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# Where do Blow Holes in Solder Joints Come From?



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## Blow Holes and voids

- Differences
  - Blow holes/Pin holes
  - Internal voids in the solder joint



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## Explanations

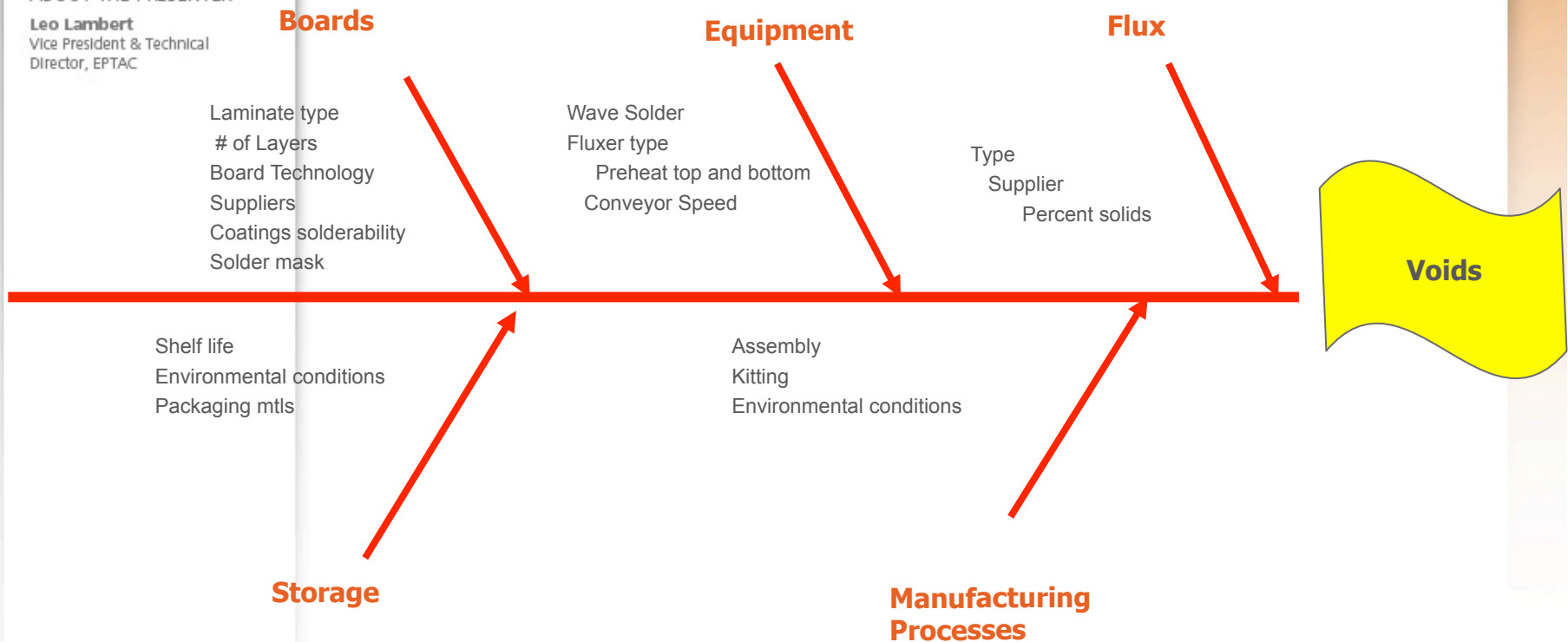
- Blow holes are caused by
  - Plating in the PTH
  - Excess flux in the hole during soldering, entrapment
  - Product solderability, leads and boards



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# Voids in Plated Holes





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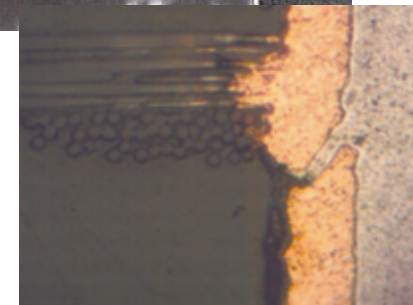
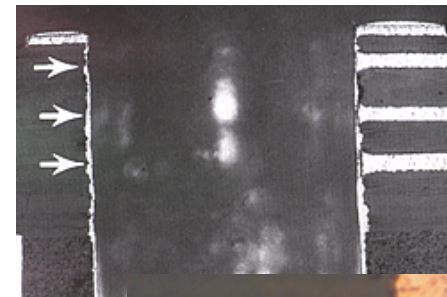
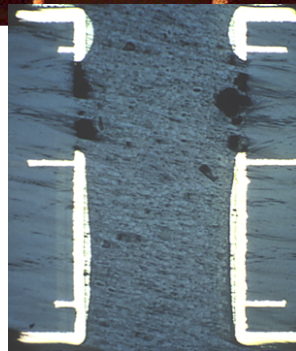
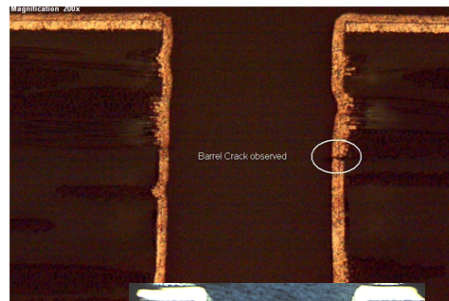
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# Causes of Blow Holes

- Plating in the barrel problems







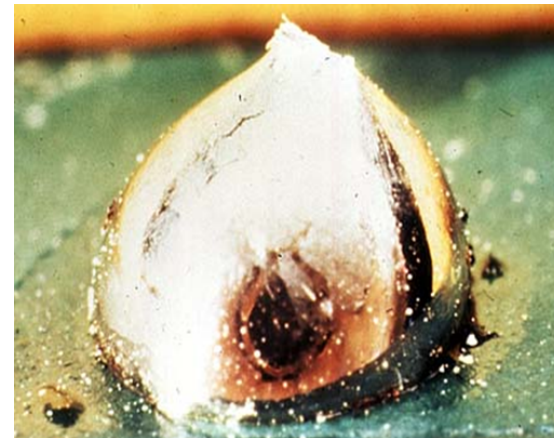
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# Examples Blow Holes





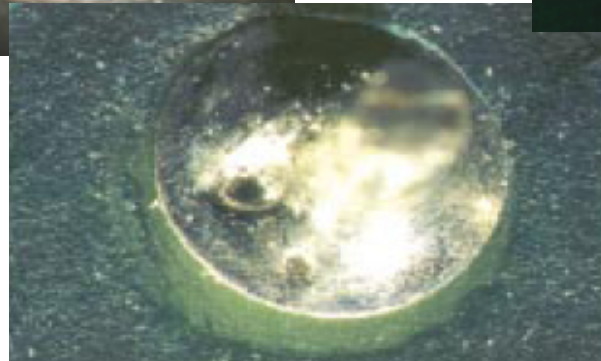
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# Solder Source Pinholes





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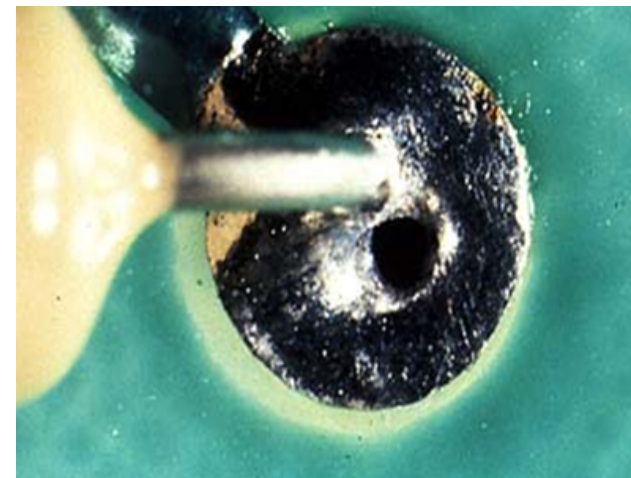
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# Solder Destination Side Void

- Supported Hole







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# Solder Source Void

- Unsupported Hole





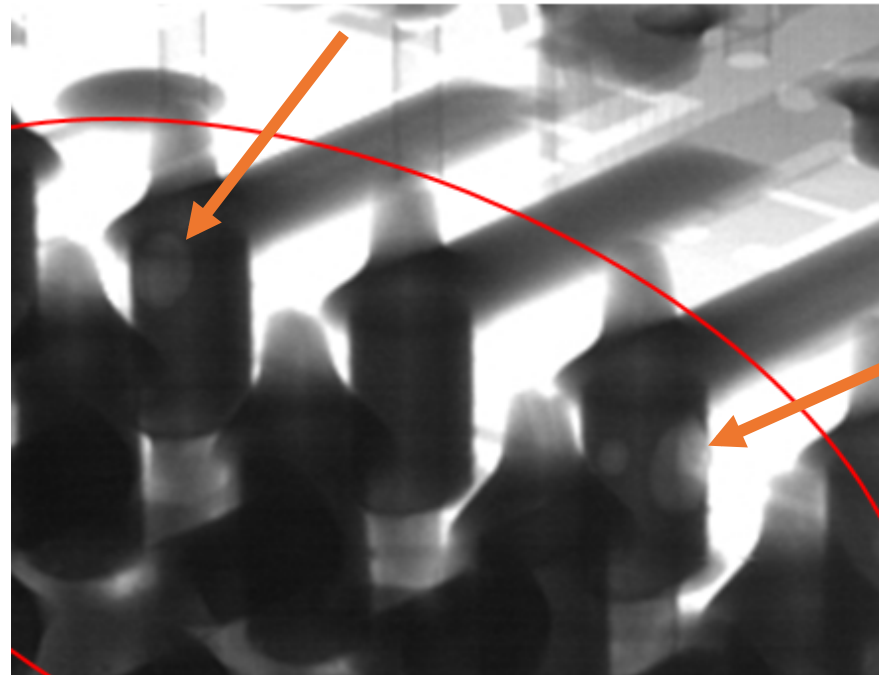
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# X-Ray Image of Internal Voids in PTH





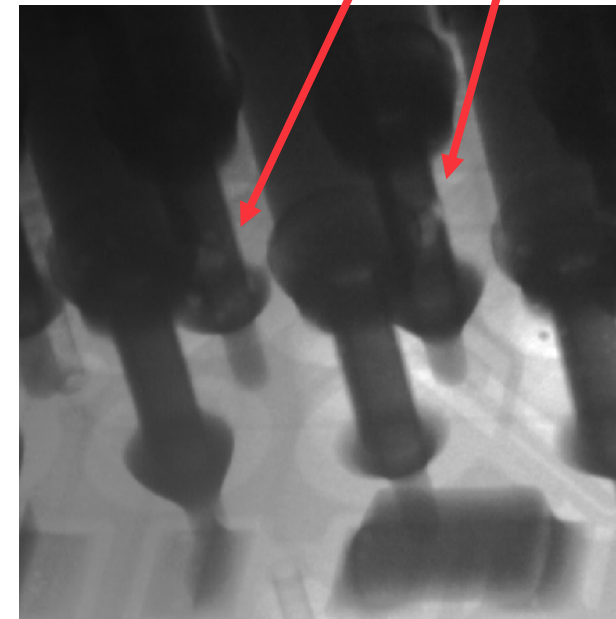
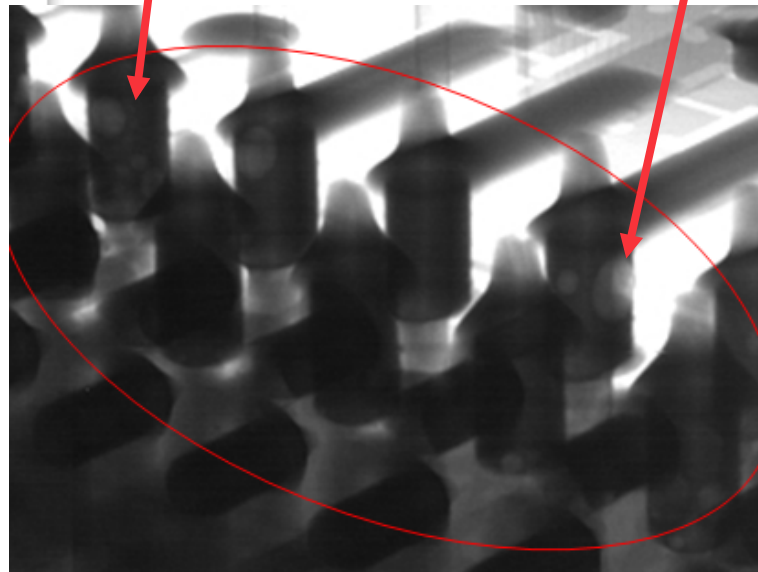
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# X-Ray Image of Voids in PTH





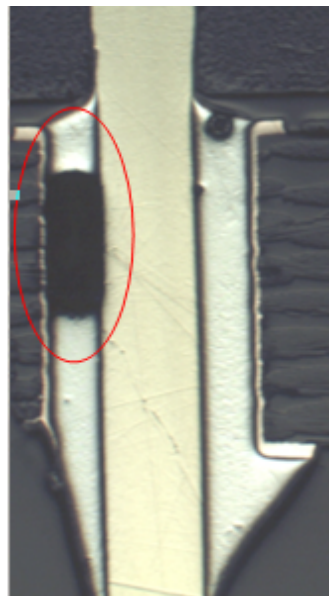
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## Examples of Soldered PTH



- Void within solder joint which was found when microsectioned





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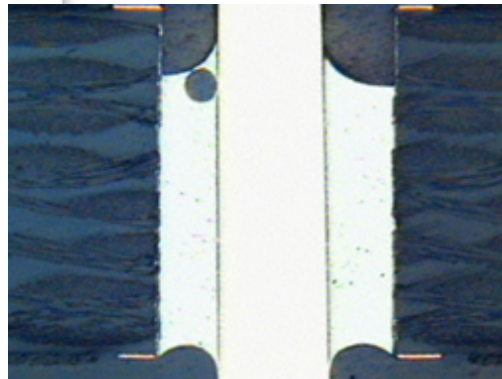
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## Examples of Soldered PTH

- Microsections of solder hole fill with voids



**TechnoLab**  
qualifying and testing solutions

[http://www.technolab.de/\\_en/solderdict/smdhmd/poorsolderfilletinthroughhole.php](http://www.technolab.de/_en/solderdict/smdhmd/poorsolderfilletinthroughhole.php)





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# Supported Holes – Solder Criteria

**Table 7-4 Plated-Through Holes with Component Leads - Minimum Acceptable Solder Conditions<sup>1</sup>**

Criteria	Class 1	Class 2	Class 3
A. Vertical fill of solder <sup>2,3</sup> , see 7.3.5.1.	Not Specified	75%	
B. Circumferential wetting of lead and barrel on solder destination side, see 7.3.5.2.	Not Specified	180°	270°
C. Percentage of original land area covered with wetted solder on solder destination side, see 7.3.5.3.	0		
D. Circumferential wetting of lead and barrel on solder source side, see 7.3.5.4.	270°		330°
E. Percentage of land area covered with wetted solder on solder source side, see 7.3.5.5.	75%		

**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



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## Voids

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



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Thank You



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## Further Information

For questions regarding this webinar, please contact Leo Lambert at [leo@eptac.com](mailto:leo@eptac.com)

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