

Electronic Imaging Enterprise⁺
First EIE
32 years imaging Experience

Photoplotters series
Maximum films size from 20" x 26" to 96" x 63"
Accuracy - Reliability

Direct Imager
Panels size up to 24" x 26"
Cost-Effective



Institute of Circuit Technology

Harrogate Winter Seminar 2017- Sponsored by Fineline VAR Ltd

Developments in Photo-plotters, UV Direct Imaging and Automatic Visual Inspection (AVI) Systems

5th of December 2017
Jean-paul BIRRAUX
Sales & Marketing Manager
sales@firsteie.com

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It contains confidential information and
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a written permission from First EIE S.A.



Founded in **1980**

Reincorporated in **1993, +20 years**

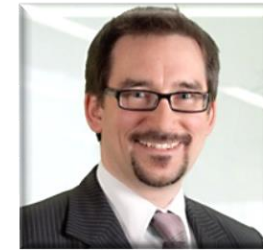
CEO **M. Gregory STOECKLI**

Installed Base **+1000 units World Wide**

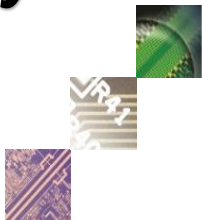
Factory **1200 sqm in Nyon, Switzerland**

Global Network **18 Distributors covering 25 countries**

Core Technologies **Opto-Electronic, Image Processing, Ink-Jet**



***We Provide The True Figures
through Swiss Quality***

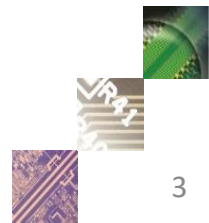




Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

First EIE SA already moved to a bigger place





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Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

First EIE SA already moved to bigger a corporate size

- Acquisition of First EIE on 2015
- From imaging to inspection
- Complementary Product Portfolio
- Stronger Synergies



President
Mr Masashi Sugawara





Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

First EIE SA already moved to bigger a corporate size

Name	INSPEC Inc
Code	6656 (Tosyo Mothers)
Line of Business	Manufacturing of Visual Inspection Equipment on Electric Cuircuit Board (SemiCon PackageBoard•FPC, etc) and Development Sales Service Medical Equipment manufacturing Development and Sales
Head Office	Kakunodate, senboku, Akita Pref
Founded	January 1984
Capital	485mil yen
Employee	43 (as of Apr 30 2015)
URL	http://www.inspec21.com

INSPEC Inc kakunodate Akita



First EIE Nyon Switzerland



Tera Inc
Hirosaki Aomori





Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

First EIE SA already moved to bigger market

Automatic Optical Inspection

Automatic Visual Inspection

SX5000



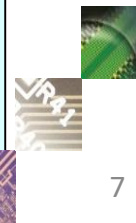
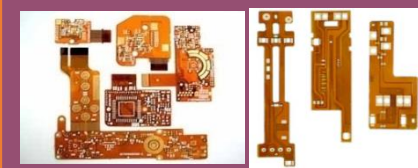
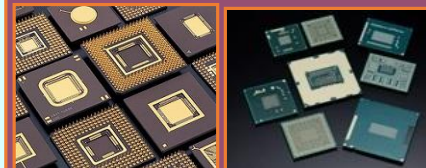
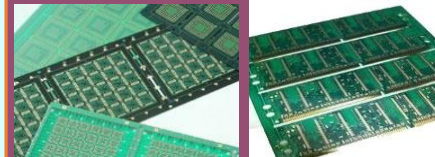
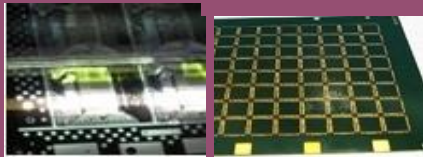
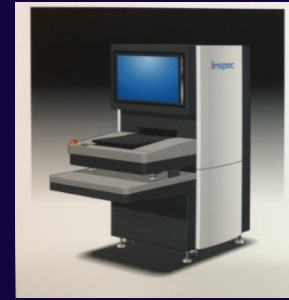
AV3300



BP7000



AV500





Are you ready to think bigger?

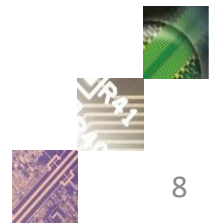
Inkjet Printers - Photoplotter - Direct Imager

15th of March 1999
My first day....

Mr Skynazy, former First EIE President: « Jean-paul, I expect that we will still sell photoplotters for the next five years only. Then everything will be LDI»

Today in 2017, the Silver Halide films and Photoplotter market remain very strong

With higher resolution, higher speed and larger size

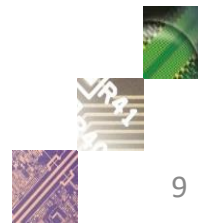




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Inkjet Printers - Photoplotter - Direct Imager

Photoplotters: External drums and Flat beds

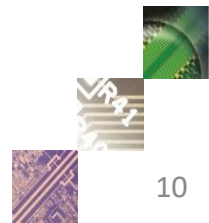
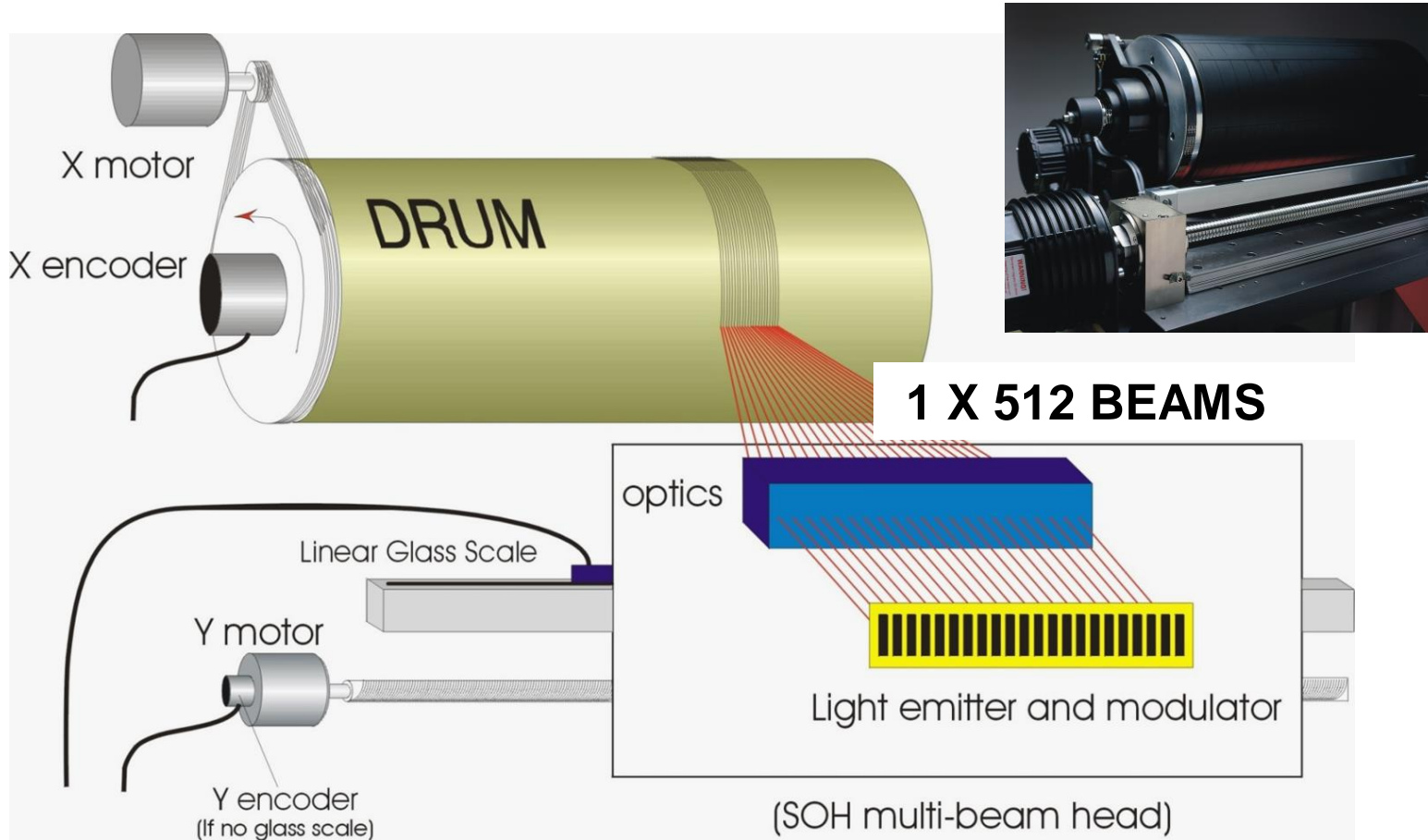




Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

External Drum the must up to 2.4 meters





Are you ready to think bigger?

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First EIE SA already moved with bigger Photoplotters



RP1625

2450 x 1600 mm film size

25 000 dpi

4000 mm on the way....





Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

Long PCBs – Rigid or Flex
Shadow mask production
OLED Metal mask production

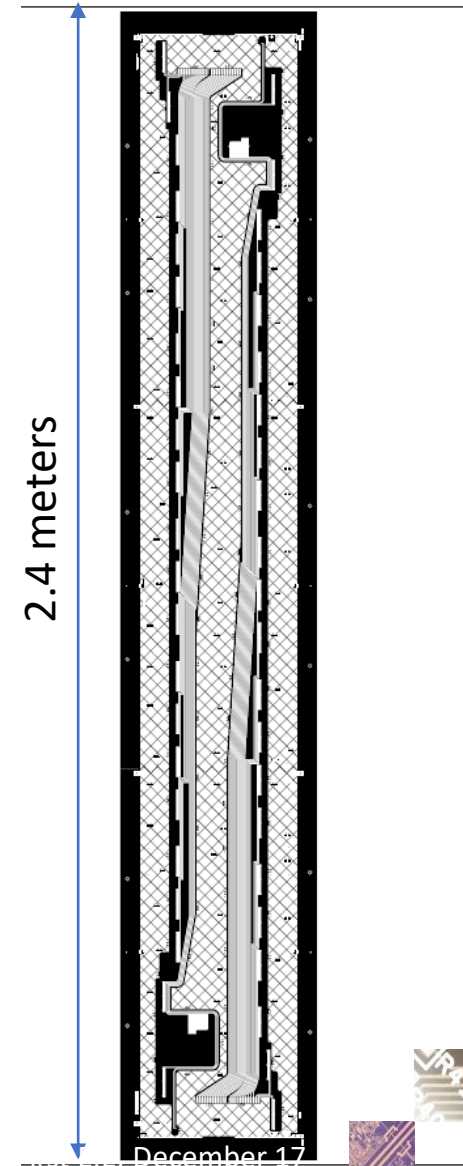
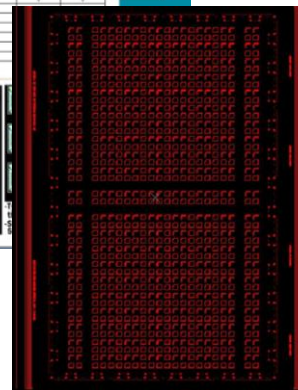


OLED Fine Metal Mask

AMOLED/PMOLED cathode deposition
G3.5 (620x750mm) & G4.5h (730x460mm) & G6h (900x1500mm)
tolerance ±30µm
Sheet thickness 100µm or 200µm

1	G3.5h	x
2	G4.5h	x
3	G6h	x
4	G4.5h	x
5	G3.5h	x

Suspension for MCM





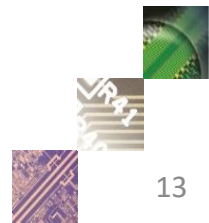
Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

Long PCBs – Rigid or Flex

One UK Supplier: today 26 meters Flex PCB – request for 42 meters

Car and Aircraft: That require Inspection....

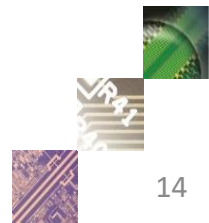
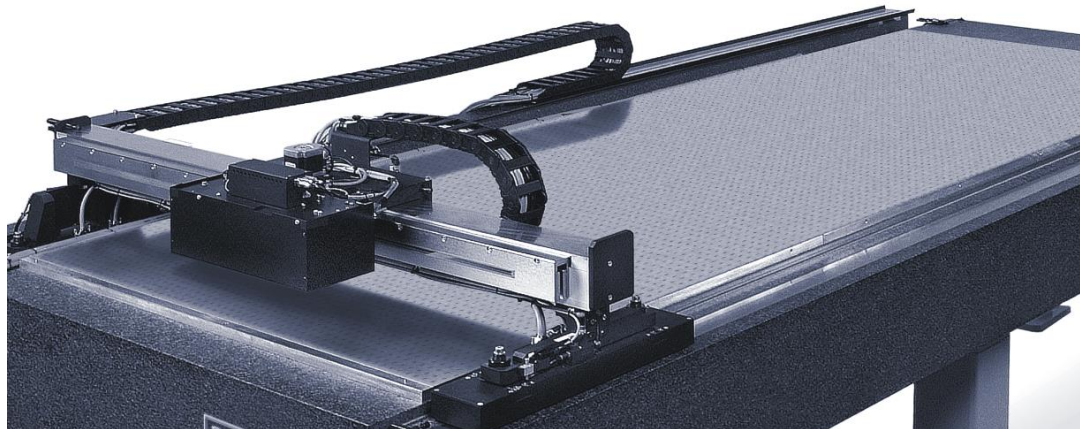




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Inkjet Printers - Photoplotter - Direct Imager

Above 2.4 meters
Hudge and heavy Gantry systems
Limited overall accuracy





Are you ready to think bigger?

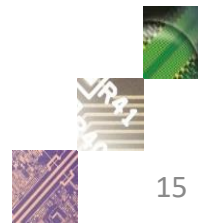
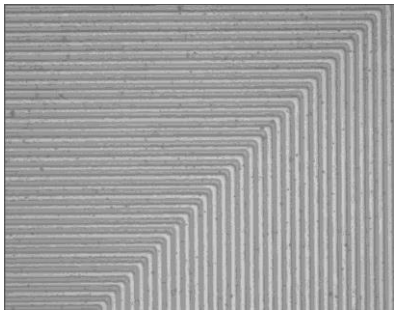
Inkjet Printers - Photoplotter - Direct Imager

Of course we keep our broad range of Photoplotter

+XT series		+SXT series		Minimum Line Width / Space		Minimum Line Width / Space		Minimum Line Width / Space		Minimum Line Width / Space	
<p>RP200 series THE SMALLEST FOOTPRINT</p> <p>26" x 20.5" / 660 x 520mm</p> <p>Films per Hour including Loading and Unloading: 4000, 8000, 12000</p> <p>26 19 14 (26" x 20")</p> <p>RP 212 XT</p>	<p>Minimum Line Width / Space: 0.5/0.5 mil</p> <p>4000 8000 12000 dpi</p>	<p>RP200 series THE SMALLEST FOOTPRINT</p> <p>26" x 20.5" / 660 x 520mm</p> <p>Films per Hour including Loading and Unloading: 4000, 8000, 12000, 16000, 20000, 50000</p> <p>26 19 14 11 5 2.5 (24" x 20")</p> <p>RP 216 SXT</p>	<p>Minimum Line Width / Space: 0.5/0.5 mil</p> <p>4000 8000 12000 16000 dpi</p>	<p>Minimum Line Width / Space: 0.2/0.2 mil</p> <p>6000 12000 18000 25000 dpi</p>	<p>Minimum Line Width / Space: 0.2/0.2 mil</p> <p>6000 12000 18000 25000 50000 dpi</p>	<p>RP216 SXT</p>	<p>RP225 SXT</p>	<p>RP250 SXT</p>	<p>The new</p>	<p>RP716 SXT</p>	<p>RP725 SXT</p>
<p>RP300 series THE LARGEST SIZE</p> <p>36" x 28" / 914 x 660mm</p> <p>Films per Hour including Loading and Unloading: 4000, 8000, 12000</p> <p>19 14 10 (36" x 20")</p> <p>RP 312 XT</p>	<p>Minimum Line Width / Space: 0.5/0.5 mil</p> <p>4000 8000 12000 dpi</p>	<p>RP700 series THE NEW</p> <p>36" x 28" / 914 x 720mm</p> <p>Films per Hour including Loading and Unloading: 4000, 8000, 12000, 25000, 50000</p> <p>19 14 8 4 2 (36" x 20")</p> <p>OPTION Dual Loader</p> <p>RP 716 SXT</p>	<p>Minimum Line Width / Space: 0.5/0.5 mil</p> <p>4000 8000 12000 25000 50000 dpi</p>	<p>Minimum Line Width / Space: 0.2/0.2 mil</p> <p>6000 12000 18000 25000 50000 dpi</p>	<p>Minimum Line Width / Space: 0.2/0.2 mil</p> <p>6000 12000 18000 25000 50000 dpi</p>	<p>RP725 SXT</p>	<p>RP750 SXT</p>	<p>RP800 series EXTRA LARGE SIZE</p> <p>36" x 34" / 914 x 864mm</p> <p>Films per Hour including Loading and Unloading: 4000, 8000, 12000</p> <p>14 9 7 (34" x 20")</p> <p>RP 816 XT</p>	<p>Minimum Line Width / Space: 0.5/0.5 mil</p> <p>4000 8000 12000 25000 dpi</p>	<p>Minimum Line Width / Space: 0.5/0.5 mil</p> <p>4000 8000 12000 25000 dpi</p>	<p>RP825 SXT</p>



From 20x26 to 63 x 83 "
 From 3000 to 50000 dpi
 Down to 5 micron line
 From 90 K to 600 K euros





Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager



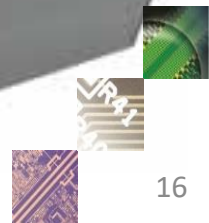
LDI – DI

Laser
LEDs
UV
DMDs



Minimum line width
Speed
Accuracy

COST....





Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

First EIE already moved to bigger Direct Imager from the established EDI500 model:

EDI500: 720 x 610 mm panel size

EDI700: 1000 x 800 mm panel size

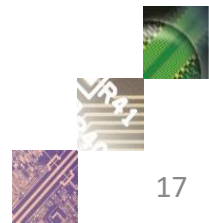
EDI1000 (NDA): 6000 x 1000 mm panels size

Full spectrum: 360 to 450 nm

4 to 1000 mJ/cm²

Local registration

Dynamic serialization



Direct Imager EDI Series



The new EDI700

- HDS or HVS light engine
- Full light spectrum
- 1000x 800 panel size
- Gantry System with Linear motors
- Granite-Glass table with Zone system
- High Accuracy



Are you ready to think bigger?

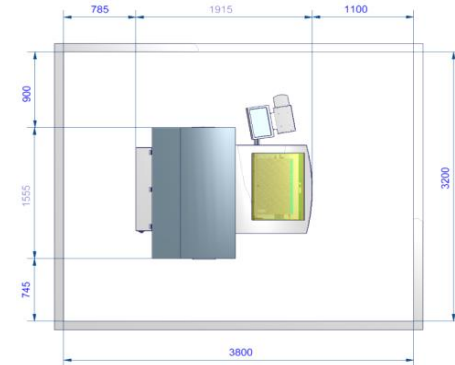
Inkjet Printers - Photoplotter - Direct Imager

Simple and efficient

Small footprint

EDI500: 150x190x147cm – 850 Kgs
 EDI700: 230x200x170 cm – 2400 Kgs

User friendly interface
 Files management
 based on 30 years
 of Imaging experience

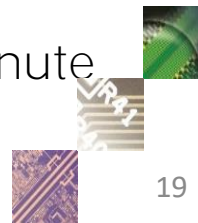


Easy Access
 for maintenance

X – Y Axis
 R Axis Rotative table for file
 to panel Alignment
 Z Axis for accurate spot size

Cold start: It takes 10 minutes
 including the UV lamp warming

Machine shut-down is done
 automatically. It takes less than 1 minute



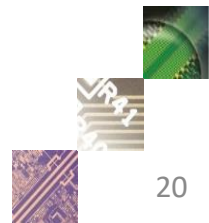
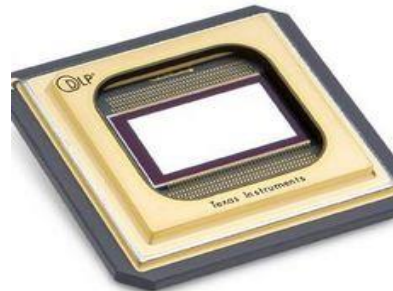


Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

DMD technology with UV Arc lamp Collimated

One single head: simplicity, reliability, low cost



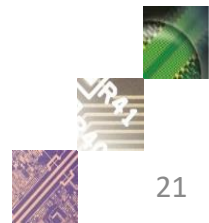
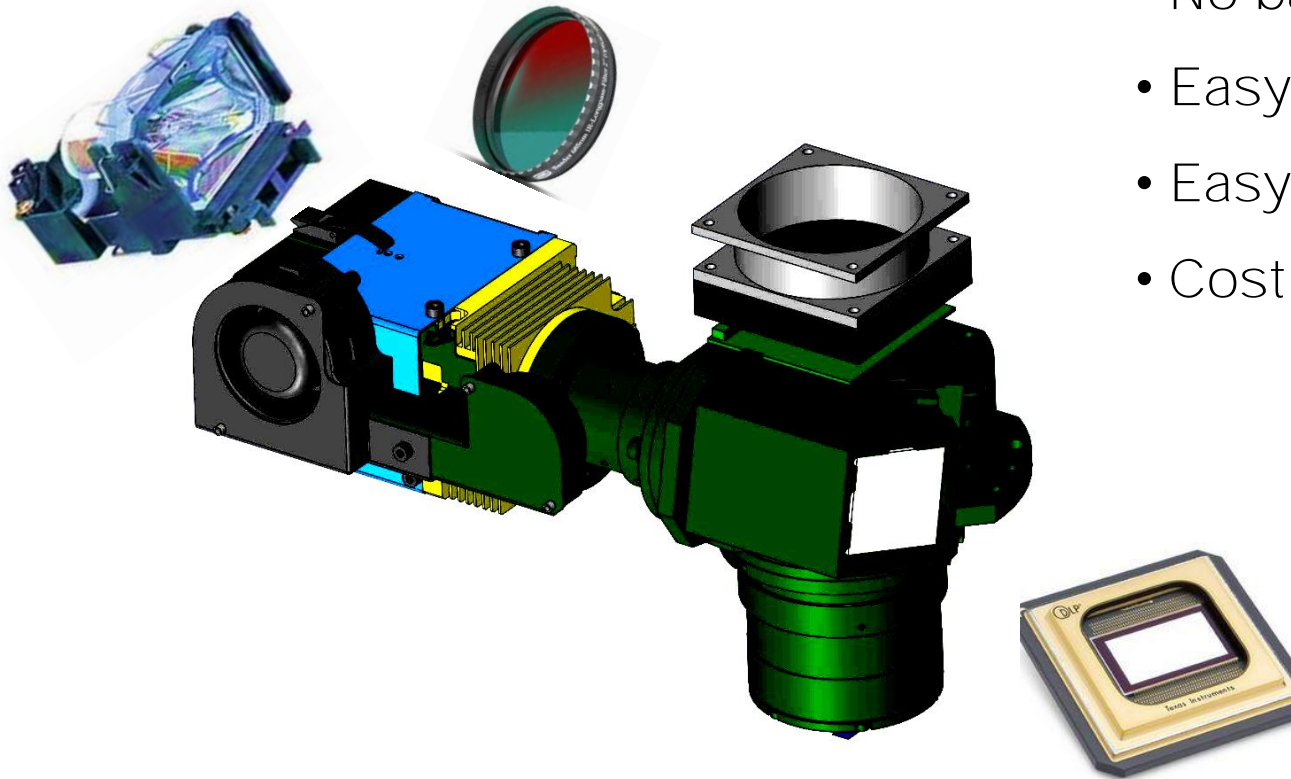


Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

One Single Digital Micro-Mirror-Device Head
Just simple and efficient components

- No banding effect
- Easy adjustment
- Easy maintenance
- Cost effective





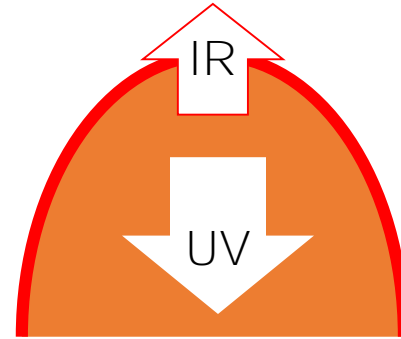
Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager



cost efficient and High-Pressure Arc Lamp 330 W

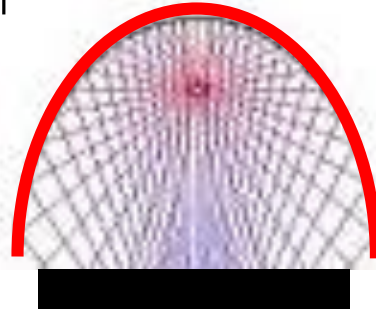
IR Filter



Proprietary First EIE Reflector with advanced coating for maximum UV reflection and minimum IR

Arc Lamp life time: over 2000 hours

=



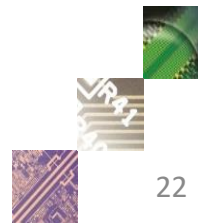
Low heat

Low consumption

800 VA max during exposure

High efficiency

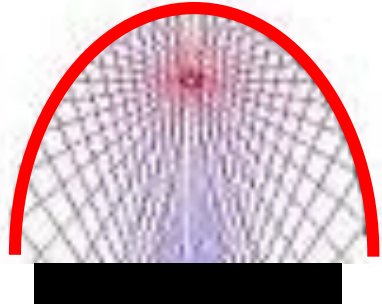
Very High exposure energy to the Panel, from 4 up to 1000 mj





Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager



+



High exposure energy to the DMD

Proprietary First EIE Optics

=

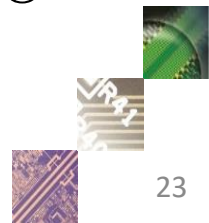
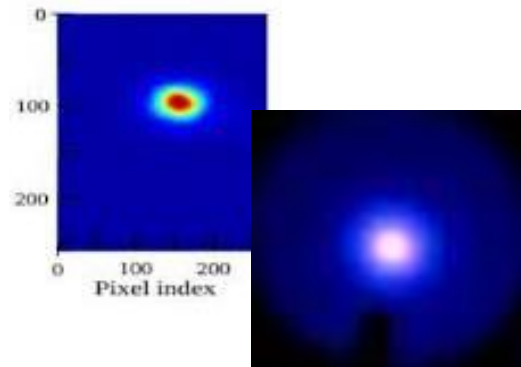
Sharped 8 micron spot size

Broad Energy

4 to 1000 mj

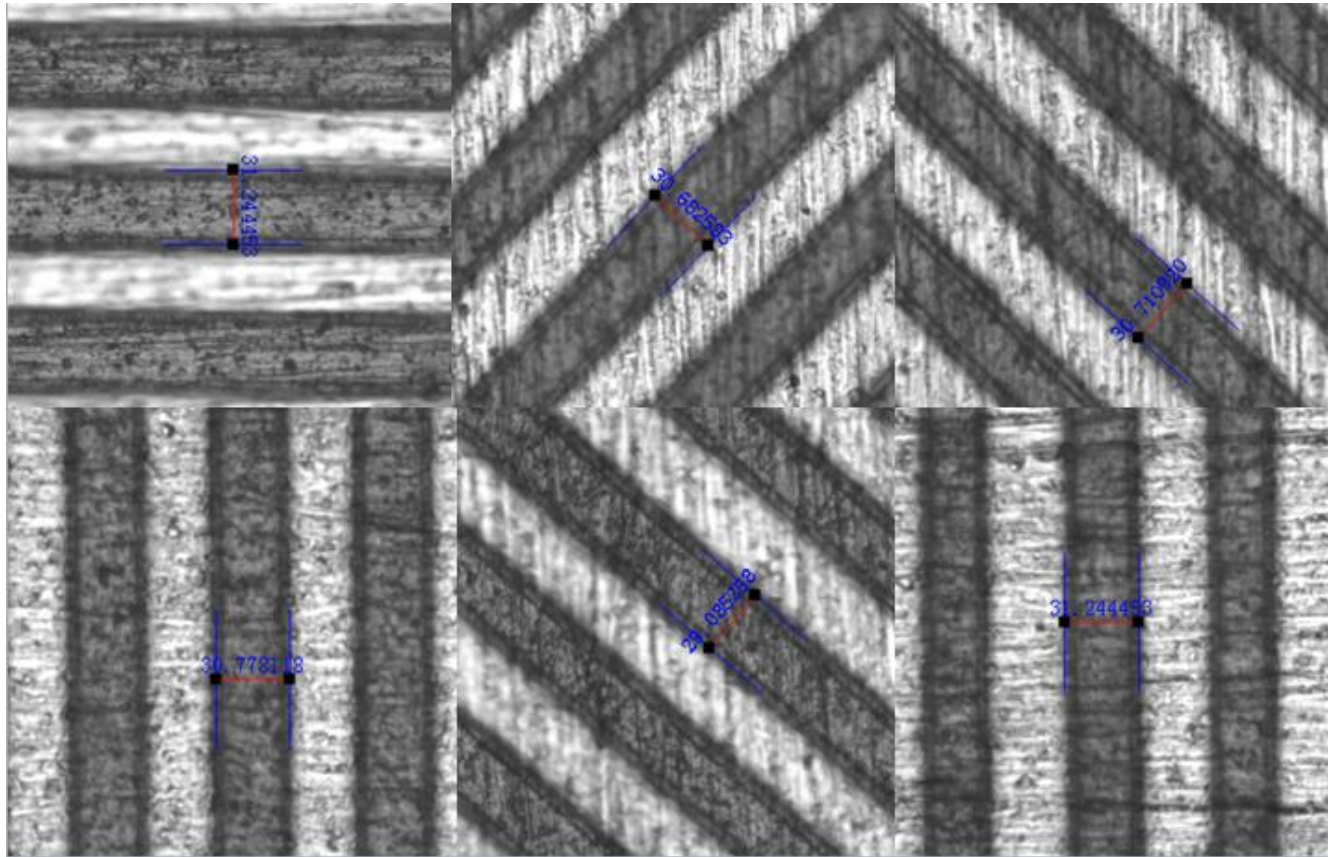
Line width capability

20 micron L/S with HDS



HDS Light Engine

30 micron lines DFR 40 mJ

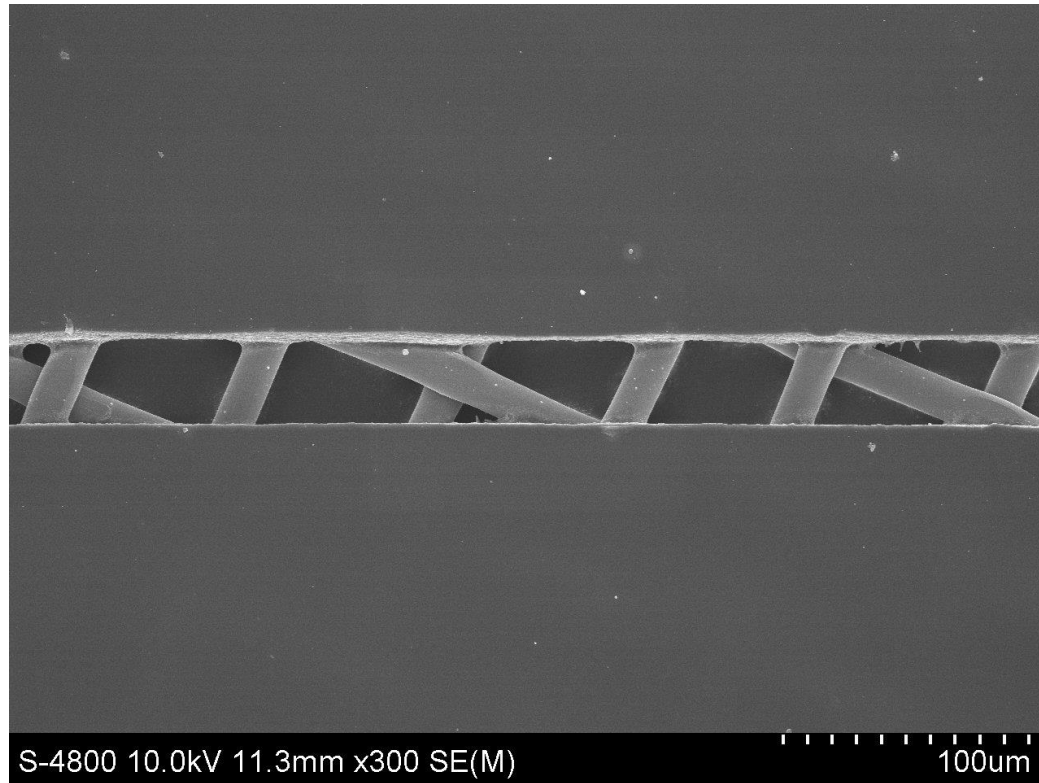




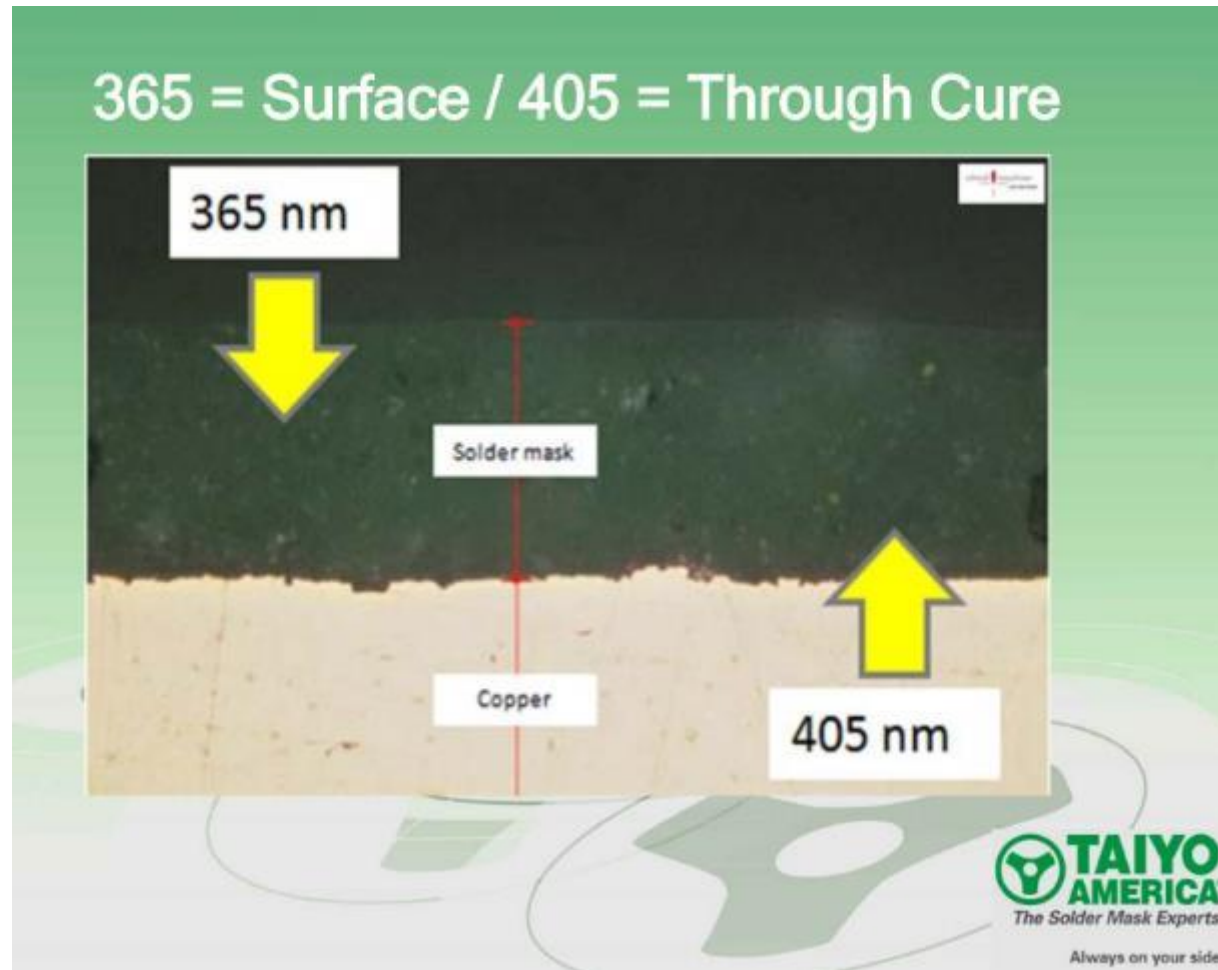
Are you ready to think bigger?

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20 micron lines on 50 micron resist

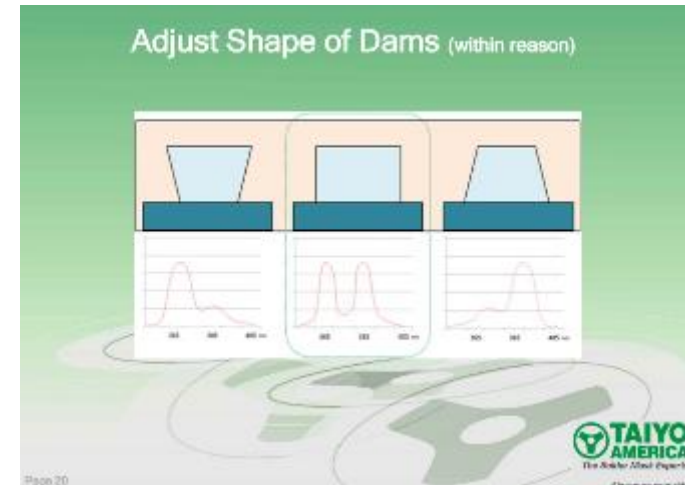
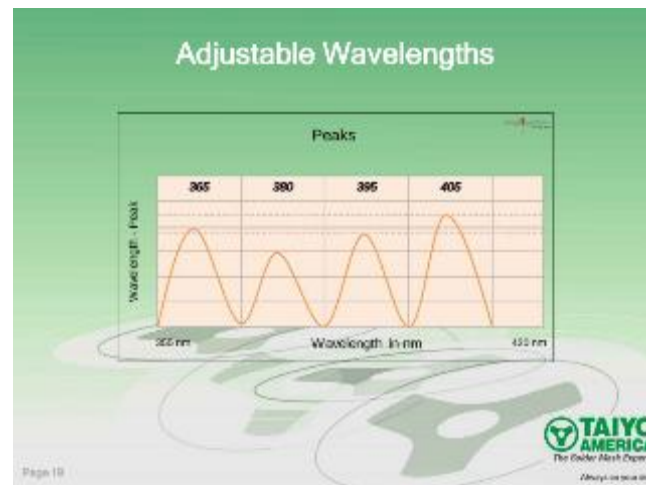


HDS - HVS Light Engines



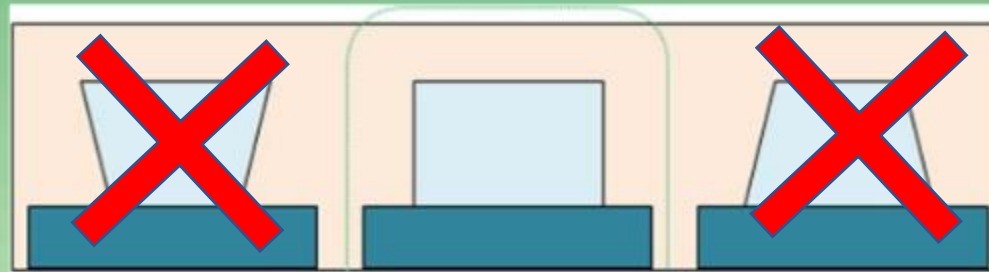
HDS - HVS Light Engines

LEDs: 1 to 4 wave lengths



HDS - HVS Light Engines

Adjust Shape of Dams (within reason)



360 to 450 nm: ALWAYS !

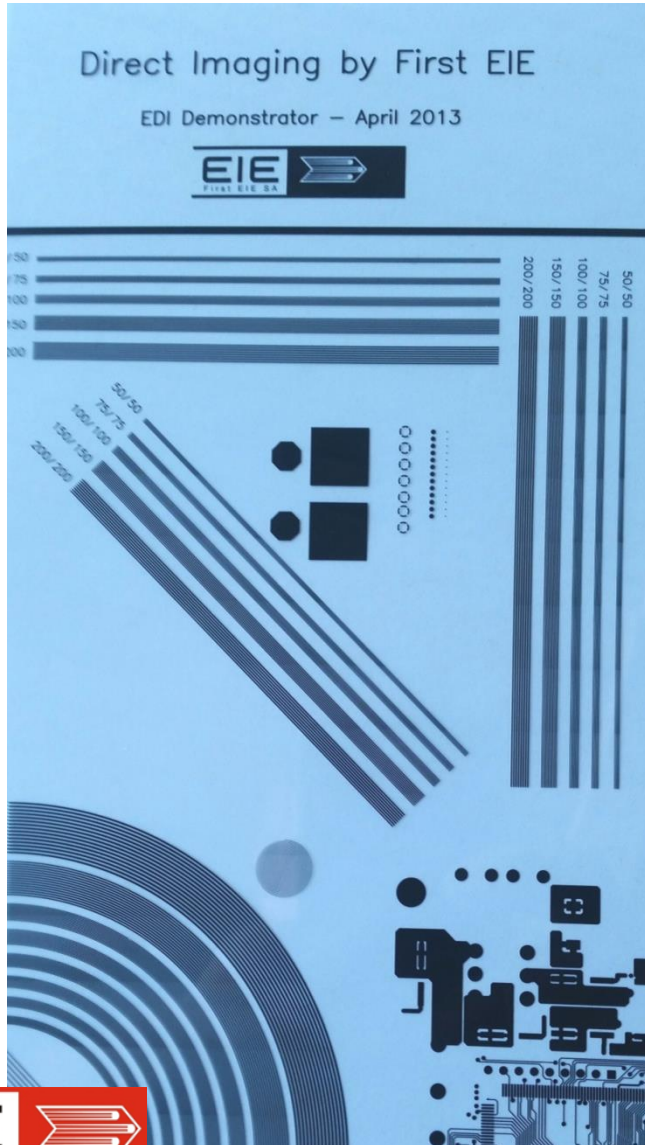
 **TAIYO AMERICA**
The Solder Mask Experts

Always on your side.



Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

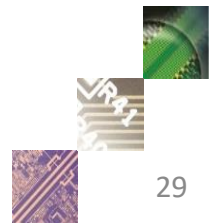


The EDI500 HDS is able to expose Silver Halide Films

Your Photoplotter back up

Black density > 5

Ask for the reference of the recommended UV sensible Silver Halide Film





Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

Air Cooling & Dust Management

Two big Fans keep the EDI500 HDS enclosure under positive pressure

- Brings cool air from the yellow room (class 100000) and evacuates calories
- Dust free system



Optional Air Exhaust Connection

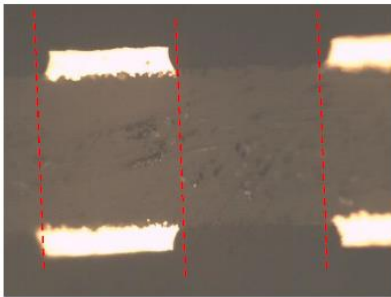


Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

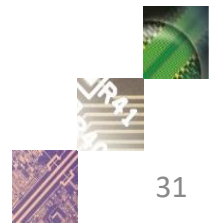
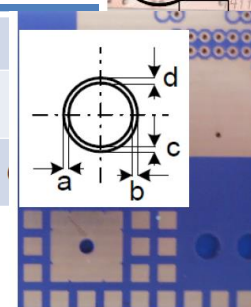
Registration side A to side B

Dry film PH2050 size 460 x 610 mm



Less than 10 microns registration side A to side B

X/Y	a	b	c	d	a	b	c	d	a	b	c	d	a	b
A1 100/100	0,06	0,06	0,08	0,06	0,04	0,08	0,06	0,06	0,06	0,08	0,08	0,06	0,06	0,06
A1 Face arrière	0,08	0,04	0,08	0,04	0,06	0,06	0,04	0,06	0,08	0,06	0,06	0,06	0,08	0,06



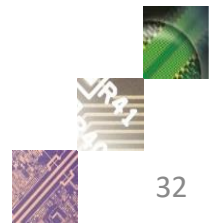
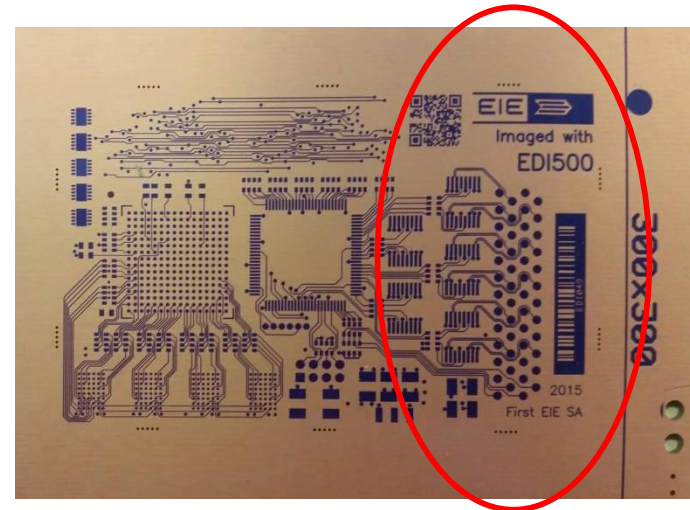


Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

- **Dynamic Information via Pads Mapping (D-code)**
 - Time code, File/Job name, User Input
 - PCB Serial number, Panel Serial
 - 1D or 2D Barcode

Industry 4.0



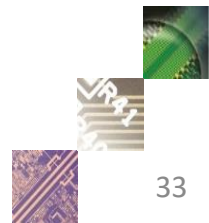


Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

Even longer with Roll to Roll

AOI and AVI already in production for PCB and components - EDI in development



AV500 Introduction



inspec 

PCB Product Cost Reduction

Evolution of products

Higher density Finer L/S

Difficulties:

- Increase of labor costs
- Low Yield in Volume Production
(Process feedback & Repair data are required)

Requirements:

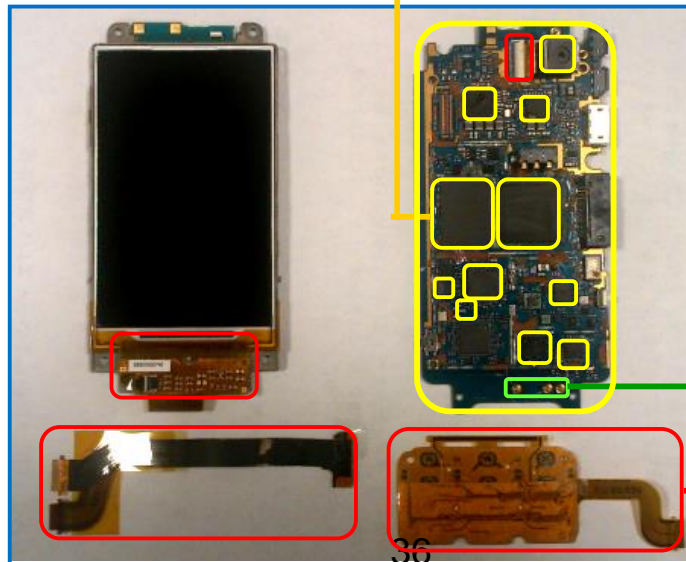
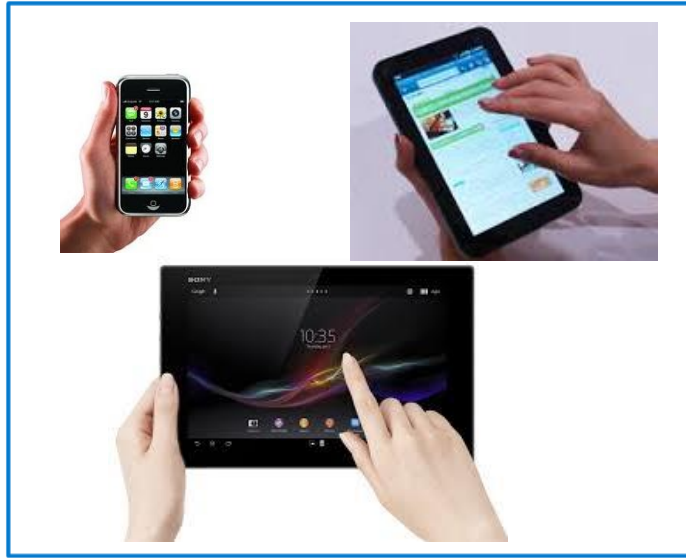
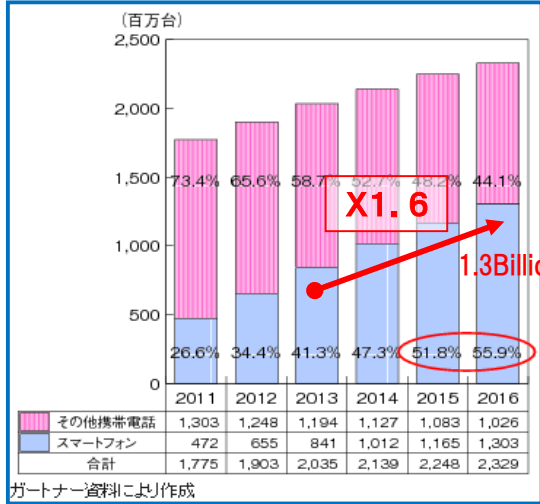
- Finer defect detection
- 100% inspection but not sampling
- Quality Assurance with data

Solution: from VI (human) to AVI (machine vision)

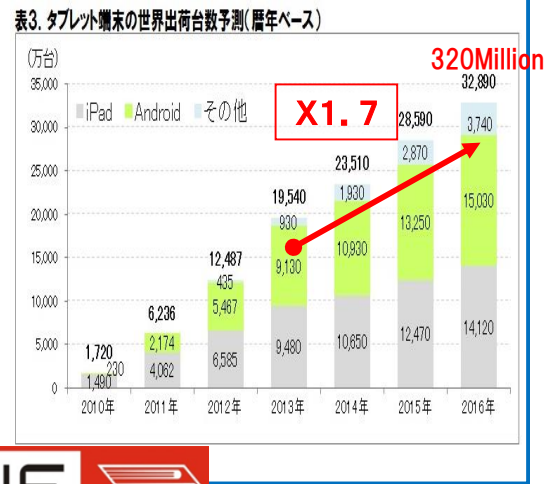
Rapidly increasing of AVI needs

AVI Market Status

World Market Forecasts Smartphone



World Market Forecasts Tablet



Semiconductor
PKG PCB

FPC PCB

LED PCB

Strip_AVI:BF8000



FCCSP_AVI:BP7100



Panel_AVI:
AV500 AV3300



R2R_AVI:RV3000

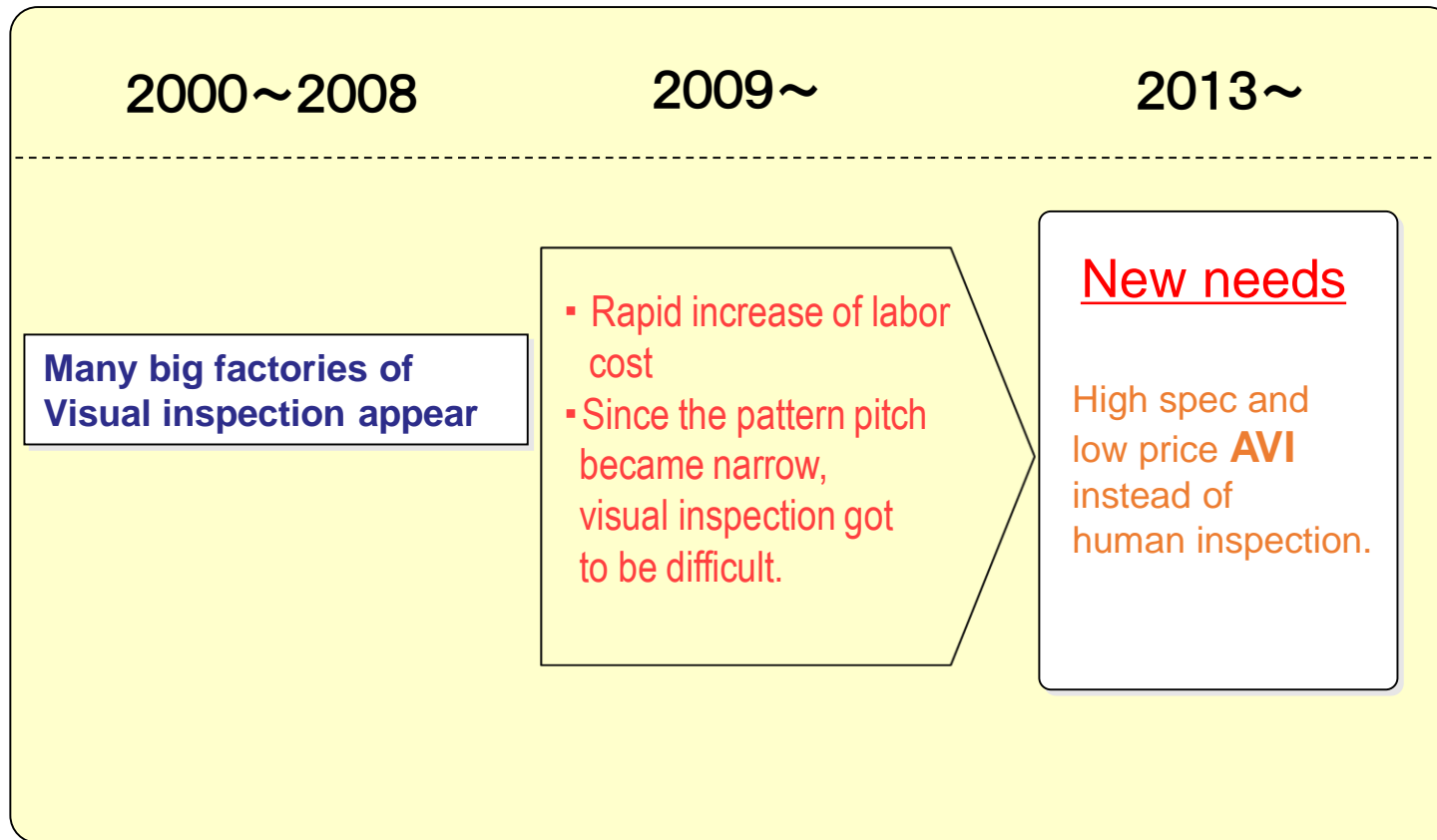


L/F_AVI:LF8000



Needs of AVI became obvious

Needs of AVI instead of VI



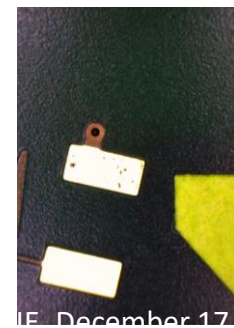
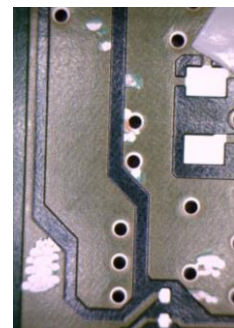
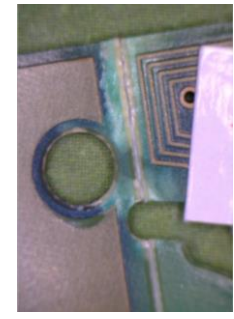
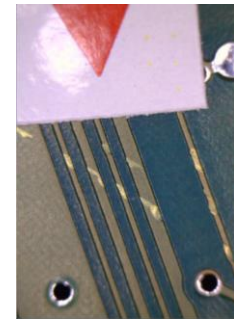
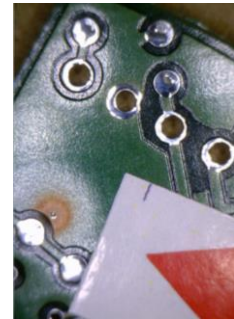
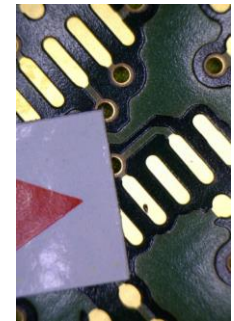
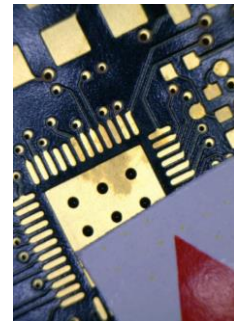
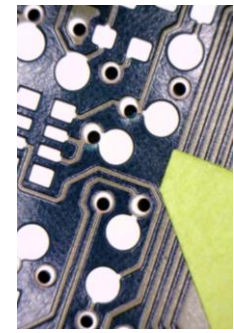
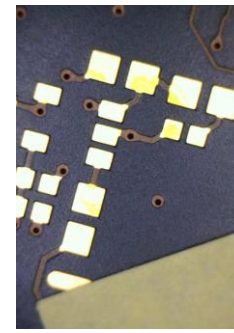
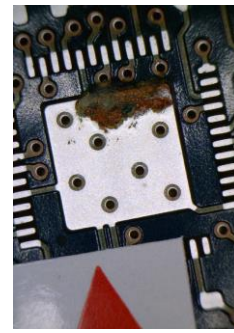
inspec suggestion

AV500



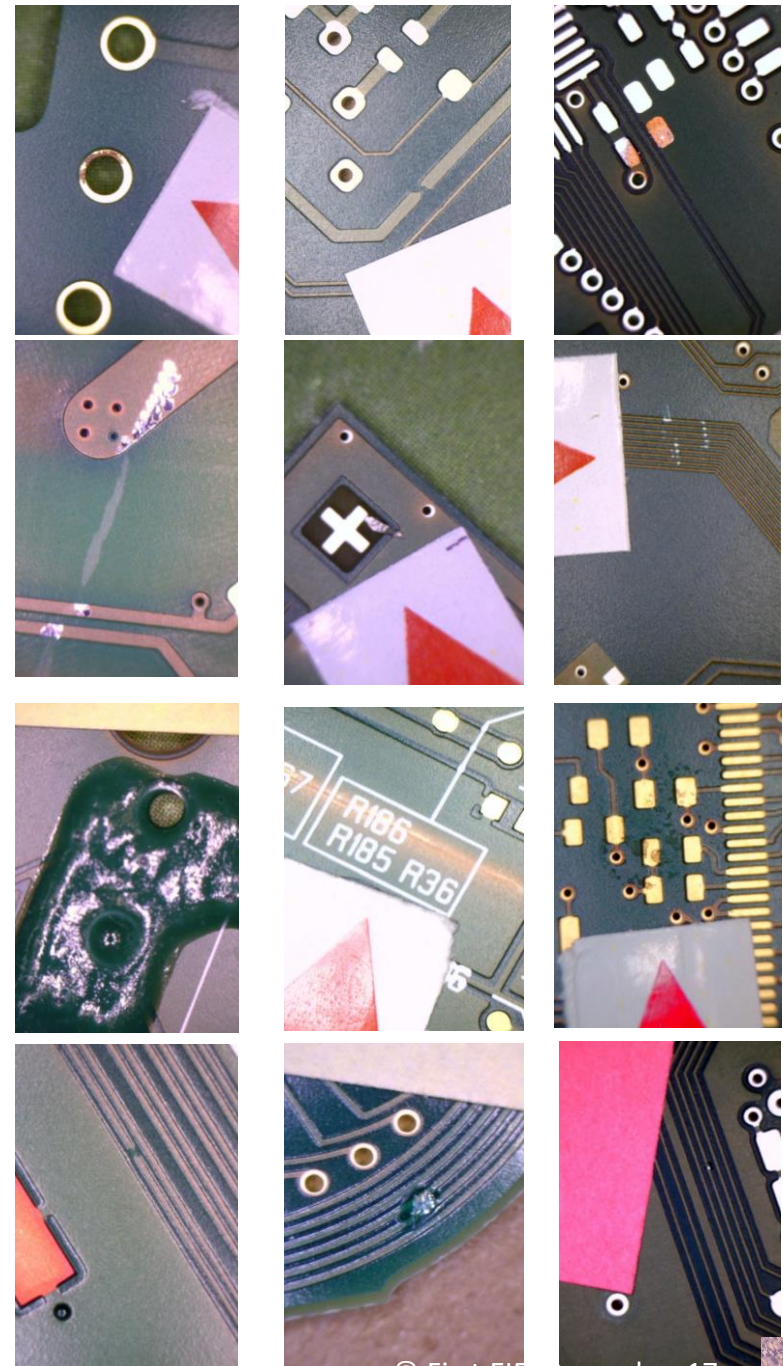
Typical defaults

Surface Finish	<ol style="list-style-type: none"> 1. Excess Solder & Solder Sweep 2. Solder Non Wetting 3. Solder residue or solder streaks 4. Gold Void 5. Oxidation on Gold 6. Imm tin Void 7. Stains or Imm tin Dullness
Routing	<ol style="list-style-type: none"> 1. Step Routing / Dip Routing 2. Missing Slots / Half rout slots 3. Dimensional error & Routing Shift 4. Missing V Groove & V Groove Shift 5. Routing dust & Routing Burrs 6. Water Stains & Water Residues 7. Improper Routing Slots / Shape
Legend & Other Prints	<ol style="list-style-type: none"> 1. Missing Legend & Illegible Legend 2. Legend Color Mismatch 3. Legend Residues & Legend Shift 4. Carbon Void & Shift 5. Carbon print Shift & Carbon short 6. Peelable Mask Shift & Peelable residue 7. Peelable Mask void
BBT	<ol style="list-style-type: none"> 1. Pad Damage, 2. Pin Impression.
General Defects	<ol style="list-style-type: none"> 1. Scratches (Anywhere in active area) 2. Foreign Particle on PCBs (Hair, Dust, >50 Microns Sq) 3. Fingure Prints & Oxidation on Surface 4. Damaged Pad / PCBs 5. Brocken Tabs & Edge Damage 6. Paper particals. 7. Residues in Hole

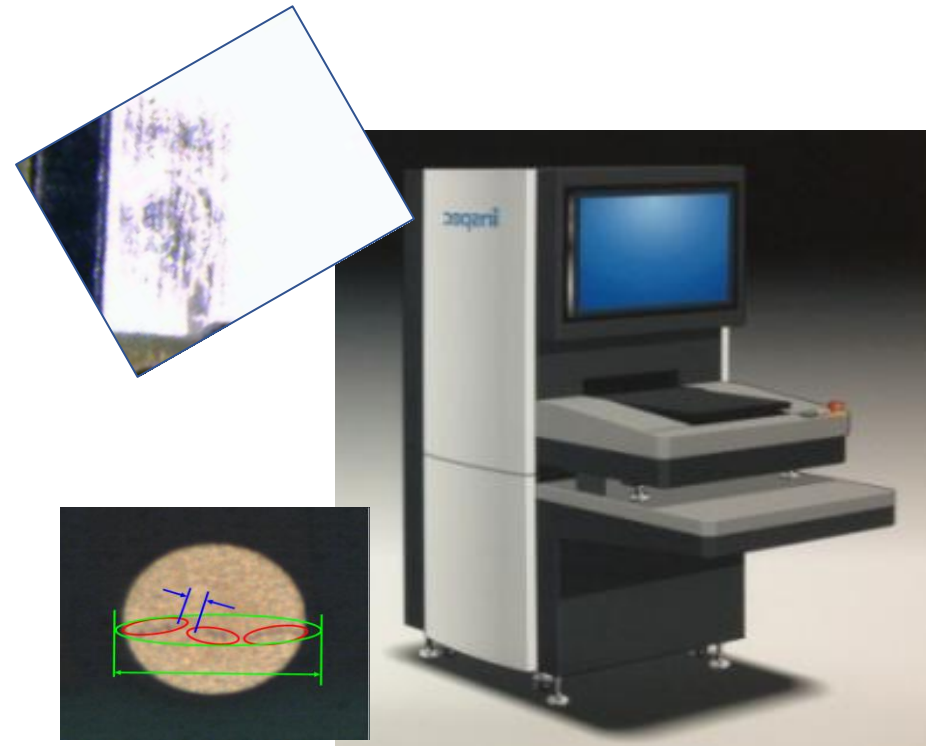


Typical defaults

Defect Location	Defects Type
Laminate Defects	<ol style="list-style-type: none"> 1. Dent, Measlings Spots 2. Delam, Blisters 3. Resin Starvation 4. Weave texture & Weave texture Exposures 5. Cracking 6. Wrinkle & Resin Residue 7. Warpage if possible
Photo Process	<ol style="list-style-type: none"> 1. Discoloration or spots on Copper 2. Copper void on surface (at any active area). 3. Copper residue / treces. 4. Image shift / Misregistration 5. Line width reduction & Line space reduction
Mechanical Drilling defects	<ol style="list-style-type: none"> 1. Drill Hole Damage 2. Drill Shift / Misregistration / Single hole offset 3. Missing & Extra Hole 4. Half Drill & Contour 5. Wrong hole Diameter (reduction or increase in hole size)
Copper Plating	<ol style="list-style-type: none"> 1. Copper Nodule on Surface / Rough Plating on surface 2. Missing Copper in Hole (Copper Void) 3. Tin Rsidues
Soldermask	<ol style="list-style-type: none"> 1. Soldermask Void 2. Soldermask Peel off 3. Soldermask residue 4. Thin & Excess Soldermask 5. Soldermask Discoloration & Spots 6. Bubles in Soldermask (Air Pocket)

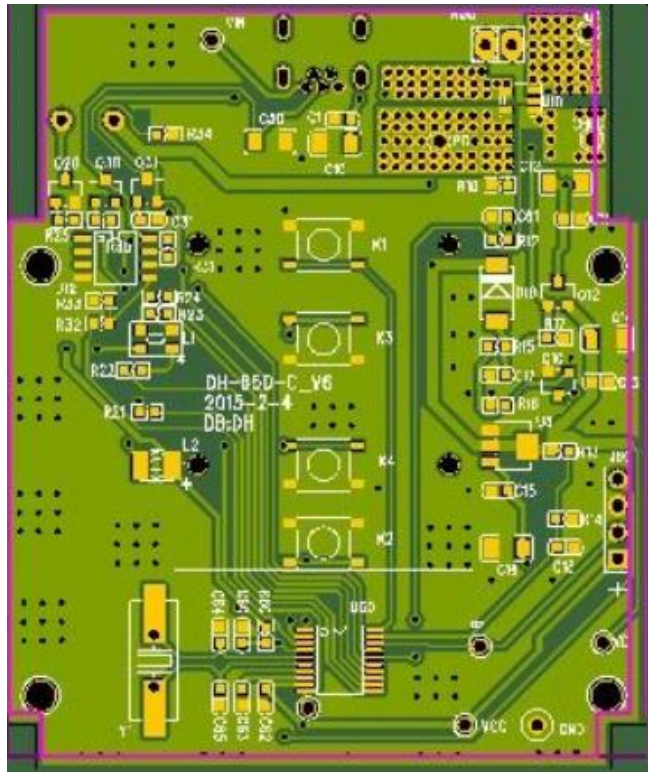


AVI500 visual inspection after final cleaning....

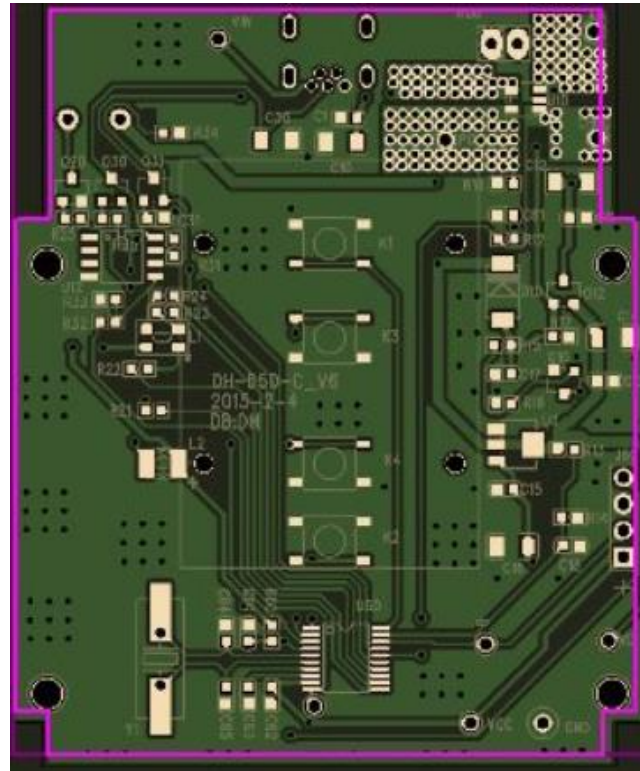


Human inspection	AVI500
90sec (Both side)	30sec (Both side with rotation time)
240 x 240 defect size from 20 to 40 micron Scratches-corrosion-dust-decoloration.....	

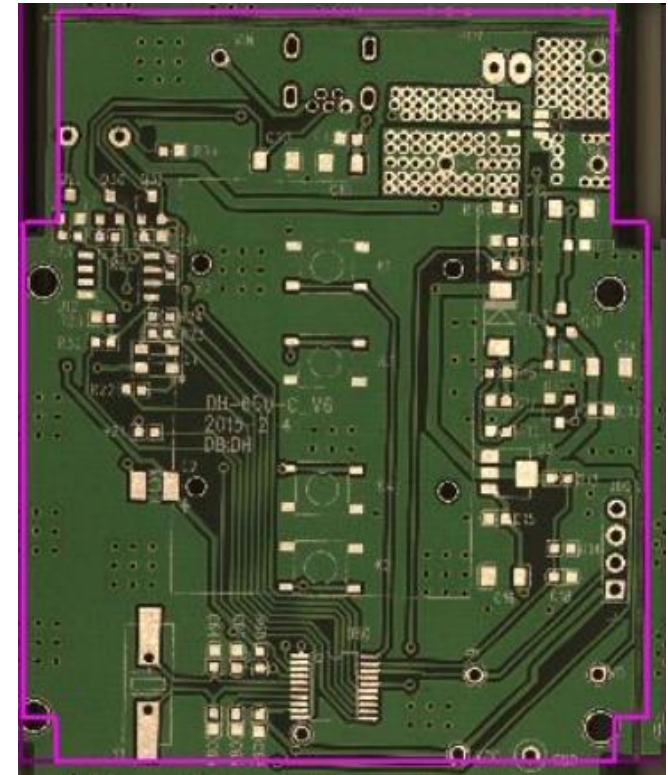
Feature – 4 : Master Image Creation



CAD data



Created master



Real sample

Master image can be made from only 1 real sample . No need to choose “Golden sample “
Color information at each part (Pad ,SR character etc.) can be capture from real sample.



Are you ready to think bigger?

Inkjet Printers - Photoplotter - Direct Imager

Thank you very much !!

