



IPC-9121-AM2

# **Troubleshooting for Printed Board Fabrication Processes**

## **Amendment 2**

Developed by the Printed Board Process Effects Handbook Subcommittee (7-24) of the Process Control Management Committee (7-20) of IPC

Users of this publication are encouraged to participate in the development of future revisions.

Contact:

IPC

# Table of Contents

<b>2</b>	<b>Applicable Documents</b>		
2.1	IPC .....	1	
<b>6</b>	<b>Mechanical Operations</b>		
6.1.2	Hole Quality .....	1	
	<b>Issue:</b> Debris in Back-Drill Hole .....	1	
	<b>Issue:</b> Residual Barrel Plating in Back-Drill Hole .....	2	
	<b>Issue:</b> Stub Length Failure .....	2	
6.7	Laser Drilling .....	3	
	<b>Issue:</b> Capture Pad Penetration .....	3	
	<b>Issue:</b> Delamination of Landing Pad .....	3	
	<b>Issue:</b> Insufficient Contact Area (As-Received Samples) .....	4	
	<b>Issue:</b> Microvias Separation (Thermal Stressed) .....	4	
<b>7</b>	<b>Hole Preparation and Protection</b>		
7.1	Desmear Using Alkaline Permanganate .....	5	
	<b>Issue:</b> Drill Smear .....	5	
7.3	Hole Formation .....	6	
	<b>Issue:</b> Nail Heading .....	6	
7.4	Electroless Process .....	7	
	<b>Issue:</b> Electroless Void .....	7	
<b>9</b>	<b>Interconnect Formation</b>		
9.10	Microvias .....	8	
	<b>Issue:</b> Cu-Filled Microvia Voids .....	8	
	<b>Issue:</b> Cu-Filled Microvia Voids .....	8	
<b>12</b>	<b>Final Finishes</b>		
12.4.1	Electroless Nickel .....	9	
	<b>Issue:</b> Skip Plating (Areas on Cu Surface Where No Ni Present) .....	9	
	<b>Issue:</b> Ni Foot – Excess Plating on Laminate .....	10	
	<b>Issue:</b> Stray Plating (Background Plating) – Ni and Au Plating on Solder Mask and Laminate .....	10	
	<b>Issue:</b> ENIG Hyper Corrosion (Corrosion Spikes in the Ni Deposit After Au Plating) .....	11	
	<b>Issue:</b> Au Plating Peels from Ni Deposit .....	12	
	<b>Issue:</b> Ni Plating Peels from Cu Surface .....	12	
12.5	Organic Solderability Preservative (OSP) .....	13	
	<b>Issue:</b> OSP Coating Has Nonuniform Appearance Over Cu .....	13	
	<b>Issue:</b> White Precipitate on Printed Boards or in the OSP Process Tank .....	14	
	<b>Issue:</b> Poor Solderability With OSP (Dewetting, Incomplete Solder Flow-Up) .....	14	
<b>13</b>	<b>Flexible Circuits</b>		
13.1	Rigid-Flex .....	15	
	<b>Issue:</b> Delamination or Insufficient Squeeze-Out .....	15	
	<b>Issue:</b> Incorrect Radius .....	15	
	<b>Issue:</b> Delamination of Stiffener .....	16	
	<b>Issue:</b> Flex Edge Damage .....	16	
	<b>Issue:</b> Open .....	17	
	<b>Issue:</b> Delamination .....	17	
	<b>Issue:</b> Foreign Material .....	18	
	<b>Issue:</b> Holes in Flex Area .....	19	
	<b>Issue:</b> Holes Too Close to Transition Area .....	19	
	<b>Issue:</b> Delamination .....	20	
	<b>Issue:</b> Cu Nesting and Stacking (Telegraphing) .....	21	
	<b>Issue:</b> Insufficient Bend Radius .....	22	
	<b>Issue:</b> Wrinkling During Flexing of Material .....	22	
	<b>Issue:</b> Too Rigid for Depanelization .....	23	

# Troubleshooting for Printed Board Fabrication Processes Amendment 2

## *New documents for Section 2 Applicable Documents*

### 2.1 IPC

#### *IPC-TM-650, Test Methods Manual*

2.6.7.2 Thermal Shock, Continuity and Microsection, Printed Board

2.6.26 DC Current Induced Thermal Cycling Test

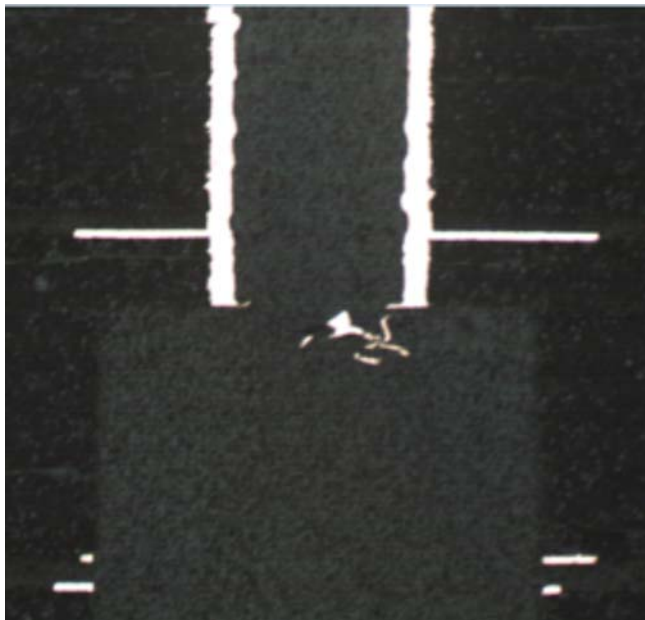
2.6.27 Thermal Stress, Convection Reflow Assembly Simulation

**IPC-4552** Performance Specification for Electroless Nickel/Immersion Gold (ENIG) Plating for Printed Boards

## *New topics for Section 6 Mechanical Operations*

### 6.1.2 Hole Quality

#### **Issue: Debris in Back-Drill Hole**



**Figure 6.1.2-7**

<b>CAUSE</b>	<b>ACTION</b>
Drill parameters not optimized	Optimize drill parameters
<b>Potential test method (discover)</b>	<b>Potential test method (verification)</b>
Microscope inspection after back-drill	