Where do Blow Holes in Solder Joints Come From?
Blow Holes and voids

• Differences
  – Blow holes/Pin holes
  – Internal voids in the solder joint
Explanations

- Blow holes are caused by
  - Plating in the PTH
  - Excess flux in the hole during soldering, entrapment
  - Product solderability, leads and boards
Voids in Plated Holes

Boards
- Laminate type
- # of Layers
- Board Technology
- Suppliers
- Coatings solderability
- Solder mask

Storage
- Shelf life
- Environmental conditions
- Packaging materials

Equipment
- Wave Solder
- Fluxer type
- Preheat top and bottom
- Conveyor Speed

Flux
- Type
- Supplier
- Percent solids

Assembly
- Kitting
- Environmental conditions

Manufacturing Processes
- Kitting
- Environmental conditions
Causes of Blow Holes

- Plating in the barrel problems
Examples Blow Holes
Solder Source Pinholes
Solder Destination Side Void

- Supported Hole
Solder Source Void

- Unsupported Hole
X-Ray Image of Internal Voids in PTH
X-Ray Image of Voids in PTH
Examples of Soldered PTH

- Void within solder joint which was found when microsectioned
Examples of Soldered PTH

- Microsections of solder hole fill with voids

http://www.technolab.de/_en/solderdict/smdhmd/poorsolderfilletinthroughhole.php
### Supported Holes – Solder Criteria

#### Table 7-4  Plated-Through Holes with Component Leads - Minimum Acceptable Solder Conditions

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Vertical fill of solder(^2,^3), see 7.3.5.1.</td>
<td>Not Specified</td>
<td></td>
<td>75%</td>
</tr>
<tr>
<td>B. Circumferential wetting of lead and barrel on solder destination side, see 7.3.5.2.</td>
<td>Not Specified</td>
<td>180(^\circ)</td>
<td>270(^\circ)</td>
</tr>
<tr>
<td>C. Percentage of original land area covered with wetted solder on solder destination side, see 7.3.5.3.</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>D. Circumferential wetting of lead and barrel on solder source side, see 7.3.5.4.</td>
<td>270(^\circ)</td>
<td></td>
<td>330(^\circ)</td>
</tr>
<tr>
<td>E. Percentage of land area covered with wetted solder on solder source side, see 7.3.5.5.</td>
<td></td>
<td></td>
<td>75%</td>
</tr>
</tbody>
</table>

**Note 1.** Wetted solder refers to solder applied by the solder process. For intrusive soldering there may not be an external fillet between the lead and the land.

**Note 2.** The 25% unfilled height includes both source and destination side depressions.

**Note 3.** Class 2 may have less than 75% vertical hole fill as noted in 7.3.5.1.

Target – Class 1, 2, 3

Adapted from IPC-A-610 Table 7-4
Voids

- Voids have always existed
  - Poor plating in PTH
  - Wrong conveyor speed
  - Wrong preheat temp
    - Entrapment of chemical
  - Outgassing of intermetallic
Thank You
Further Information

For questions regarding this webinar, please contact Leo Lambert at leo@eptac.com

For information on any of EPTAC’s or IPC’s Certification Courses, please visit our website at http://www.eptac.com