



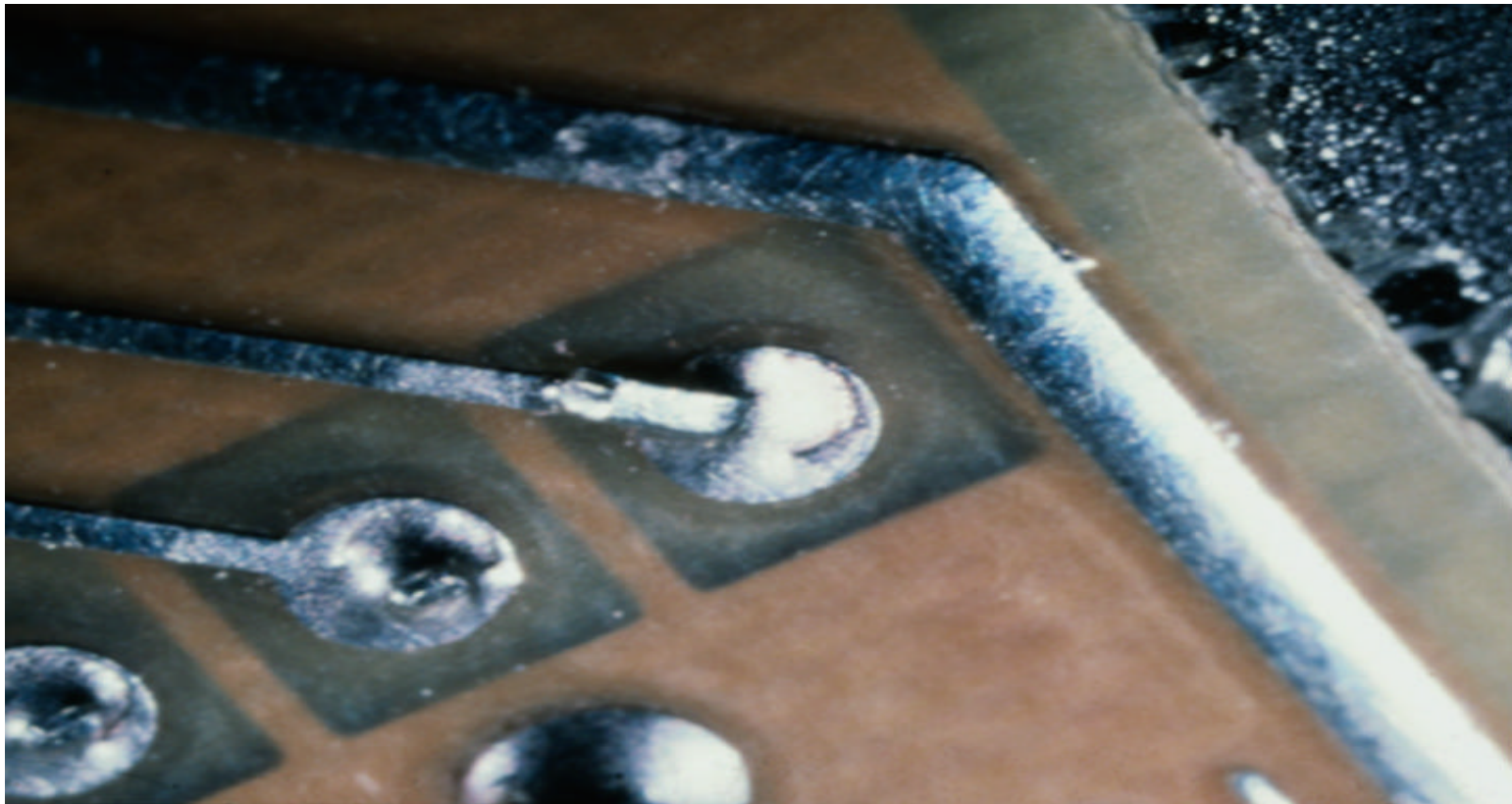
Types of Wave Solder Defects

- Non-Wetting
- Dewetting
- Pin Holes
- Webbing
- White Haze
- Solder Balls
- Icycling
- Bridging
- Excess Solder
- Dull/Grainy Joints
- Cold/Disturbed Joints



Non-Wetting

- Recognized by pull back of solder to expose the surface to be soldered



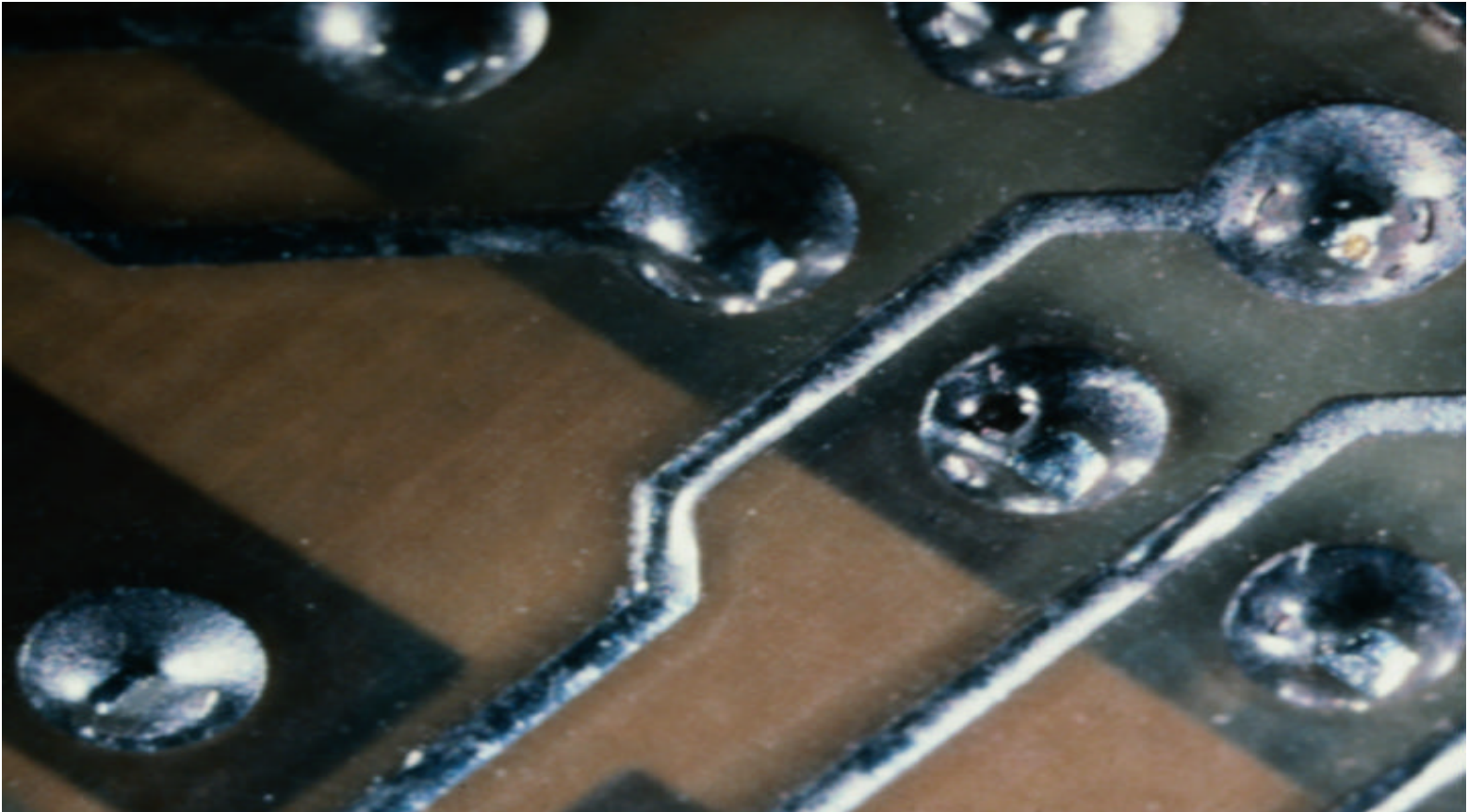


Non-Wetting

- Possible Causes:
 - Grease, oil or dirt on the pre-soldered surface
 - Bleeding or misregistered soldered mask
 - Low temperature solder
 - Contaminated solder
 - Surfaces too heavily oxidized for flux being used
 - Contaminated flux
 - Poor application of flux
- Remedy
 - Investigate each possible cause and correct suspected discrepancies one at a time until solderability is restored

Dewetting

- Recognized by metal wetting initially, then pulling back to form droplets of solder on the surface.





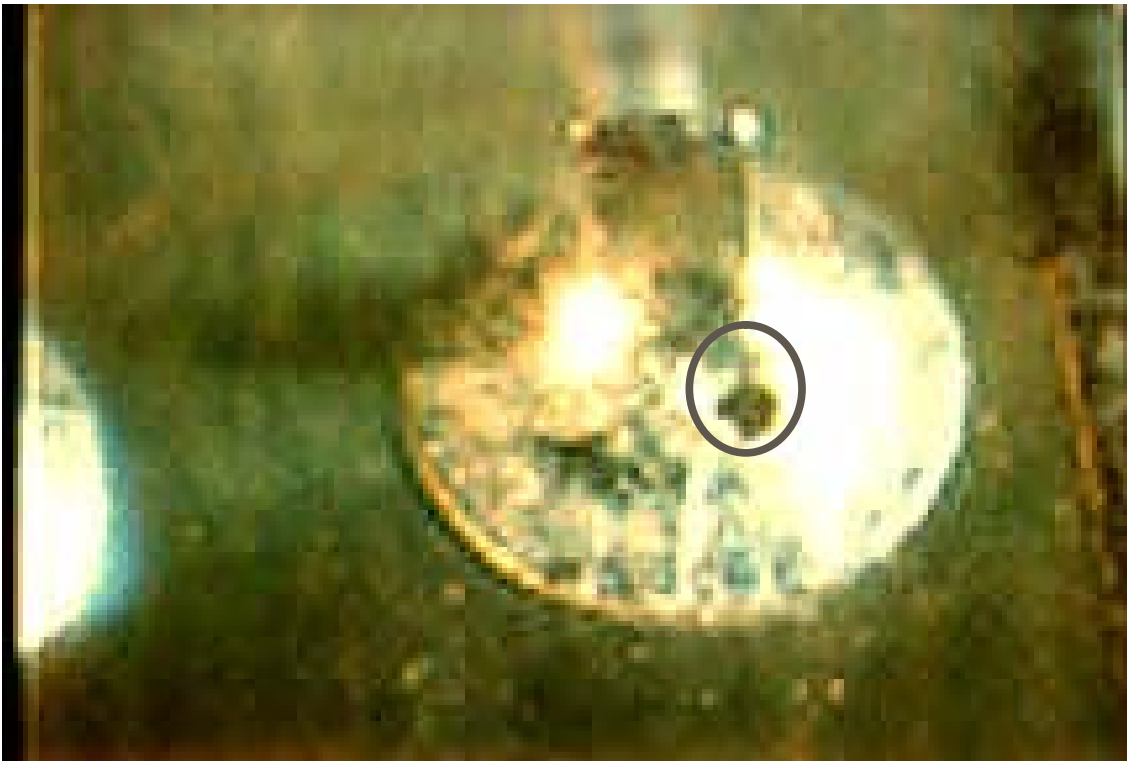
Dewetting

- Possible Causes:
 - Contamination of surface by abrasives
 - Poor plating
 - Poor hot air solder leveling during PCB manufacture
- Remedy
 - Restore solderability of the surface



Pin Holes

- Recognized by small holes or eruptions in the solder fillet.





Pin Holes

- Possible Causes:
 - Moisture or plating solution in the PCB laminate
 - Inadequate preheat to evaporate flux solvent
 - Flux has absorbed water
 - Physical blockage due to foreign body in hole
 - Top of Plated Through Hole prematurely solidifying

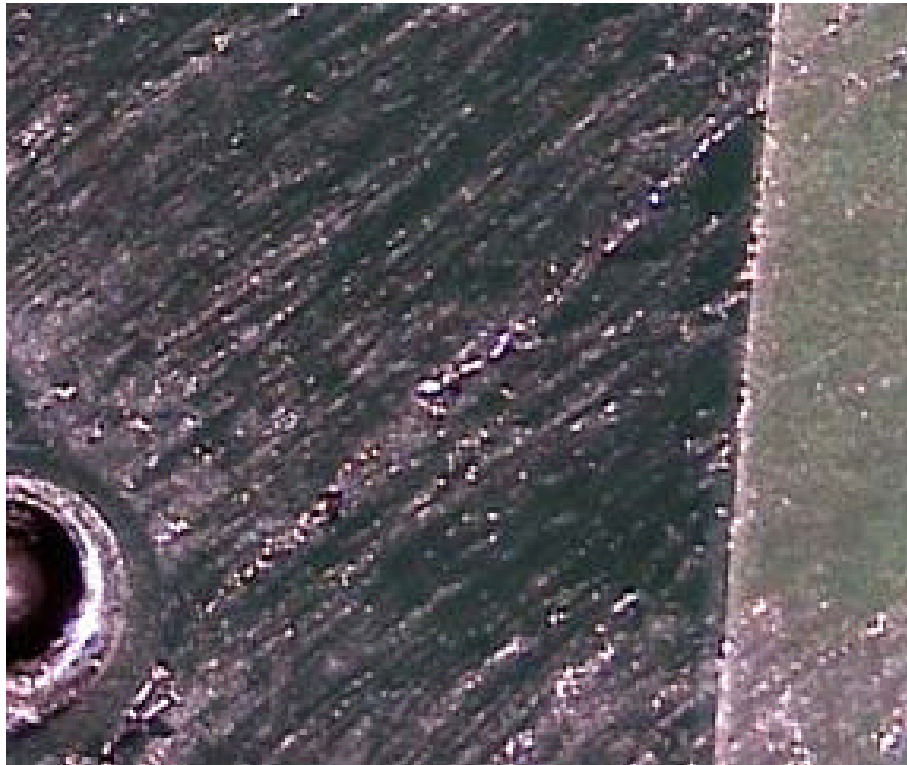


Pin Holes

- Remedy
 - Increase preheat to see if it eliminates problem
 - Put in new flux to see if it eliminates problem
 - Increase topside preheat and/or solder temperature to correct premature topside Plated Through Hole freezing
 - If all of these fail to correct the problem, have the PCBs baked and cross sectioned.

Webbing

- Recognized by a spider web like extension of solder across the non conductive portion of the PCB.





Webbing

- Possible Causes:
 - Improper curing of the laminate or solder mask
 - Inadequate flux (when accompanied by bridging or ictycling)
 - Dross in the solder wave
- Remedy
 - Baking the PCB will sometimes correct the improperly cured mask or laminate condition
 - Substituting a more viscous flux or increasing the quantity of flux put on the PCB
 - Correcting the drossing problem in the wave



White Haze on Solder Mask

- Recognized by a white haze on the non-conductive portion of the PCB that cannot be removed by washing.



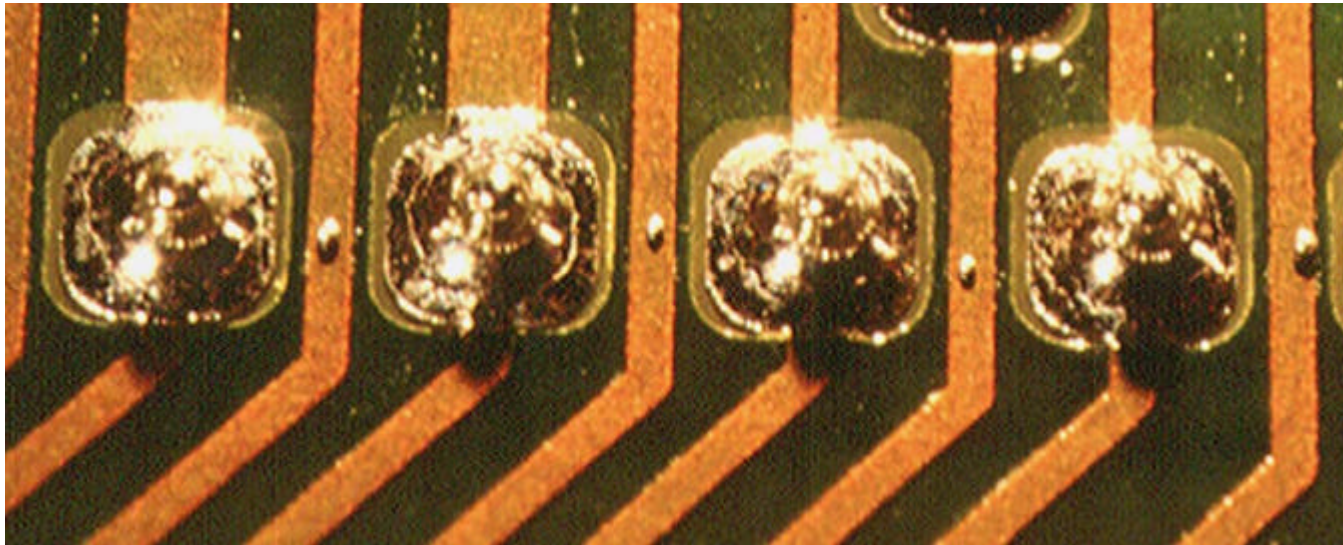
White Haze on Solder Mask

- Possible Causes:
 - Improper curing of the laminate or solder mask
- Remedy
 - Baking the PCB will sometimes correct the improperly cured mask or laminate condition



Solder Balls

- Recognized by tiny spherical shapes of solder dispersed over the surface of the PCB





Solder Balls

- Possible Causes:
 - Insufficient preheat
 - Plated Through Hole conditions that create pin holes, resulting in Solder Balls
 - High humidity in the manufacturing area
 - Moisture in the flux

- Remedy:
 - Investigate each possible cause, correcting suspect causes one at a time until the problem is corrected.



Icycling

- Recognized by conical or flag shaped extensions of the solder fillet



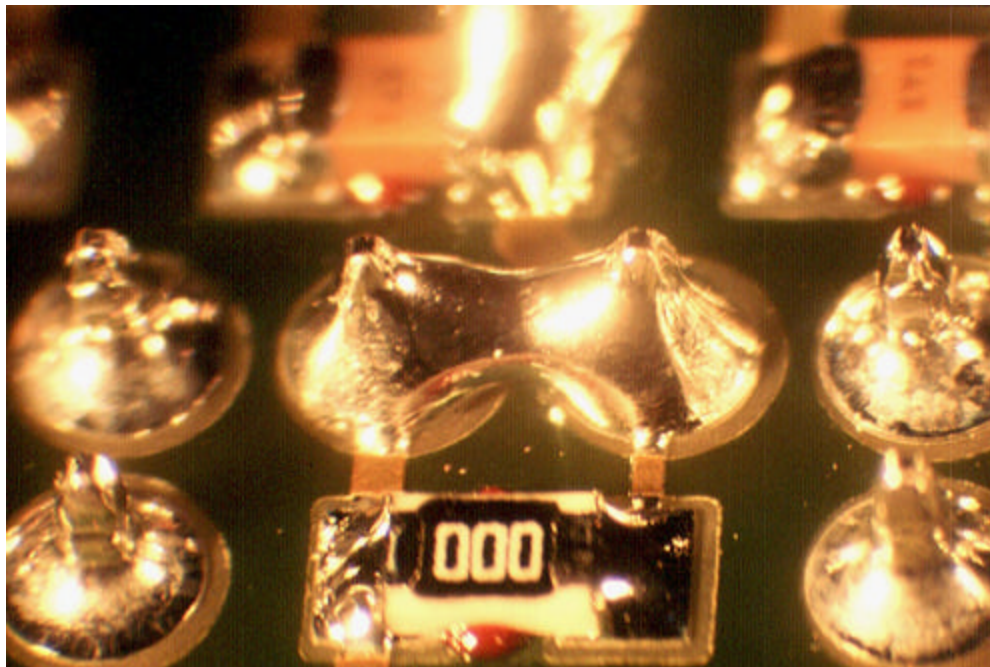
Icycling

- Possible Causes:
 - Any condition that causes the solder to solidify while in the process of draining, such as:
 - inadequate flux to promote quick drainage
 - pot temperature too low
 - soldering surface unusually heat absorbent
 - leads picking up dross in the wave
 - wrong Plated Through Hole to wire ratio
- Remedy:
 - Investigate each possible cause and correct the suspect conditions one at a time until the problem is eliminated



Bridging

- Recognized by solder extending from one lead to an adjacent lead, causing a short circuit





Bridging

- Possible Causes:
 - Component leads that are bent or too closely spaced
 - Excess solder
 - Inadequate flux remains to promote drainage
 - Board immersed too deep in the wave
 - Leads picking up dross in the wave
 - Contaminated solder
 - Poor component solderability



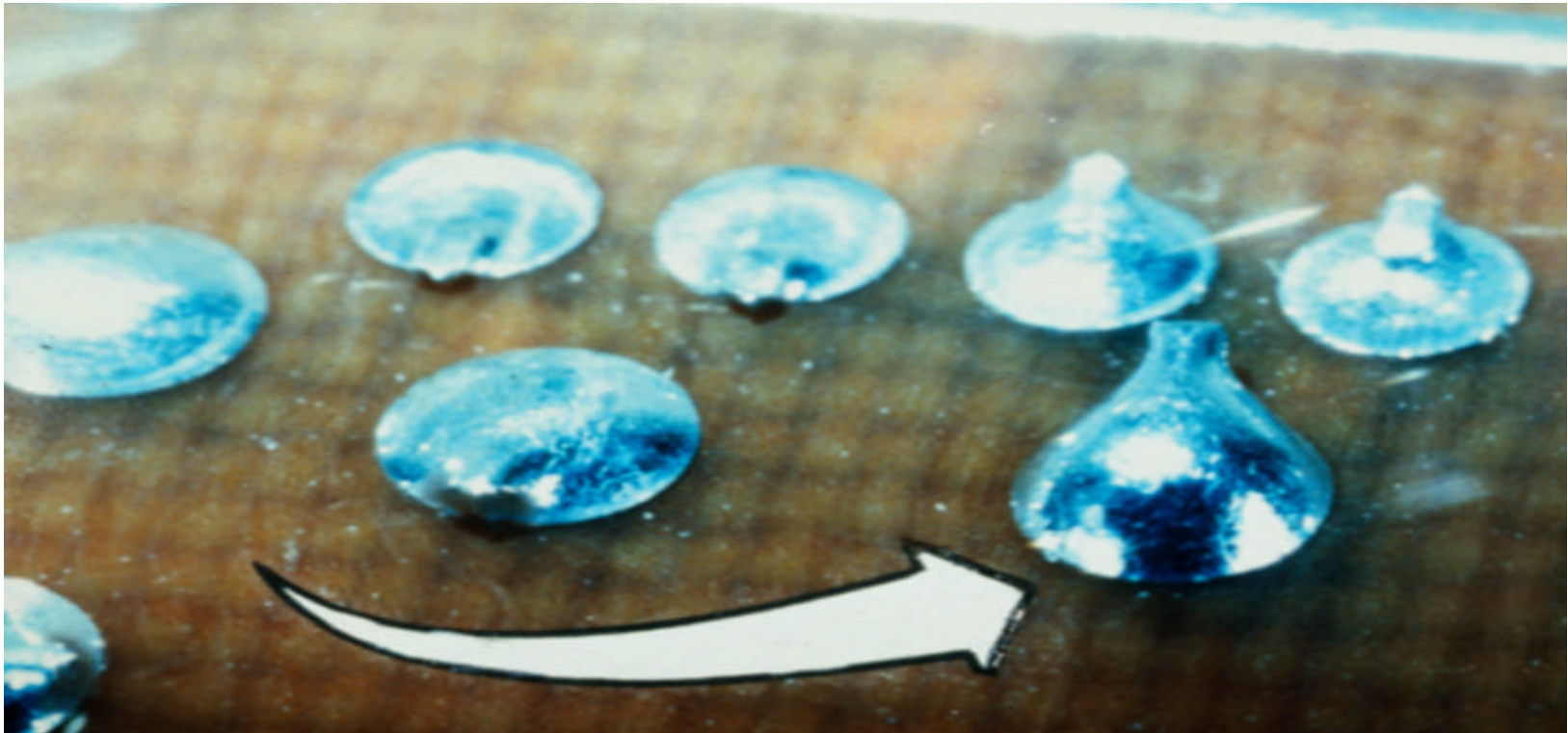
Bridging

- Remedy:
 - Investigate each possible cause and correct suspect conditions one at a time until the condition is eliminated



Excess Solder

- Recognized by:
 - Bulbous appearance of fillet.
 - Unable to see contours of lead and land.





Excess Solder

- Possible Causes :
 - Any condition that contributes to poor drainage of the solder
 - Low temperature of solder or preheat
 - Contamination of solder
 - Insufficient flux to promote drainage
 - Incorrect wave exit angle or speed
- Remedy:
 - Investigate suspected causes and correct them one at a time until the problem is corrected



Dull or Grainy Joints

- Recognized by dark, non reflective, rough surfaces from an alloy that is normally bright and shiny.



Dull or Grainy Joints

- Remedies:
 - Determine that the alloy is normally a shiny alloy
 - Examine a recent pot analysis or get one done
 - Conduct electrical and mechanical evaluation to see if rework is necessary
 - If solder meets J-STD-006 Purity Standards and joints are mechanically sound, there is no reason for rejection or touch up
 - If solder does not meet standard, it is a *cold joint* and should be replaced



Cold/Disturbed Solder Joints

- Recognized by rough and dull finish on the fillets in conjunction with unacceptable mechanical strength of the joint



Cold/Disturbed Solder Joints

- Possible Causes:
 - Movement while joint is still molten caused by:
 - Conveyor mechanism erratic
 - Solder Temperature too high
- Remedy:
 - Look for causes of vibration being transmitted to the PCB and correct them
 - Insure that solder reaches solidus temperature immediately after joint is completed