

SELECTIVE SOLDER TROUBLESHOOTING GUIDE

PROBLEM: INSUFFICIENT HOLE FILL

POSSIBLE CAUSES:

- Not enough flux
- Distance from Fluxer to PCB is too high, Flux can not go up the hole
- Pin to hole ratio is too small
- Temperature on top side of board is too low
- Solder temperature is too low
- Distance from solder wave to PCB is too high



PROBLEM: INSUFFICIENT SOLDER

POSSIBLE CAUSES:

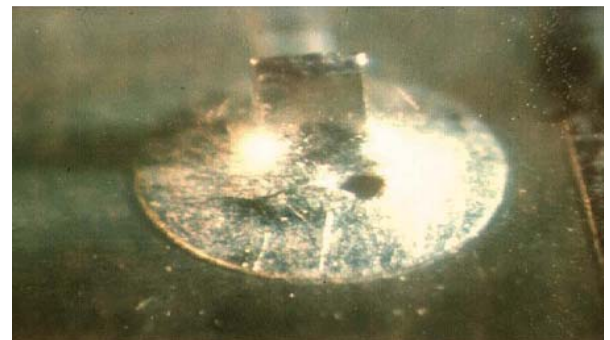
- Not enough flux
- Solderability of component
- Bad PCB pads
- Solder time too short, reduce speed or increase dipping
- Distance from solder wave to PCB is too high
- Bad flux solids



PROBLEM: BLOW HOLES

POSSIBLE CAUSES:

- Board temperature is too low
- Moisture in the PCB



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PROBLEM: EXCESSIVE SOLDER

POSSIBLE CAUSES:

- Typically happens at the end of line soldering of connectors
- Layout too tight to make a good peel off movement
- Try to move over the connector or diagonally out of the connector
- Let the wave switch off at the end of the connector
- Board / Component solderability
- Lead length is too long (1 to 1.5mm is perfect)
- Solder temperature is too low
- Speed is too fast, solder time is too short



PROBLEM: BRIDGING

POSSIBLE CAUSES:

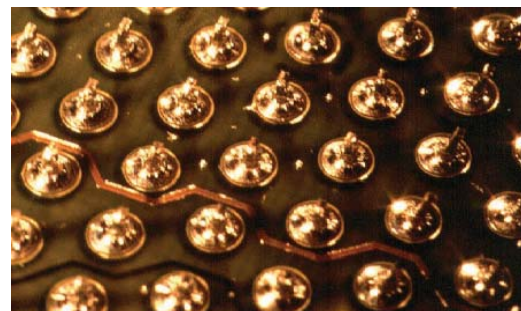
- Typically happens at the end of line soldering of connectors
- If bridging occurs in the middle or at the beginning of a connector, it is typically a heat or N2 purity problem
- Layout is too tight to SMD component to make a good peel off movement
- Let the wave switch off at the end of the connector
- Board / Component solderability
- Lead length is too long (1 to 1.5mm is perfect)
- Solder temperature is too low
- Speed is too fast, solder time is too short



PROBLEM: SOLDER BALLS

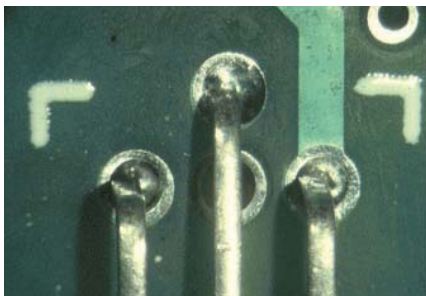
POSSIBLE CAUSES:

- Occur more often in selective soldering than in wave soldering. Reason is typically due to the higher temperatures used in selective soldering
- Solder mask type is the most important factor
- Too much flux
- N2 adjustment is too high
- Preheat is too low



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PROBLEM: POOR HOLE FILLING



POSSIBLE CAUSES:

Poor or incomplete hole fill is normally a fluxing or heating issue. It is not commonly a printed board problem.

As a guide, the topside temperature of the printed board should be 100° - 110°C just before wave contact. This is generally true for double sided and multilayer boards. Single sided boards should be processed at slightly lower temperatures as no solder penetration is needed.

In the above examples, the solder has not fully filled the plated thru-hole. This is either due to the preheat operation being set too low or poor flux application. In both cases, checking the process parameters should eliminate the problem.

PROBLEM: SOLDER SHORTS ON PIN GRID ARRAY

POSSIBLE CAUSES:

Solder shorts are a major problem in both selective and wave soldering, particularly as component pitches continue to decrease.

In the example shown, shorts are seen on the Pin Grid Array device. Due to the close proximity and the number of pins, the solder separation is impeded from the base of the board. Shorting can occur due to poor fluxing, incorrect heat or wave separation. Poor N2 quality can also cause shorts.

All shorting can be decreased through good design rules with reduction in pad size and component lead length. A lead length from 1 - 1.5mm is perfect for selective soldering. Longer pins can cause more shorts.



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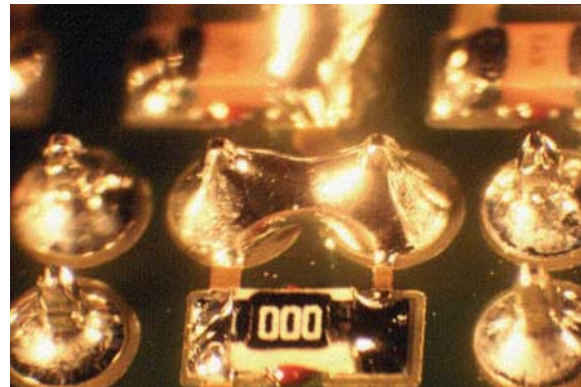
PROBLEM: SOLDER SHORTS NEAR SMD COMPONENTS

POSSIBLE CAUSES:

It is critical to selective solder a heavily populated board. Most can only be fluxed by good design. Increasing the flux solids will improve the drainage on all joints.

In the example shown, the pin length is correct at 1 - 1.5mm, but the surface pads could be reduced in size. With smaller pads, less solder is retained on the board to short between pins.

If this is the only defect area on the board, then a nice fix is a glue dot placed between the two pins.



PROBLEM: SUNKEN SOLDER JOINTS

POSSIBLE CAUSES:

Sunken joints may be seen on the topside and base of the board.

The most common cause for sunken joints is the hole to lead ratio. If the hole is large in comparison to the lead diameter, the solder literally drops in or out of the hole.

Sunken solder joints can be caused by incorrect preheat or poor fluxing when seen on the topside of the board.

Sunken solder joints on the base of the board may be caused by outgassing. If the soldering process is functioning correctly, when the hole outgasses the solder tends to shrink back into the hole to fill the void.

