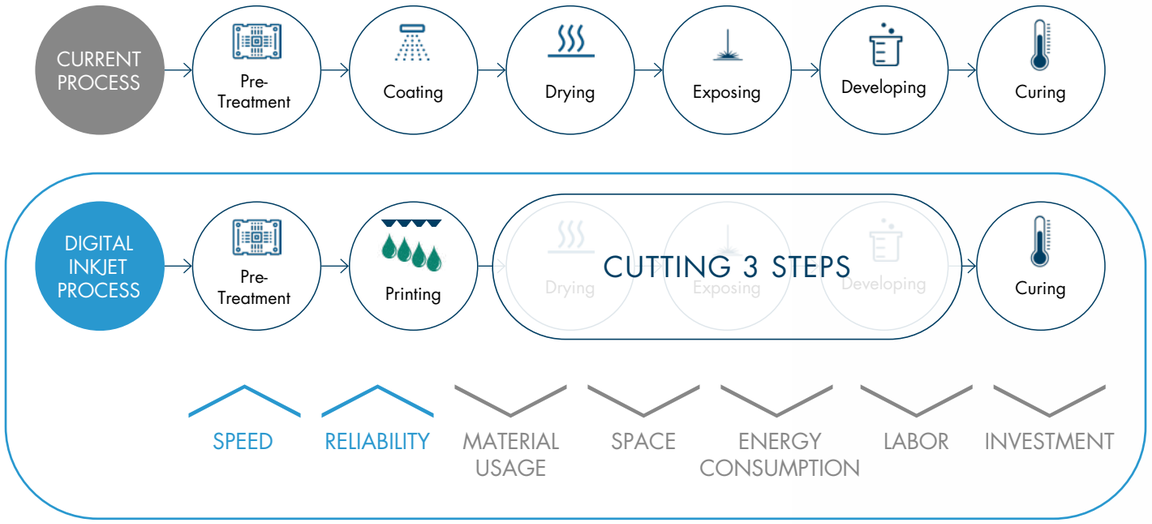
n.jet soldermask

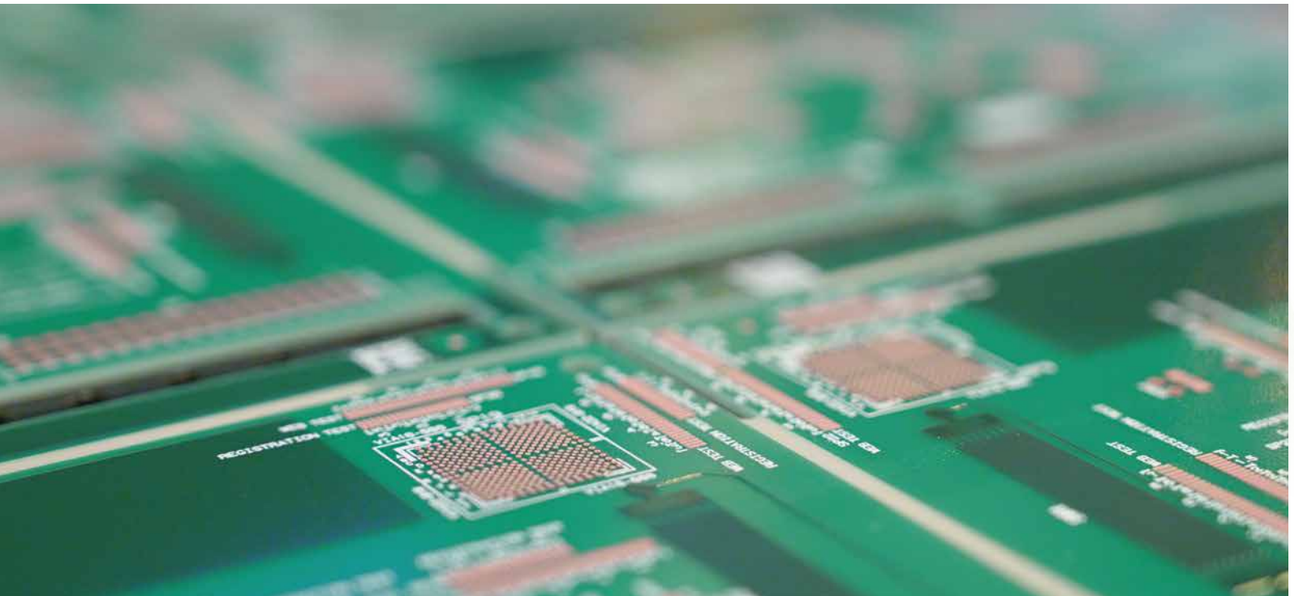
NOTION SYSTEMS

INKJET IN ELECTRONICS MANUFACTURING

INKJET PRINTING IN PCB PRODUCTION

Replacing the current subtractive process chains with additive process steps in the production of electronics has been one of the founding ideas of Notion Systems, as it increases production efficiency and reduces waste. On top of this, the n.jet electronics series increase process stability and enables new features not found in today's electronics production. This pushes the production, which in turn limits of current production technology for rigid and flexible circuitry on most substrate material.





INKJET IMPROVES SUSTAINABILITY

Inkjet printing of solder mask helps reduce the environmental footprint of PCB (Printed Circuit Board) manufacturing in several key ways:

MATERIAL EFFICIENCY AND WASTE REDUCTION

Inkjet technology applies the solder mask only to the required areas. This precise deposition drastically reduces material waste, as only the necessary amount of ink is used.

NO SOLVENT BASED MATERIALS

The latest inkjet technology uses UV based inks which contain no solvents. Traditional solvent-based inks release volatile organic compounds (VOCs) during drying or curing. VOCs contribute to air pollution by forming ground-level ozone and smog, which can harm both the environment and human health.

ELIMINATION OF PHOTOMASKS, SCREENS AND CHEMICALS

By directly printing solder mask, inkjet technology eliminates the need for photomasks and chemical processing. This leads to fewer hazardous chemicals and less water and energy consumption in treating those chemicals, making the process more eco-friendly.

ENERGY EFFICIENCY

Inkjet printing consolidates many production steps which reduces overall energy usage. The process also avoids excess material removal and curing of unused portions, further cutting down on energy consumption.

IMPROVED PRODUCTION YIELD AND REDUCED REWORK

Inkjet printing offers better accuracy and control, which improves the overall quality and precision of the solder mask layer. This results in fewer defects and less rework, further reducing waste and resource consumption in the manufacturing process.

WATER CONSERVATION

Since no chemical developing is required, there is far less need for water in the post-processing steps, contributing to overall water conservation.

LOWER CARBON EMISSIONS

The reduced use of materials, energy and water, combined with fewer waste products, leads to lower overall carbon emissions in the manufacturing process. Streamlining the steps with inkjet technology also reduces the logistical footprint, such as transportation and disposal of hazardous chemicals.

n.jet soldermask

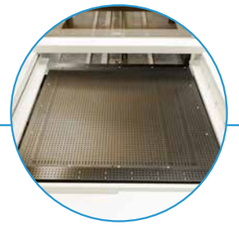
Being digitally controlled, inkjet printing allows for better control over the thickness, placement, and curing of the solder mask and legend, improving the overall quality and consistency of PCBs.

MAIN FEATURES

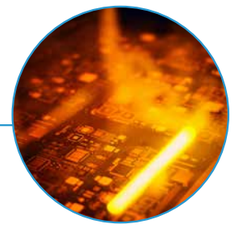
- Stand-alone inkjet printing system
- Muli-color solder mask & legend
- Digital printing of solder mask & legend
- Manual or fully automated
- Use of industrial printheads
- Vacuum/mechanical stage
- Integrated non-contact cleaning system
- Non-contact printhead cleaning system
- Automated nozzle calibration
- Optical alignment & calibration
- Fully integrated UV curing system
- Full MES integration

Industrial printhead

Non-contact cleaning system



Vacuum stage



UV curing

FOR HIGH MIX / LOW VOLUME PRODUCTION

FASTER TURNAROUND TIME

- Quick design changes: Inkjet printing allows for on-the-fly design changes without any retooling. This is crucial in high-mix production environments where many different designs are processed within a short time frame.
- Elimination of intermediate steps: Traditional methods involve multiple steps (masking, exposure, developing, curing), while inkjet printing is direct-to-board, reducing production time and making it ideal for rapid prototyping or quick turnaround jobs.

DESIGN FLEXIBILITY

- Variable designs: Since it is a digital process, inkjet printing allows for different designs to be easily loaded and printed in sequence without physical changes (such as screens or masks) to the printing setup, making it ideal for high-mix production where every board could be different.

CUSTOMIZATION AND PROTOTYPING

- High customization: Inkjet printing supports customization without added cost or complexity, which is important for prototyping and customer-specific designs typical in high-mix, low-volume production.
- Rapid prototyping: It allows manufacturers to quickly iterate on PCB designs without the delay associated with preparing masks or screens, enabling rapid prototyping and faster product development cycles.

n.jet soldermask
FOR HIGH VOLUME PRODUCTION

The entire solder mask cluster can be fully automated from pretreatment to inkjet printing and final cure. The fully automated set up helps to improve efficiency, consistency, quality, and cost savings, making it an important component of modern PCB manufacturing. The n.jet soldermask can be connected with any Manufacturing Execution System (MES) to streamline and quality control the entire manufacturing process.

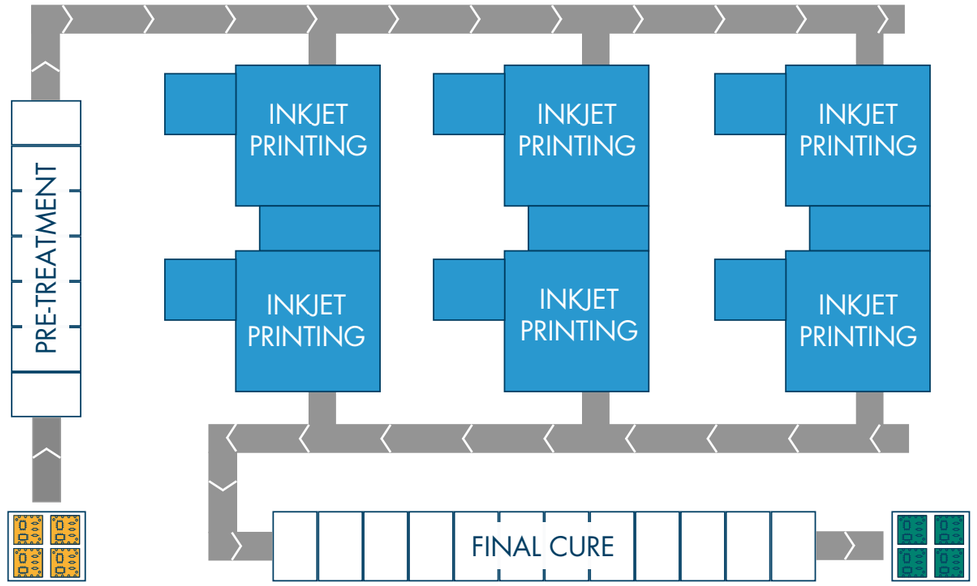
Fully automated inkjet solder mask system cluster

The gripper can be adjusted to different substrate sizes

The 2D code reader scans the code on the pcb and enables the automatic loading of the correct printing program

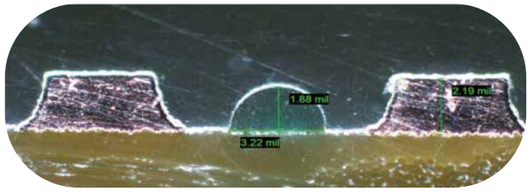
FULLY AUTOMATED INKJET SOLDER MASK CLUSTER

The n.jet soldermask system can be directly connected to the pre-treatment line and handles the board with special designed vacuum grippers softly through the entire printing process.

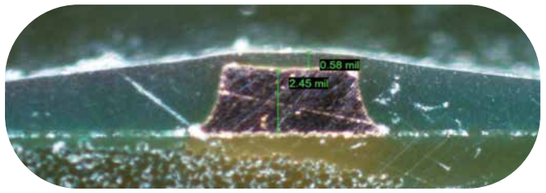


The n.jet soldermask can be automated as a single or double line to increase throughput

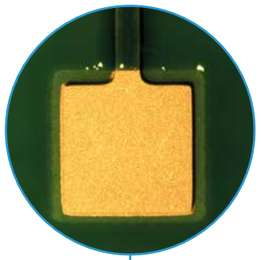
SOLDER MASK PROCESS IMAGES



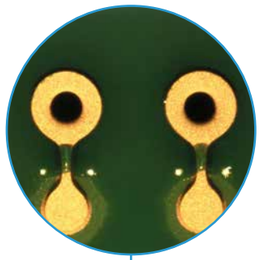
Minimum achievable dam size is 2 mil (50 microns)



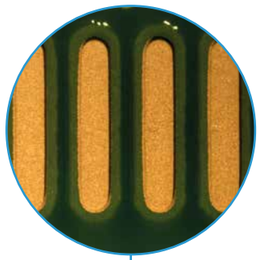
Edge coverage of traces can be adjusted. For high copper thickness, only trace edges need additional ink



Clear interface area between base material, edge and copper



- Solder mask edge printing
- No bleeding



- Superior edge definition
- High uniformity

Matt & glossy effects

NOTION SAMPLE BOARD

The Notion sample board demonstrates the wide variety of innovative and endless possibilities of inkjet printed solder masks and shows a test layout with the following advanced and innovative structures:

- 3D printing of solder mask
- Layer thickness variation
- Layer matting
- Legend[sm]

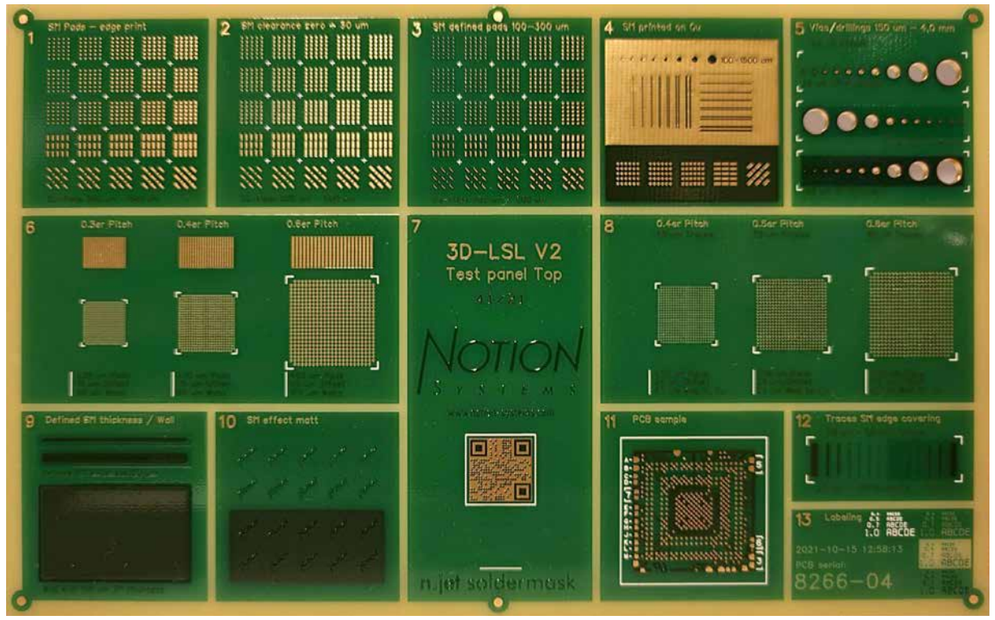
The printing strategy defines the final properties of the solder mask such as film thickness, print speed, edge coverage, etc.

FULLY FINISHED ENIG BOARD

Available for different soldermask inks

For validation tests such as:

- Adhesion test
- Cross sections
- Scratch tests
- Microscopic views



Please scan the QR Code for more information and ask a sales representative for your own Notion Sample Board.

INKS - UV BASED WITHOUT SOLVENT

The n.jet soldermask applies UV based inks. This has several advantages over traditional solvent based inks:

- UV ink cures quickly when exposed to light
- Very clean process
- UV based process improves accuracy
- Environmentally friendly

COMMERCIALLY AVAILABLE INKS

AGFA · ELECTRA · peters Coating Innovations for Electronics · RONGDA · TAIYO AMERICA

NOTION ADVANCED APPLICATION CENTER

The Notion advanced application center plays a crucial role, as it offers several important functions and benefits for research, development and industrial practice.

CUSTOMER DEMONSTRATION

KNOWLEDGE TRANSFER AND TRAINING

TECHNOLOGY DEVELOPMENT AND INNOVATION

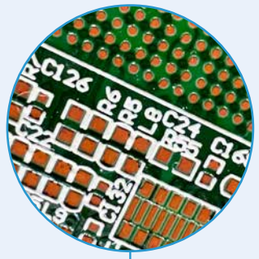
TEST ENVIRONMENT FOR INDUSTRIAL PRODUCTION PROCESSES

PROTOTYPING, BENCHMARKS AND TESTING

Our application center is equipped with the latest n.jet systems and offers a wide range of possibilities for customer developments. The systems are configured with different inks and printheads to match our customers' requirements. Additional test equipment ensures that the printed structures can be measured and tested immediately after printing.

HARDWARE OPTIONS

Up to 9 solder mask printheads



Legend printing

External refill station

Automation

SOFTWARE OPTIONS

- Serialization codes
- 2D Matrix codes

CAM station

Legend[sm] printing with solder mask ink

MES integration

DATA PREPERATION

1 INPUT & PREPERATION

n.cam pcb
Intuitive file inspection and data preparation with Notion n.cam pcb frontend for UcamX (.odb++ I Gerber I .dpf)

OR

Customer's CAM - System
Automatic output of data via .xml interface

CAM data export
XML interface

2 FILE CONVERSION & GENERATION

n.jet cam software
Fully automated and fast file conversion (RIP) and machine file generation with powerful n.jet cam software via separate PC or via server solution

n.jet cam output

3 PRINTING

Print images & files
Ready to print
Respects all specific panel and data requirements

n.jet soldermask
TRAINING COURSE

Training is essential because it ensures that the technology is implemented correctly, efficiently, and the specific customer requirements are met. Inkjet solder mask printing is a advanced technology, so understanding the nuances is critical to achieving high-quality results.

Here are several reasons why training is crucial:

- Process Optimization for Customer-Specific Designs
- Fast and safe start up at customer site
- Reducing errors and waste
- Maximizing the equipment's potential

A typical training course is designed for up to 5 persons and includes following training chapters:

OPERATION OF THE SYSTEM

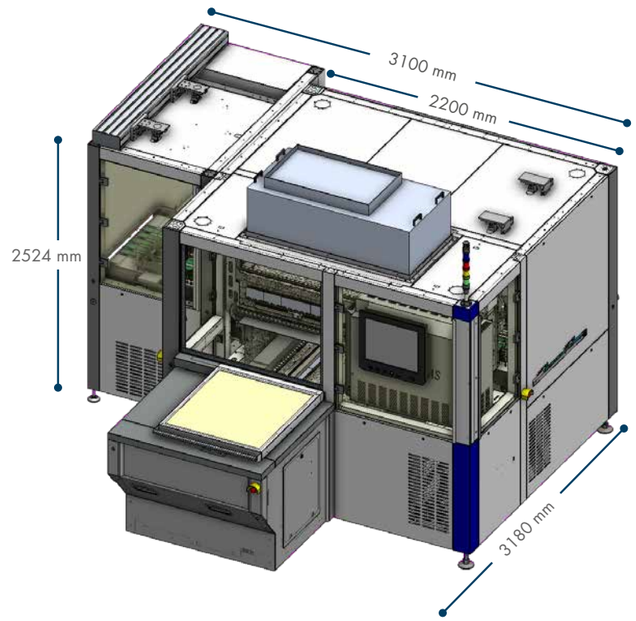
PREVENTIVE MAINTENANCE

PROCESS TRAINING

CAD DATA HANDLING

DIMENSIONS & SPECIFICATIONS

Machine dimensions (WxDxH):	3100mm (2200mm) x 3180mm x 2524mm (122" (86") x 125" x 99")
Machine weight:	4500 kg (8818 lbs) - incl. automation 3900 kg (7720 lbs) - base machine
Max. panel size:	610 x 610mm² (24"x24") (larger on request)
Number of printheads:	Up to 9 printheads for soldermask printing Up to 2 printheads for legend printing
Printing time per side:	Depends on copper thickness, typically 30 pcb/h (Please consult for individual cycle time calculation)
Optical alignment:	4 fiducials / panel or subpanel
Load/unload:	Manual (standard)
Automatic load/unload:	Optional
Facility connections:	400V, 32A, 3P, N, PE & CDA 6,5 - 8 bar
Energy consumption:	5 kWh - incl. automation 3 kWh - base machine



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ECO FRIENDLY

THE FUTURE OF ADDITIVE MANUFACTURING

LAB EQUIPMENT

INDUSTRIAL SOLUTIONS

PLATFORM ENGINEERING

SERVICE

PROCESS

INKS

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