

AEROSOL JET® 300 SERIES SYSTEMS

For Development of Printed Electronics and Biologics

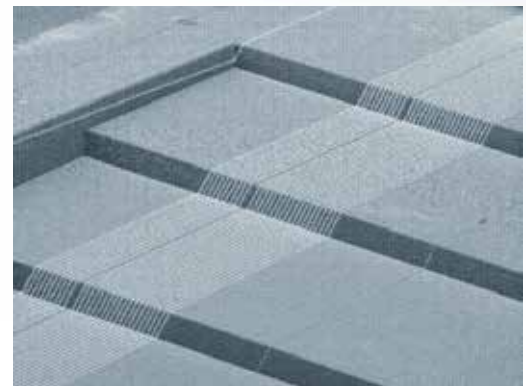
Aerosol Jet® 300 Series systems are ideally suited for developing next generation printed electronics and biologics processes and products.



Aerosol Jet 300 Series System

The Aerosol Jet system supports a wide variety of materials, including conductive nanoparticle inks and screen-printing pastes, polymers, insulators, adhesives, etchants, and even biological matter that can be accurately deposited by the system onto non-planar and 3D substrates.

Aerosol Jet printing is a breakthrough additive technology enabling finer feature sizes than traditional ink-jetting and screen printing processes. Aerosol Jet printing utilizes an innovative aerodynamic focusing technology that produces electronic and physical structures with feature sizes from 10 microns to millimeters.



Silver lines printed over a 3D substrate

KEY FEATURES

- ▶ Feature Sizes as Small as 10 Microns
- ▶ Wide Features Ranging from Millimeters to Centimeters
- ▶ Thin Layer Deposits from 100 Nanometers
- ▶ Many Inks and Substrates
- ▶ Nanomaterial Deposition Capability
- ▶ Planar and Non-Planar Capabilities
- ▶ Low Temperature Processing

RESEARCH AND DEVELOPMENT APPLICATIONS

- ▶ High-Density Traces for Flat Panel Displays, Solar Cells...
- ▶ Fully Printed TFTs for Next Generation Displays, Backplanes, etc.
- ▶ 3D Interconnects for Stacked Die & Other Complex Packaging Applications
- ▶ Embedded Passives on Rigid & Flex Substrates
- ▶ Repair & Re-Work of Production Defects
- ▶ Cost Effective Low Volume Manufacturing
- ▶ Printed Biologics for Many Life Sciences Applications

Aerosol Jet Process



How the Aerosol Jet Process Works:

- 1 A liquid sample is atomized, creating a dense aerosol composed of droplets with diameters between approximately 1 and 5 microns.
- 2 The aerosol is transported to the deposition head using an inert carrier gas. [In-flight aerosol heating is optional].
- 3 The aerosol is focused within the deposition head by an annular sheath gas. The resulting high-velocity jet is deposited onto planar and 3D substrates, creating features ranging from 10 microns to millimeters in size.

Features	Aerosol Jet 300 Series Systems Details
Minimum line width	10 μm , 20 μm pitch (material and surface dependent)
Single Pass Layer Thickness	100 nanometers to >5 μm
Print Speed	200mm/s max (100 mm/s typical) (linear speed)
Mechanical shutter	Response time 2 ms
Ink Viscosity Range Ultrasonic Atomizer Pneumatic Atomizer	1 to 10cP (Temperature stabilized water bath required- see below) 1 to 1000 cP (Heating may be used to reduce ink viscosity to achieve atomization of more viscous inks)
Pneumatic Atomizer heater/stirrer	Controls ink temperature, 25-60°C, Stirrer revolutions per minute, viscosity dependent
Platen (Standard)	300 mm x 300 mm; temp control up to 120°C
Platen (Optional)	370 mm x 470mm; temp control up to 120C
Laser (Optional)	700mW 830nm IR Multimode Laser System including Class I Laser Safe Hood
Droplet size	1-5 μm \emptyset
Nozzle Stand-off height	Up to 5mm (nozzle tip to substrate surface)
Position accuracy	+/- 5 μm
Position repeatability	+/- 2 μm
CE Certifications	Fully compliant
Stand alone system dimensions	1020mm x 1375mm x 2240 mm (Does not include dimensions for ErgoArm and monitor)
Stand alone system weight	ff795 kg
Electrical	110/220V, 50 or 60Hz, 30 Amps (10 Amp at continuous operation, typical)
Utilities Gas Coolant	28 LPM Nitrogen Gas Input Requirements for Ultrasonic Atomizer: Temp Range: 5 °C – 50 °C; Heating/Cooling Capacity: 240 W at set point; Pump Flow: 15 LPM.; ¼ inch tube connection In-House H2O supply is not recommended

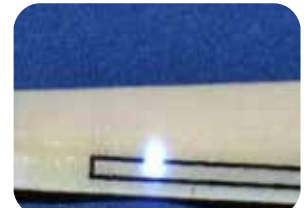
Aerosol Jet Printing Examples



Printed Silver Conductors
Powering LEDs



Printed Biologics Micro-Arrays
(20 micron spots)



Printed Ag on Non-planar
Surface Powering LED

ABOUT OPTOMECC

Optomec® is a privately-held, rapidly growing supplier of Additive Manufacturing systems. Optomec's patented Aerosol Jet Systems for printed electronics and LENS 3D Printers for metal components are used by industry to reduce product cost and improve performance. Together, these unique printing solutions work with the broadest spectrum of functional materials, ranging from electronic inks to structural metals and even biological matter. Optomec has more than 300 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about Optomec, visit <http://www.optomec.com>.