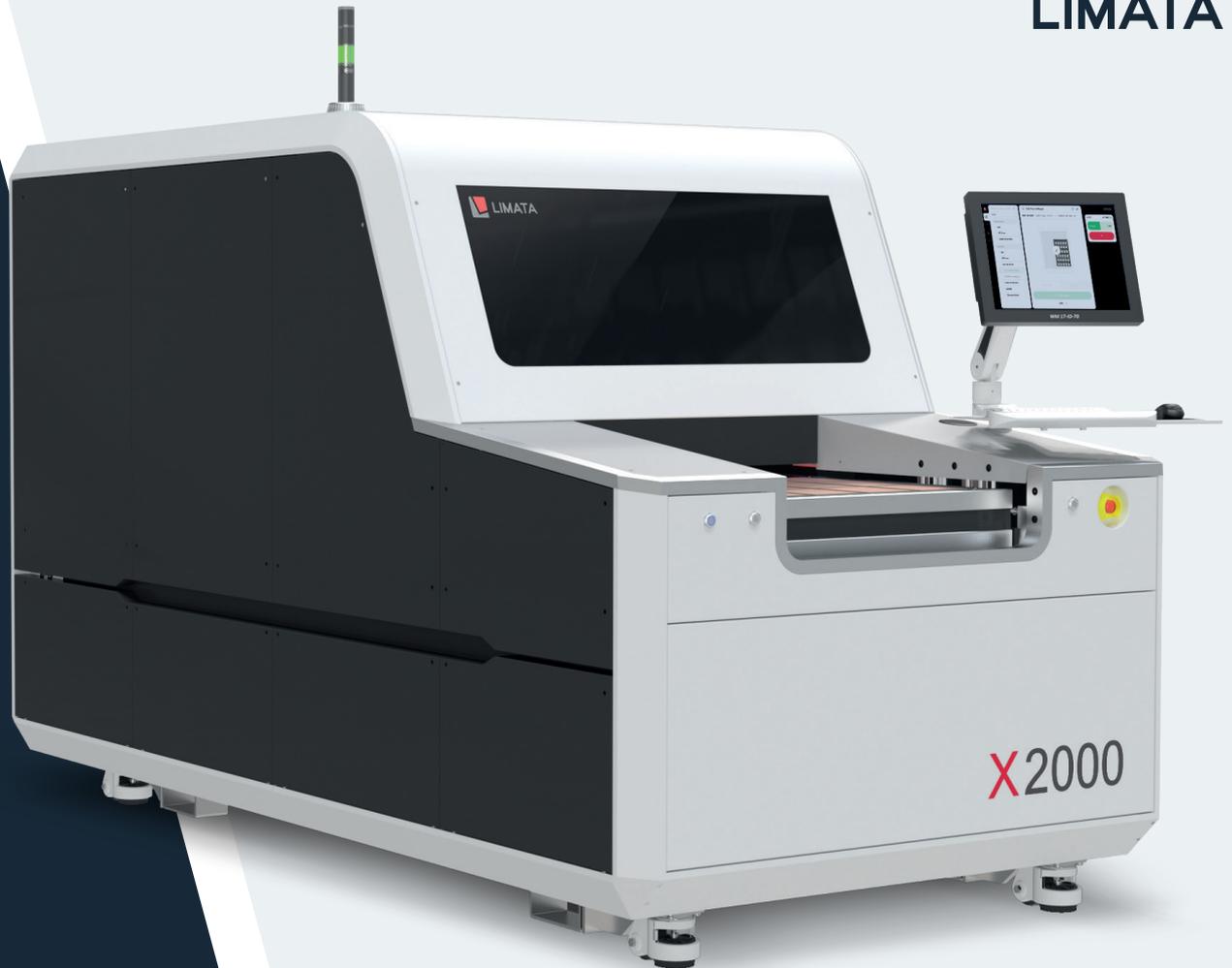




LIMATA



X2000

X2000

Powered by



## About X2000

A flexible DI platform equipped with a dual-table system and designed for continuous mid- to high-volume production of dry-film and/or solder mask applications (manual or turnkey automated).

Also suitable for short-run production with the capability to image panel sizes up to 24" x 48".

## Key Benefits

- ▶ Unparalleled manufacturing flexibility
- ▶ Highest imaging speed and efficiency („prints / head“) Powered by PX-Technology
- ▶ Fully digitized workflow and real-time process control
- ▶ Best-in-class OEE and TCO over the equipment lifecycle

## X2000 | Specifications

### 1. Basic Machine Specification

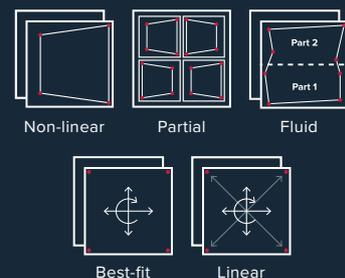
<b>Facilities</b>	External dimensions (W x D x H)	1.6 m x 3.2 m x 2.2 m (5.3 x 10.5 x 7.2 ft) Std 1.6 m x 3.5 m x 2.2 m (5.3 x 11.5 x 7.2 ft) XL
	Manufacturing footprint (floorplan / W x D)	ca. 3.5m x 6.0m (11.5 x 20 ft) (incl. space for ancillaries and service)
	Weight	4500 kg
	Power (DI + Vacuum system)	380 - 400 VAC 50-60 Hz 32 A / 3 Ph (Std) 480 VAC 50-60 Hz 32 A / 3 Phase (US)
	Power consumption (DI + Vacuum system)	< 10 KW full exposure mode (dual table)
	Safe operating temperature / humidity range	Optimal 18°-25°, 40-60 % humidity
	Compressed air supply (vacuum table)	6-8 bar   1.5 m <sup>3</sup> /min
<b>Motion</b>	Mechanical (X,Y)	High-precision XY- linear axis system on granite base
	Position repeatability (motion axis system)	+/- 100 nm
<b>Panel Handling</b>	Table system	Dual table 2 vacuum tables (anti-stick coated with integrated pressure sensorics)
	Max. panel size	711 mm x 711 mm (28" x 28") Standard 711 mm x 1,270 mm (28" x 50") XL Table No. 2
	Max. exposure area	610 mm x 660 mm (24" x 26") Standard 610 mm x 1,220mm (24" x 48") XL Table No. 2
	Max. panel thickness	Up to 6 mm (0.23") Optional up to 15 mm (0.6")
<b>Compliance</b>	Base machine Electro-mechanical	CE / UL certified

### 2. Registration

<b>Scaling and Registration</b>	Advanced transformation and scaling modes	<ul style="list-style-type: none"> <li>• Best Fit</li> <li>• Linear Scaling</li> <li>• Non-linear Scaling</li> <li>• Partial multi-point alignment</li> <li>• Fluid scaling (XXL boards)</li> </ul>
	Registration system	CCD HD Cameras with telecentrical optics Camera Lighting: RGB / IR
	Target recognition types	Mechanical and laser drilled holes, etched fiducials, UV markers, punch marks etc.
	Optional target generation	UV markers (in vacuum table)
	Registration accuracy (front-to-back) [3σ / 4 targets]	+/- 10 μm



Optimized imaging and registration time with dual-table panel handling and transport mechanism



### 3. Digital Imaging

#### 3.1. PX-Light Engines

	DMD_DLP Chipset	4K_Ultra HD UV_Ultra	<b>PX 4K</b> <b>PX UV</b>
	UV-LED Illumination	<b>3-wavelength spectrum</b> (UV, standard) 365 / 385 / 405 nm <b>4-wavelength spectrum</b> (UV and white, optional) 365 / 385 / 405 nm + [420 nm]	
	Advanced optical lens systems	+/- 500 µm optical D.o.F (PX_4K_30) +/- 200 µm optical D.o.F (PX_UV_15)	
	IR-Laser add-on (UV+IR imaging)	Fiber-coupled IR laser	
<b>Imaging accuracy and consistency</b>	Stitching	Fully automated stitching adjustment and control	
	Autofocus	Individual autofocus per light engine (+/- 10 mm)	
	Alignment	Automated head-to-head alignment	
	Calibration	Auto-calibration mode	

#### 3.2. Imaging Features and Applications

Resist patterning	Applications	MLB (Inner-/Outer) HDI, CM	Adv HDI   mSAP FPC, CM	mSAP   ICS
	PX Light-Engine models	<b>PX 4K</b> [30]	<b>PX UV</b> [15]	<b>PX 4K</b> [10]
	Min. Resolution (Line and Space)	30 µm L/S	15 µm L/S	10 µm L/S
	Optical depth of focus (DoF)	+/- 500 µm	+/- 200 µm	+/- 150 µm

Solder Mask Imaging	Solder Mask types	DI Solder Mask	Conventional SM
	PX Light-Engine models	<b>PX 4K</b> [30]	<b>PX LUVIR</b>
	Min. Dam / SRO	50 µm / 75 µm	30 µm / 50 µm
	Most suitable Energy ranges	50 - 250 mJ/cm <sup>2</sup>	250 - 1500 mJ/cm <sup>2</sup> (UV+IR)

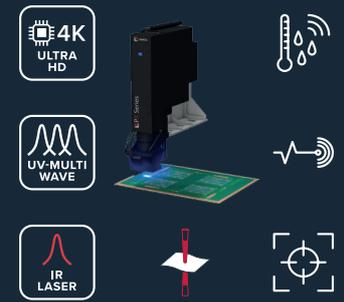
#### 3.3. Imaging Performance by Application and System Configuration

Resist patterning	Exposure cycle time * per side of a panel (24" x 18")	1-Head	2-Head	3-Head
<b>PX 4K</b> [30]	Resolution: 30 µm L/S Energy: 30 mJ / cm <sup>2</sup>	< 12 sec	< 7 sec	< 5 sec

Solder Mask Imaging	Exposure cycle time * per side of a panel (24" x 18")	1-Head	2-Head	3-Head
<b>DI Solder Mask</b> <b>PX 4K</b> [30]	Dam/SRO: 50µm / 75µm Energy: 150 mJ/cm <sup>2</sup>	< 35 sec	< 25 sec	< 15 sec
<b>Conventional SM</b> <b>PX LUVIR</b>	Dam/SRO: 30µm / 50µm Energy: 600 mJ/cm <sup>2</sup> (IR) IR: Included	< 75 sec	< 40 sec	< 30 sec

\* excluding registration / depending on resist and solder type and process



#### Real-time monitoring and control

Enabled by embedded sensor systems and software algorithms



- Temperature and humidity sensoric
- UV-power and focus measurement sensor system
- Sensorics for automated stitching and calibration

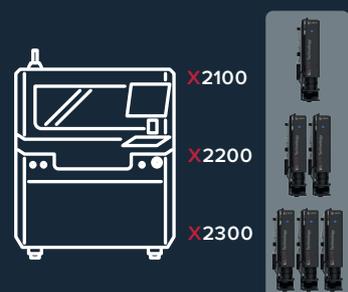
#### Wide resist material capability



#### All ink types, brands and colors



#### Modular Scalable Imaging [1-3 PX heads]



Field-upgrade options with minimum downtime

## 4. Software

<b>PC-Hardware</b>	Machine PC	Industrial System PC incl. GPU
	PX Imaging PC	External (server rack) or integrated PC 1 PC per additional imaging head (max. 2 PX PC's for 3 heads)
	Operating System	Windows 11 LTSC (ITAR compliant)
	Communication Interface	Ethernet (GigE)
<b>Software Data Connectivity</b>	CAM data import	Extended Gerber RS-274X (standard) ODB++, DPF, DXF etc. Support of many further data formats
	Job Preparation Software	LIMATA Path-X Desktop PC App, on machine or external server
	HMI (Human-Machine-Interface)	LIMATA Print-X 15" touchscreen or mouse / keyboard + 8 operator languages
<b>Software Options</b>	Traceability	Support of multiple serialization levels and complex formats (Reading and Writing) QR-Code   DataMatrix   Dot or Drill DMC   Barcode
	Real-time machine data and connectivity	All in one database Data connectivity with factory systems (MES)



## 5. X2000 Automation Options | Island of Automation or In-Line

<b>X2000 A</b> Single or Twin DI	Rigid and Flex-Sheets / Max. panel size	610 mm x 610 mm (24" x 24") Standard max.
	Application(s)	DF (Inner- / Outer Layer) SM (Solder Mask layer)
	Dimensions (W x D x H)	<b>X2000 A_Single</b> 4.5 m x 3.5 m x 2.3 m (15.0 ft x 11.5 ft x 7.5 ft) <b>X2000 A_Twin</b> 6.0 m x 3.5 m x 2.3 m (20.0 ft x 11.5 ft x 7.5 ft)
	Options	Extended in-line transportation options (from coating to X2000 to developer line)

### X2000 A



## 6. Other Options

<b>Clamping</b>	Mechanical clamping system for fixation of warped panels (in addition to vacuum table)	Max. exposure area (with clamping): 660 mm x 610 mm (26" x 24")
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