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Today’s New Technology

- Using Semiconductor Manufacturing Technology to Manufacture Today's Printed Circuit Board Requirements
- The Future in PCB Manufacturing is About the Technology and Automation
- Trained Operators, Not 20 year Journeymen (Saves on Wages to Stay Competitive $$$)

STREAMLINE CIRCUITS
TIME AND TECHNOLOGY EXPERTS

A Full PCB Solution

- Multilayer Rigid / Rigid- Flex / Flex
- 48 + Layers
- 28:1 High Aspect Ratio
- 3.23 Mils Hole to Copper
- Buried / Blind Vias
- 9 Sequential Laminations
- 13+ Stacked Vias
- 1 Mil Trace & Space
- Cavity Constructions
- 6 oz + Copper Thickness
- Copper Filled Micro Vias
- +/- 5% Controlled Impedance Tol.
- AS9100 Rev. B / ISO 9001
- Mil-Spec 55110 / ITAR
- RoHS & Halogen Free Materials
- IPC 6012 Rigid / 6013 Flex / 6015 MCM / 6016 HDI / 6018 High Frequency
- 4 Mil Mechanical Drills
- 24” x 30” Oversize Panel
- 2 Mil Laser Drill Vias
- Up to 345 Mils Board Thickness
- Via Under Pad (Conductive & Non-Conductive Filled)
- 40+ Materials (Hybrid Constructions)

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PCB TECHNOLOGY ROADMAP

Category	Attribute	Standard	Advanced	Emerging	Future
1. Line and Space	Line Width	.003”	.002”	.001”	.0005”
	Line Space	.003”	.002”	.001”	.0005”
	Tolerance	+/-.001”	+/-.00075”	+/-.0005”	+/-.00025”
2. Drilled Via Size	Drill Size	.010”	.008”	.006”/.004”	.003”
	Pad Diam	+.010”	+.008”	+.006”	+.004”
	Aspect Ratio	12:1	18:1	28:1	28:1
4. Misc. Attributes	Layer Count	Up to 36	36 to 48	48 to 60	
	Thickness	Up to .187”	Up to .300”	Up to .350”	>.350
	Board Size	<16”X22”	<19”X22”	<22X28	
5.Laminate Materials		FR4 Polyimide Nelco-13 Gtek/Megtron	Hybrids High Speed Low loss RF Halogen Free	Hybrids	?

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TECHNOLOGY ROAD MAP CONTINUED

		Standard	Advanced	Emerging	Future
5. Micro Via Size	Via Size Pad Dam Aspect Ratio	.002" +.004" 2:1	. .001" +.003" 3:1	?	?
6. Surface Finishes		HASL Entek Imm Silver ENIG ENEPIG	LF HASL Eless Au Sel Solder Imm tin	Solder bump	TBD
7. LDI Soldermask	Registration Min opening	.0005	SMOP	Tangency	?
8. Conductive and Non-Conductive Via Fill	Min hole Aspect Ratio	.012" 8:1	.010" 12:1	.008" 18:1	<.008 20:1

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LDI (Laser Direct Imaging) Orbotech Paragon SM20

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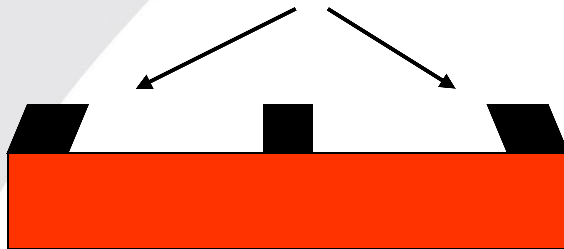
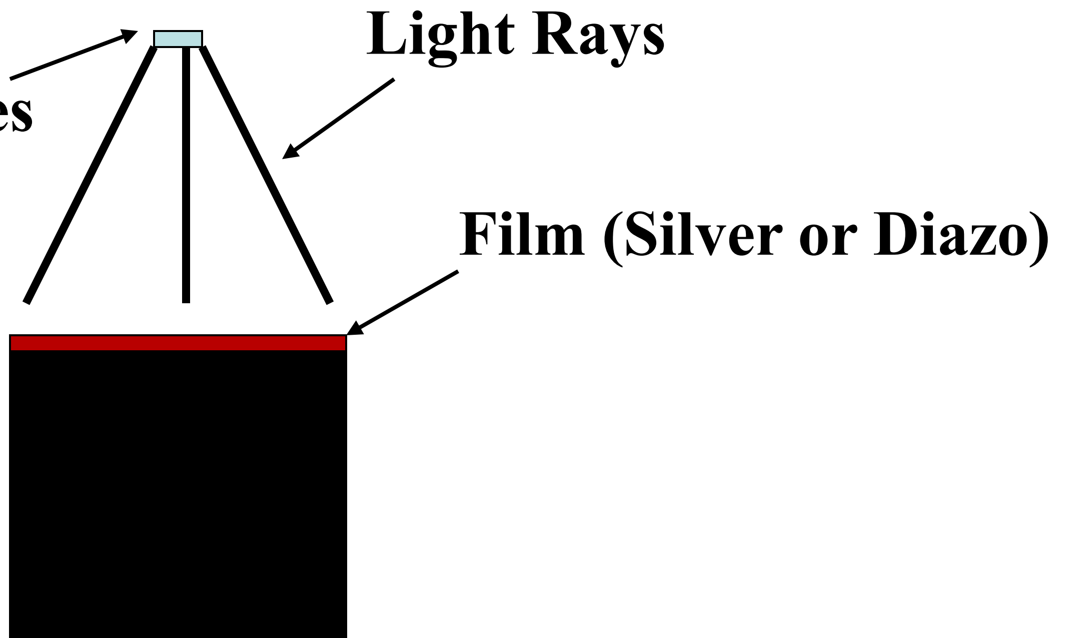
LDI (Laser Direct Imaging)

- Enables Fine Lines (3 & 3 Is Standard)
- LDI Eliminates Silver and Diazo Film (Saves $)
- 140 panels per hour through put
- Processes Inner Layers, Outer Layers and Flex
- Class 10,000 Type Clean Room Environment In The Image Area Of The Machine
- Horizontal Imaging Means No More Side Cut

Older Technology

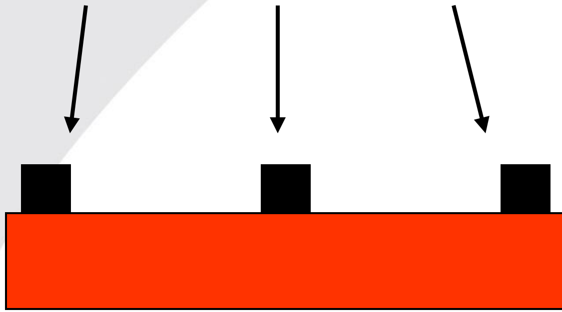
Typical Light Source Creates Angled Images (Side Cut)

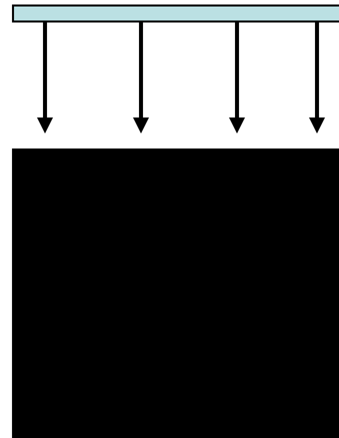




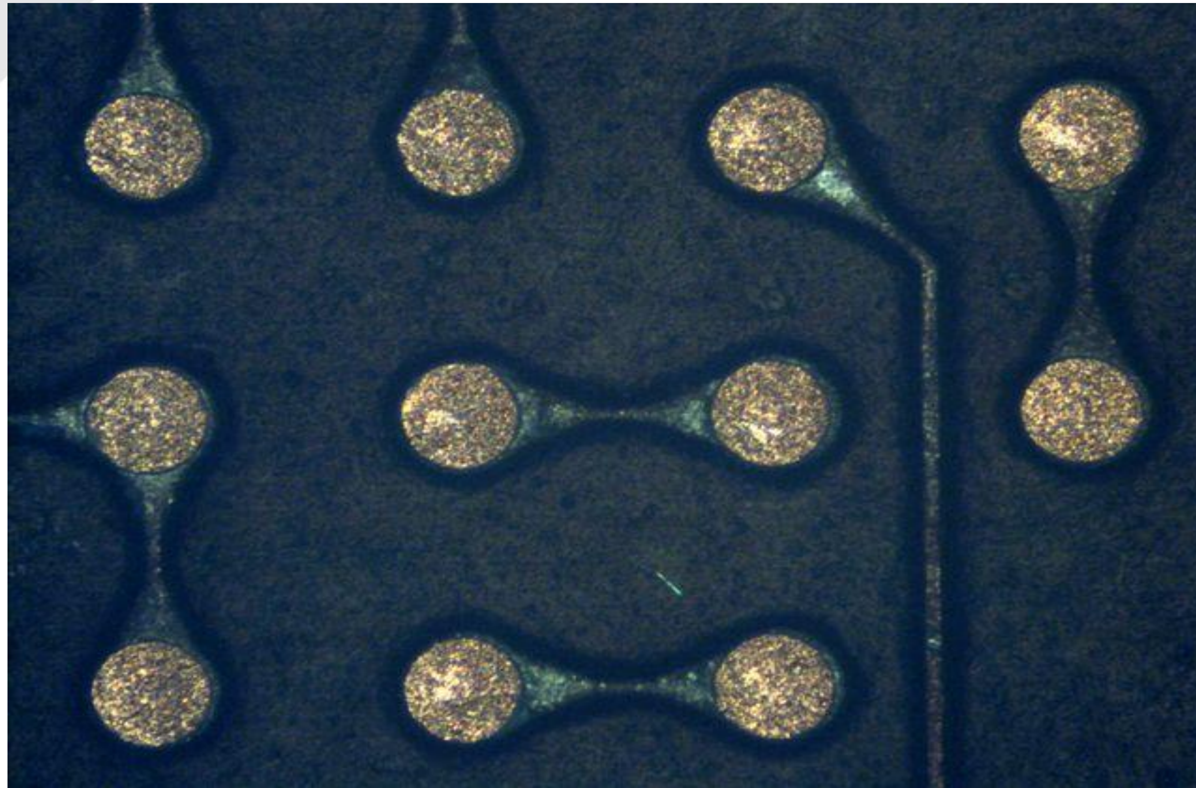
Laser Direct Imaging (LDI)

LDI Produces Crisp, Straight Uniform Edges





LDSM
(Laser Defined Solder Mask)



LDSM
(Laser Defined Solder Mask)

- Precise Imaging to .5 Mil Tolerance
- Can Reduce Solder Mask Clearance Sizes
- Maximize Geometry
- Solder Mask Defined Pad Technology (SMD)
- You Can Create A “Dam” On Top of a Pad

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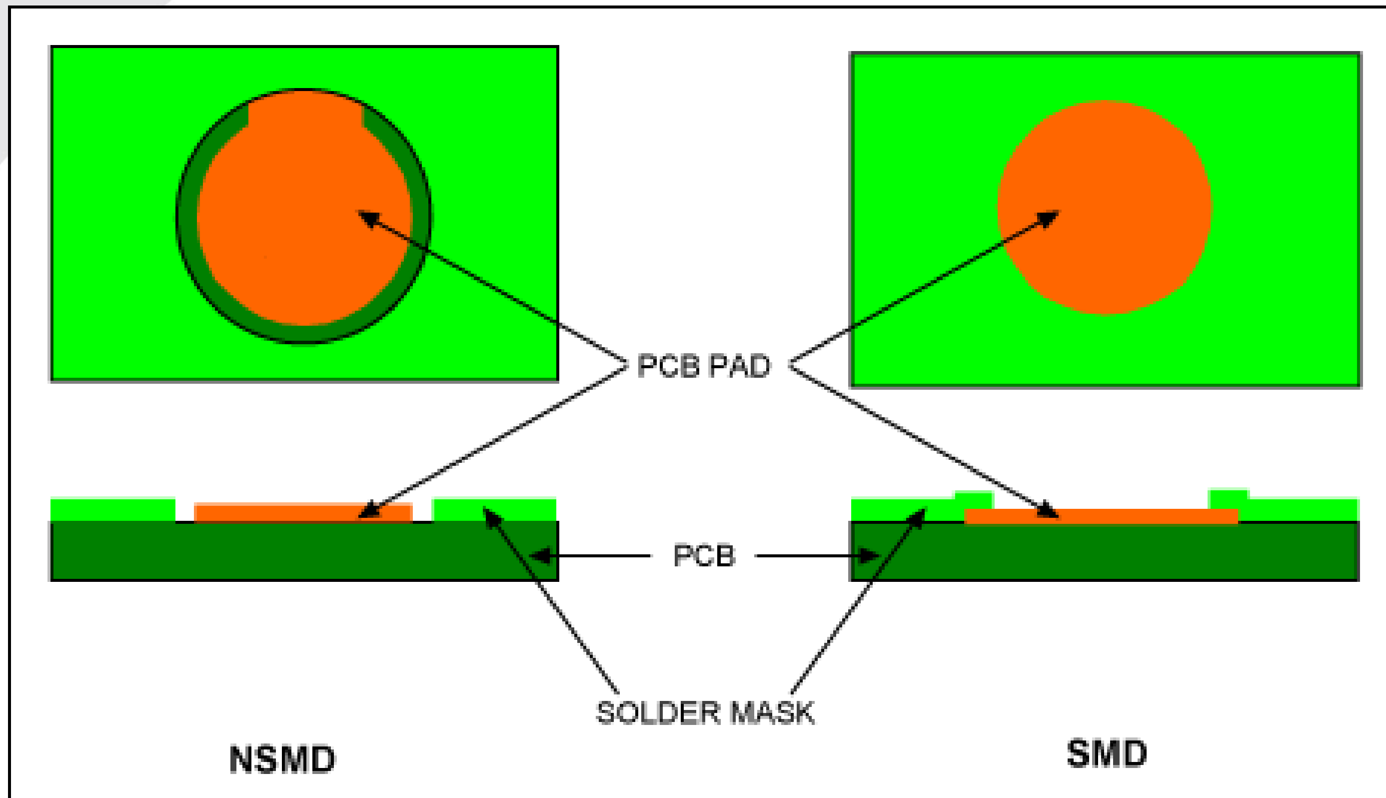
LDSM (Laser Defined Solder Mask)



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Ink Jet Silkscreen
Orbotech Sprint-8™

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Ink Jet Silkscreen

- **Ultra Fine Crisp Lines**
- **Combination Inkjet and Laser Technology**
- **Dry's the Ink As It's Applied**
- **Can Be Applied Over Partially Cure Mask Providing for the Mask and Legend to be cure simultaneously to Reduce Cycle Time**

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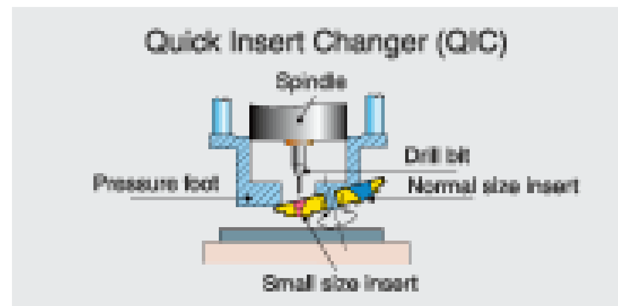
Precision Vision Drilling

- High Performance Ni Series equipped with full range spindles of 125,000 ~ 200,000 min-1 to meet a variety of processes applications



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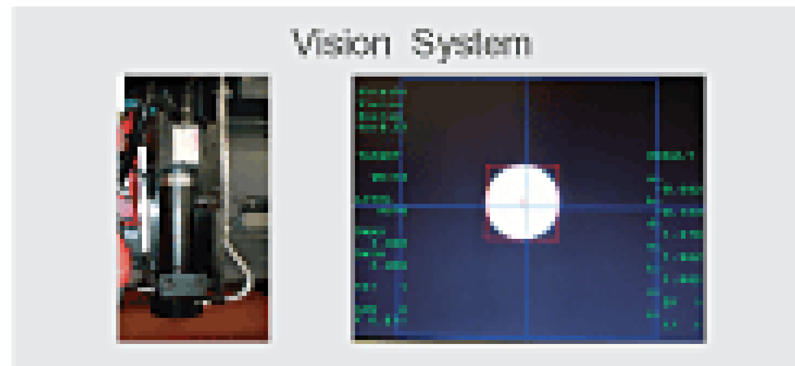
Hitachi Vision System

- **Precise Hole Location**
- **Pinpoint Accuracy for BGA or Connector Alignment**



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