Metalon and PChem Inks

Extending on our origins as a nanomaterial synthesis company, our electrically-conductive inks offer a variety of high-performance and economical options for substrates and deposition methods.

PCHEM
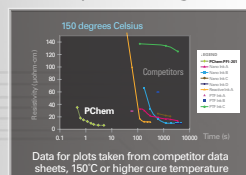Silver Nano-Inks for Printed Electronics

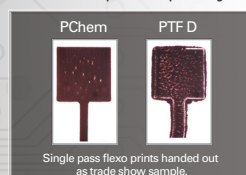**PChem inks are now an exclusive offering of NovaCentrix.**

PChem Ink Advantages

- Faster thermal processing times
- Lower processing temperatures
- Better print quality and resolution
- For flexo, screen, spray, and gravure
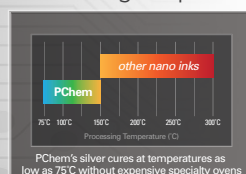- Water-based for safety and sustainability
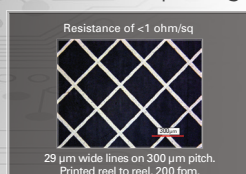- *New lower pricing*

Faster processing times

Data for plots taken from competitor data sheets, 150°C or higher cure temperature

Better print quality

Single pass flexo prints handed out as trade show sample.

Lower curing temperature

PChem's silver cures at temperatures as low as 75°C without expensive specialty ovens

Ultra fine line printing

29 μm wide lines on 300 μm pitch. Printed reel to reel, 200 fpm.

Metalon® ICI
Inexpensive Copper Oxide Reduction Inks

- Use multiple printing methods
  - Screenprinting
  - Gravure
  - Flexography
  - Inkjet
- Ideal for use on paper

Functional printed RFID antenna on paper

- As low as 10 milliohms/square
- Cure in milliseconds in open air with PulseForge® high-speed equipment
- As low as $75/kg
- Water-based

Metalon® HPS
Water-based, Silver Inks

- Screen and aerosol formulations
- Economical
  - High performance = lower cost per sheet resistance
  - Achieve resistivities of less than 3x bulk silver
- Versatile
- Variety of substrates (plastic, glass, metals, etc.)
- Variety of particle types
  - Micron flake
  - Nano flake
  - Nano spherical
- Customizable
- Work with customers to take "off-the-shelf ink" and optimize for their application
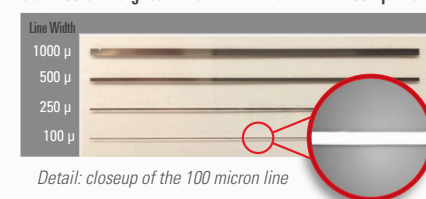
Metalon® JS-B
Water-based, Inkjet Silver Formulations

JS-B40G

- Compatible with Dimatix, Xaar, and other printheads.
- Printable on non-porous substrates (glass, plastics, metals, etc.)
- Matched for ITO-Glass substrates
- PulseForge tools or other thermal

JS-B40G on ITO-glass made with a Dimatix DMP-2831 printer

Detail: closeup of the 100 micron line

JS-B25HV

- Compatible with Dimatix, Xaar, and other printheads.
- Printable on porous substrates (Novele, photo paper, etc.)
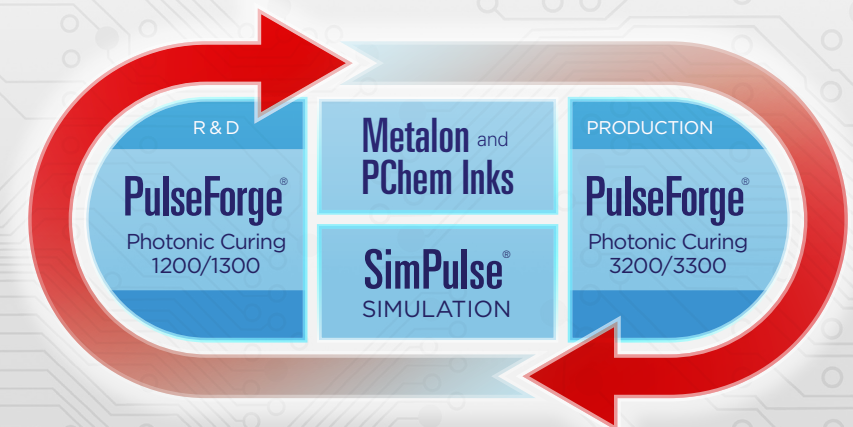- PulseForge tools or other thermal

JS-B25P

- Inkjet starter kit
- Piezoelectric desktop printers

Order NovaCentrix Inks Online

NovaCentrix inks can be purchased in sample quantities directly on our web store at store.novacentrix.com or from our website at www.novacentrix.com.

NOVACENTRIX®

Experts in Printed Electronics

predict | test | monitor | measure | modify

NovaCentrix provides state-of-the-art products and services for development and manufacturing of printed electronics applications.

Key applications include:
Displays | RFID | Photovoltaics | Batteries | Automotive | Wearables

Our experts bring exceptional capability to each customer project, combining our unique skills and experience with our customers to promote faster development cycles, enhance market and product differentiation, and sustain economical production.

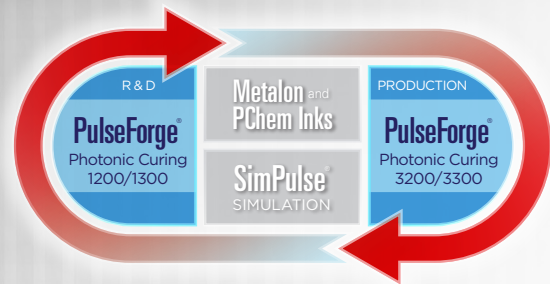We look forward to working with your team.

NOW YOU CAN

NOVACENTRIX®

PulseForge® Tools

NovaCentrix pioneered and patented the photonic curing process, and the current the PulseForge photonic curing tools are the state-of-the-art.

SimPulse®

predict | test | monitor | measure | modify

RESEARCH & DEVELOPMENT
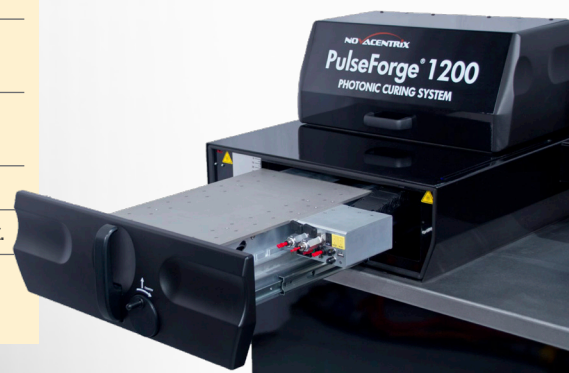## PulseForge® 1200/1300

State-of-the-art photonic curing in a low-cost, compact chassis closes the loop for effective R&D.

Control What is Happening

- *Pulse shaping* with pulses and spaces from 25 microseconds to 10 milliseconds
- Linear process rates up to 30 meters/minute
- Advanced easy-to-use interface

Know What is Happening

- Integrated photodiodes record pulse outputs
- Integrated energy measurement
- SimPulse® numerical process simulation
- Easy-access connections

PRODUCTION
PulseForge® 3200/3300

Precise photonic curing tools ready to handle your high volume manufacturing on a range of substrates. Use roll-to-roll and conveyor-based material processing.

Production on a Fast Track

- Quickly transition from R&D to high-volume
- Same pulse shaping flexibility as the PulseForge 1200 & 1300
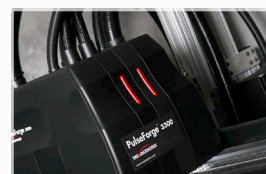
Designed for Volume Production

- High uptime and high throughput @ > 300 ft/min.
- Configureable in 3 in. widths up to > 16 ft.
- Modular for tight production spaces

Adaptable for Evolving Products

- Advanced software controls and simulation with SimPulse®
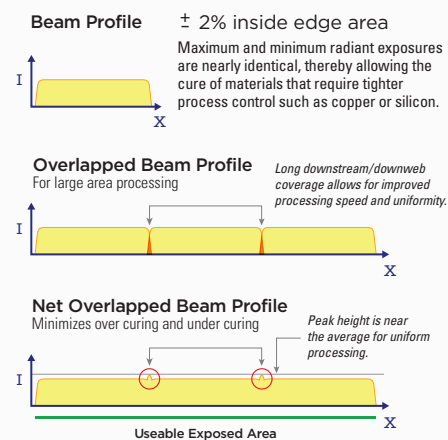- Backed by NovaCentrix engineering support
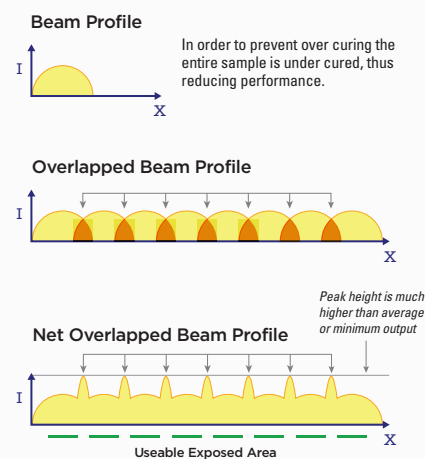
PulseForge® 3200

PulseForge® 3300

Beam Uniformity is Important

Advanced materials require an engineered beam profile for uniform exposure and tight process control. The optimized beam profile of PulseForge tools enables higher performance. PulseForge has produced continuous uniform cures miles long.
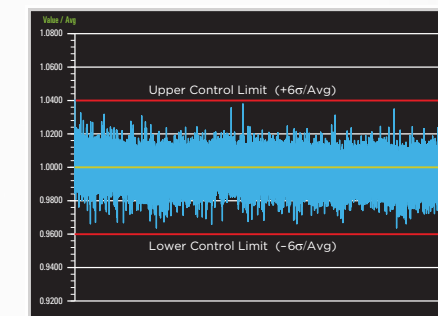
STITCHING: PulseForge

Beam Profile ± 2% inside edge area
Maximum and minimum radiant exposures are nearly identical, thereby allowing the cure of materials that require tighter process control such as copper or silicon.

Overlapped Beam Profile
For large area processing
Long downstream/downweb coverage allows for improved processing speed and uniformity.

Net Overlapped Beam Profile
Minimizes over curing and under curing
Peak height is near the average for uniform processing.

Useable Exposed Area

STITCHING: Competitors Non-Uniformity

Beam Profile
In order to prevent over curing the entire sample is under cured, thus reducing performance.

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Peak height is much higher than average or minimum output

Useable Exposed Area

Quality Matters

PulseForge tools are designed to integrate into customer Quality Management Systems.

Process Control Chart
Lamp Output 100,000 Shots

Upper Control Limit (+6σ/Avg)

Lower Control Limit (−6σ/Avg)

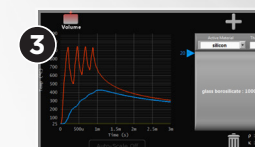Actual data from PulseForge 3300 production tool: 100,000 shots

- Tool parameters can be tracked for consistency
- Each individual pulse can be linked to specific product for traceability
- Specific exposure conditions can be saved and referenced for work order production
- Access for changing tool exposure conditions can be controlled

Steps to Creating a SimPulse Model

① Build material stack
SimPulse allows material stacks of up to 7 layers to be created. Each layer can be assigned a material type from the reference library, or can be uniquely defined by manually entering the known or estimated thermo-physical properties for that material. Each layer thickness is also defined.

Integrated Photonic Curing Simulation

NovaCentrix has created the world's first integrated photonic curing simulation. SimPulse® is an interactive numerical model for PulseForge® photonic curing tools. SimPulse dramatically decreases process development time and reduces the number of samples needed for optimization. SimPulse reduces trial and error, and allows users to close the loop.

SimPulse is easy to use.
SimPulse is fast.
SimPulse is for R&D and Production.

Q. Why Simulate Photonic Curing?
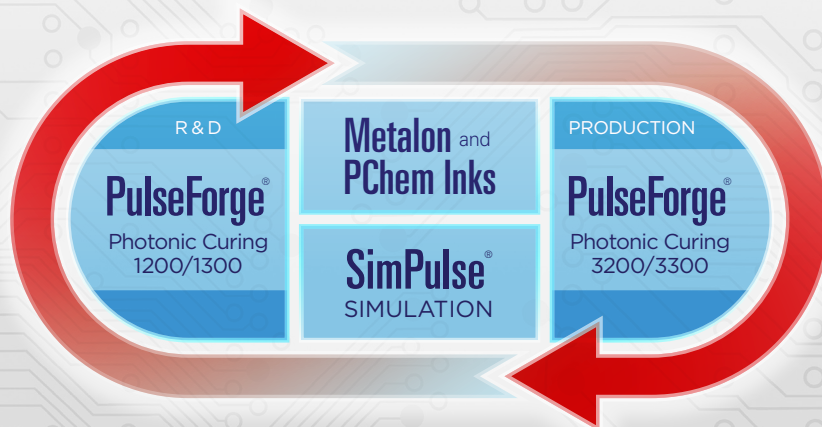**A. To Save Time and Expense.**

- Determine the impact of over 12 process variables on the material stack in minutes, not days.
- Optimize materials thicknesses and architecture prior to extensive design-of-experiments testing.
- Define exposure conditions which maximize lamp lifetime.

② Define exposure conditions
The interface for defining the exposure conditions is the same as the interface for the actual PulseForge tools. In this way, process conditions can be quickly applied back and forth between the tool and the simulation.

③ View results
The output is presented in the form of thermal time curves. The predicted temperature at any point in the depth of the stack can be seen using the slider arrow positioned next to the material stack.

NOVACENTRIX®

Experts in Printed Electronics

R & D

PulseForge®
Photonic Curing
1200/1300

Metalon and **PChem Inks**

SimPulse®
SIMULATION

PRODUCTION

PulseForge®
Photonic Curing
3200/3300

predict | test | monitor | measure | modify

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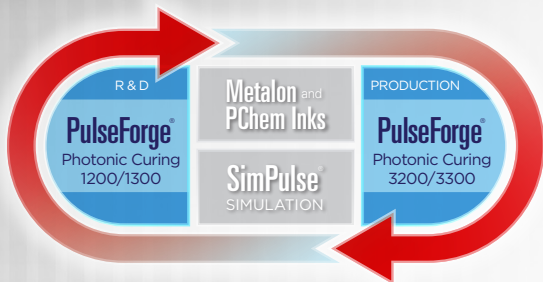
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R&D → PulseForge® Photonic Curing 1200/1300 → Metalon and PChem Inks → SimPulse® SIMULATION → PRODUCTION PulseForge® Photonic Curing 3200/3300

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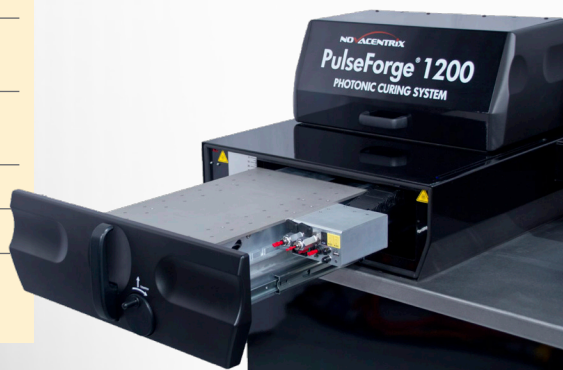
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Adaptable for Evolving Products

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PulseForge® 3200

Standard Safety Features

- Fully CE Mark safety compliant.
- Safety interlocks on access panels and sample drawer: power is stopped if opened.
- Safety interlocks and indicators for cooling water: flow and conductivity.
- Obscured light path, no stray emissions.
- Status indicators on-screen.
- Isolated control volume from lamps and rest of cabinet via seals and barriers.
- Sealed drawer opening for capture and control of sample outgas products.
- HEPA-filtration of used process air.
- Output flow can be plumbed via side port.
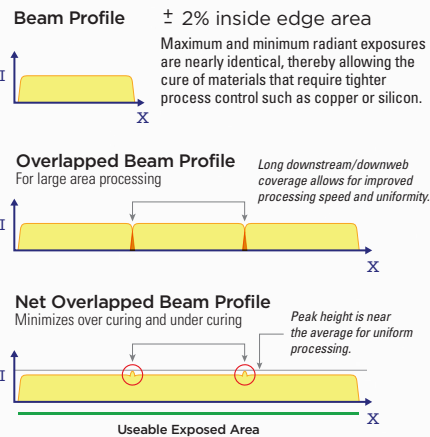- Air and inert gas feeds for process area or process chamber
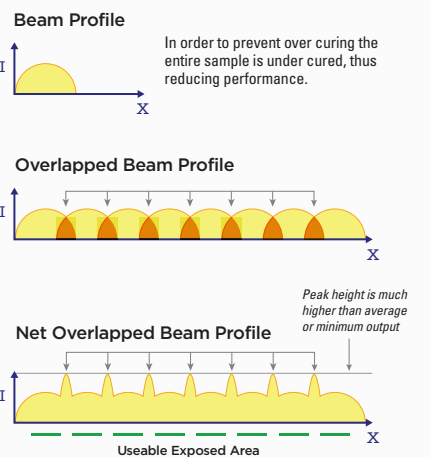

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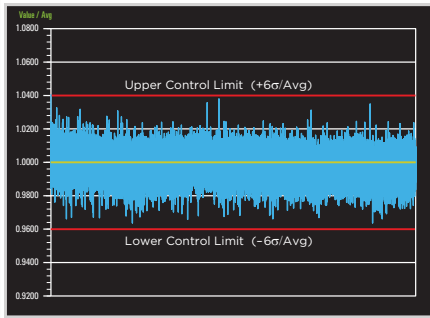
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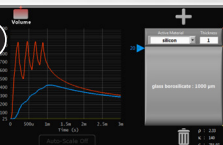**SimPulse is for R&D and Production.**

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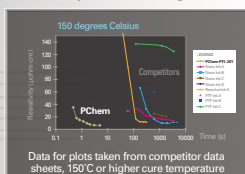
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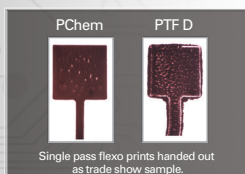**PChem inks are now an exclusive offering of NovaCentrix.**

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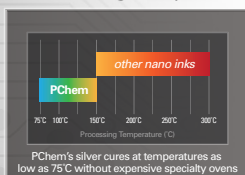- *New lower pricing*

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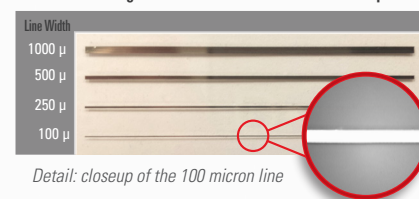
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