

## Solder Paste Printer Process Parameters

### Clamps:

- **Foil-less Clamps:** Give the best performance, especially if there are apertures near the edges of the boards. Vacuum tooling is required if these clamps are used.
- **Foil Clamps:** Used if vacuum tooling is not available or pallets are being used. The foil goes over the board edges, holding the board in place in the Z-axis. Note that the foils will create a gap between the board and the stencil near the edge of the board. If there are apertures near the edge of the board, variation in the transfer efficiency of these apertures may be observed.
- **Snuggers:** Hold the board in place in the X-, Y-, and Z-axes.

### Board Support:

- **Recessed Vacuum Tooling:** Best option. Provides the best board support and holds the board in place with vacuum during the printing operation. This type of support also minimizes board warpage, which is common with thin boards.
- **Vacuum Box:** Used in conjunction with magnetic pins. Provides good board support and holds the board in place.
- **Pallets:** Board support and proper gasketing of the stencil to the board depends on how well the pallets are designed and manufactured. Many times the board is still able to move around a bit and board warpage could be an issue for proper gasketing of the board to the stencil.
- **Magnetic Pins:** Worst option for board support, but may be necessary in some circumstances.

### Squeegee Blades:

- **Angle:** Typically, 60° squeegees are used.
- **Stiffness:** Different flex/stiffness options may be available. The spring force or the stiffness may degrade over time. It is important to replace the squeegee blades periodically.

- **Age:** Squeegees wear over time and lose the sharpness of their edge, or the edge can become bent, dinged, or damaged. The elasticity of the metal also degrades over time, resulting in different angles and force on the solder paste bead being printed over the stencil.

### Squeegee Speed:

Typically determined by the manufacturing line's throughput needs. Different solder pastes often perform differently with different squeegee speeds; most have sweet spots where they perform the best. It is key to determine the optimal setting for the solder paste that is being used.

### Separation Speed:

Different solder pastes often perform differently with different separation speeds; most have sweet spots where they perform the best. It is key to determine the optimal setting for the solder paste that is being used.

### Squeegee Pressure:

Determined by the print speed, the stencil, and the length of the squeegee blade being used.

- The lowest pressure that allows for a clean wipe of the stencil should be used.

### Separation Distance:

Typically, 2mm is used.

- When the board drops from the stencil, it should drop to a distance that clears the solder paste's height on the board.

### X/Y Offsets:

If the stencil is not aligning with the board pads properly, X/Y offsets may need to be added. This can be due to a number of reasons, including poor stencil quality or board stretch with panelized or large boards.

APPLICATION NOTE

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### Stencil Gap:

Should be set to 0mm. If the need for a positive or negative gap is present, there is most likely an issue with the printer calibration. For example, the table to rail height could be off and may need to be calibrated.

### Stencil Type:

The type of stencil, the manufacturer of the stencil, and the quality of the stencil all play a significant role in the performance of the solder paste. Not all stencils are created equally. Some common stencil types are listed below:

- Laser cut
- Laser cut electropolished
- Electroformed
- Laser cut with nano-coating
- Step stencil

### Under Stencil Wipe:

- **Solvent:**
  - IPA or alcohol-based: best option
  - Water-based: can be problematic due to evaporation rate and compatibility with solder pastes
- **Paper Type:** Lint can cause aperture clogs. Some papers aren't as absorbent as others. Lint-free papers are the best option.
- **Wipe Style:** There are a number of options for wiping. Solder pastes can perform differently with different wipe styles. It is important to understand the affect the wipe style has on the performance of the paste being used in the process.
  - Wet/Dry/Vacuum; Wet/Dry/Vacuum/Dry; Dry/Vacuum; etc.
- **Frequency:** Determined by the solder paste being used and how well the rest of the process is set up (especially support and stencil gasketing). Some solder pastes need to be wiped more frequently than others.

APPLICATION NOTE

This Application Note is provided for general information only. It is not intended, and shall not be construed, to warrant or guarantee the performance of the products described which are sold subject exclusively to written warranties and limitations thereon included in product packaging and invoices.

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