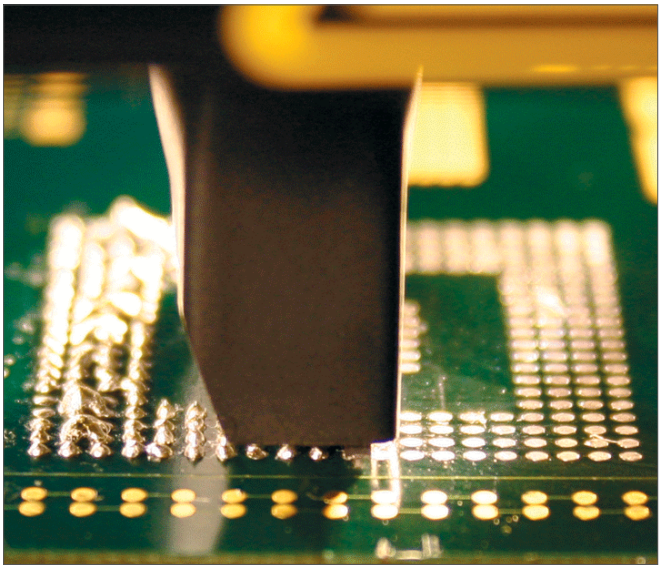

Fig. 1: Removal of residual solder in the process

CONTACTLESS REMOVAL OF RESIDUAL SOLDER

The functional principle

Removing residual solder by hand is not a reproducible process and always carries the risk that adjacent components are disturbed or that solder resist and board tracks are so affected that the PCB becomes unusable.

That is why Finetech offers a non-contact solder extraction system that works safely, precisely and, above all, reproducibly in one pass. It can be used even for the smallest surfaces on densely populated assemblies.

After the reflow process has started, the molten solder is simply sucked off the board with a powerful vacuum and collected in a container. Hot process gas (air or nitrogen) is fed into the removal head and directed onto the board. The molten solder is then sucked off through a vacuum channel in the middle of the nozzle and collected in a container.

The newest generation of solder removal heads allows the contactless removal of residual solder without endangering pads and solder resist. Surrounding components and the board itself are reliably protected against damage.

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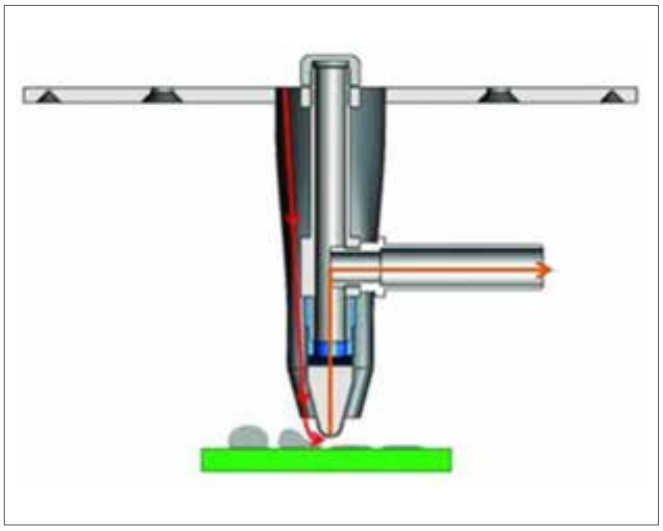

Fig. 2: Functional principle of the solder removal head

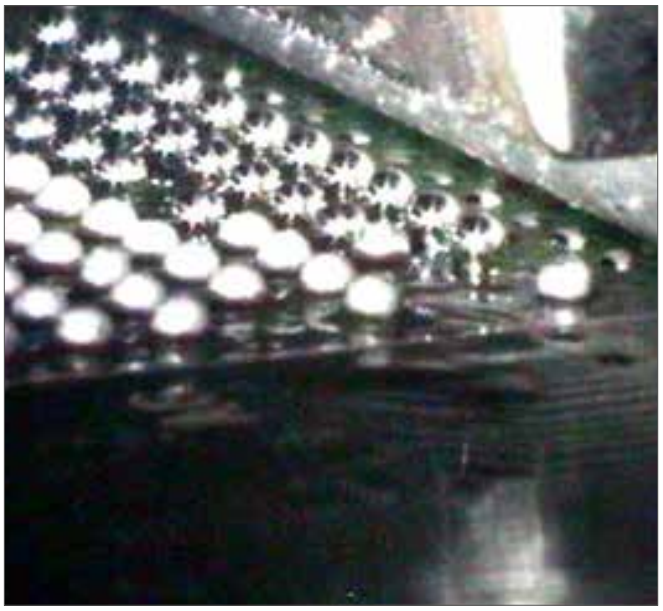

Fig. 3: Removal of residual solder in the process

Solder removal heads

Residual solder removal can be carried out using solder removal heads up to 50 mm wide. This quickly frees large BGAs and other large footprint components from residual solder. Small components on densely populated printed circuit boards represent a particular challenge. Here it is important to have the appropriate soldering head in order to remove the remaining solder from the last gap. Currently, the smallest removal head has an outer diameter of just 0.5 mm and is suitable for solder extraction of small passive components such as 01005.

Fig. 4: soldering tools

Creation of solder removal profiles

For residual solder removal, the individual contacts must be melted. To avoid overheating and to comply with guidelines such as IPC/JEDEC, the temperatures should be recorded once.

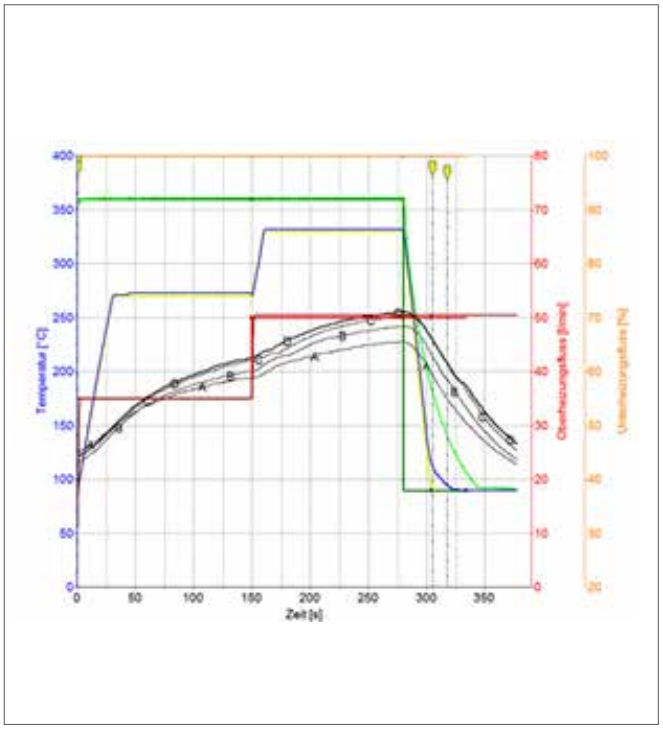

Fig. 5: Example of solder profile

The process control and fixed temperature profiles ensure that the same temperatures are always generated and that the board cannot overheat.

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Process gas

Nitrogen should be used to extend the quality of the extraction results and the service life of the extraction tools. Depending on the requirements and oxidation level of the residual solder, additional flux can also be applied.

Guiding the positioning table

The optionally available vacuum rail offers the user additional safety during manual residual solder removal. It prevents unwanted lateral movement along the X-axis and thus protects surrounding components. In addition, the rail sets a mechanical end point to stop the suction movement on the Y-axis in a defined manner.

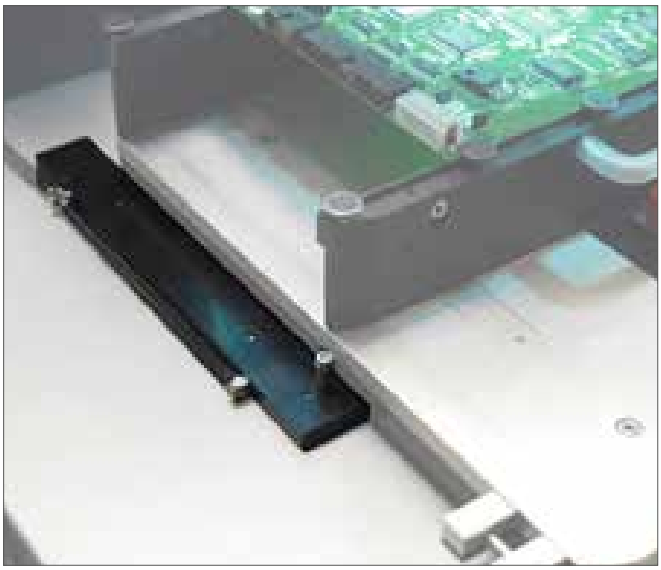

Fig. 6: Guide Bar for safe guidance of the positioning table

In addition, the process can be observed with the process camera, so that the "moving" soldering head can always be viewed during the process.

Cleaning and optical inspection

After removing the residual solder, the board (and equipment) should be cleaned, e.g. of solder and flux residues. Visual inspection of the solder joints under a microscope is important. More precise findings can be obtained by X-ray and electrical testing.

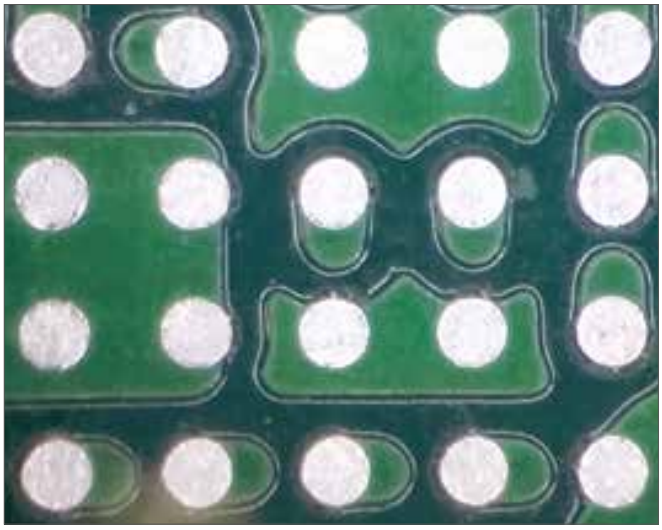

Fig. 7: Pads freed from residual solder