

AEROSOL JET[®] 5X SYSTEM

For 3D Printed Electronics Applications

The Aerosol Jet 5X System has been developed specifically for 3D printed electronics applications such as fully printed antennas, sensors, and MID's.



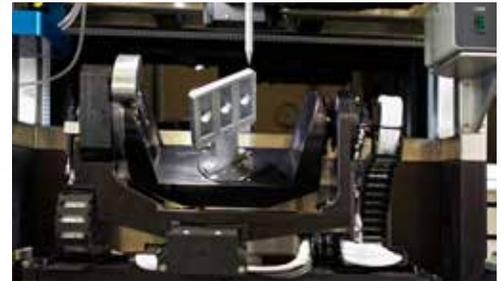
Aerosol Jet 5X System

Driven by manufacturing requirements for flexibility and reduced product cost, the system enables multi-axis deposition capabilities facilitating R&D, rapid prototyping and low volume production needs.

Aerosol Jet 5X is a modular solution. It comes standard with pneumatic and ultrasonic atomization technology which is geared specifically for printed material evaluation, prototyping, and product development. Optionally, a closely-coupled print module, Optomec's production grade printing technology, can be added to the system which enables low volume production runs. Automation platforms configured with multiple closely-coupled print modules are also available for high volume production needs.

Aerosol Jet supports a wide variety of functional materials, including conductive inks, dielectrics, polymers, adhesives, etc., which can be deposited onto planar and non-planar substrates.

The System includes interchangeable fine and wide feature print heads capable of printing features from 10 microns to millimeters. The system has 5-axes of motion with a print envelope of 200mm x 300mm x 200mm [x, y, z].



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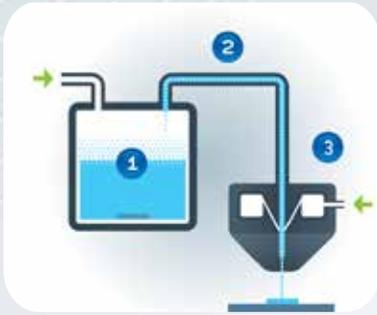
KEY FEATURES

- ▶ Features sizes ranging from 10 microns to millimeters
- ▶ Dispensing support for wide variety of inks / materials
- ▶ Repeatable recipe driven dispense
- ▶ 3D Capabilities
- ▶ CAD import eases toolpath generation
- ▶ R&D to low-volume flexibility

APPLICATIONS

- ▶ 3D Antenna for Smartphones and Notepads
- ▶ Complex Molded Interconnect Devices (MIDs)
- ▶ Embedded Sensors
- ▶ Cost Effective Low Volume Manufacturing

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 5x System Specifications

Minimum line width	10 um at 20 um pitch (material and surface dependent)
Single Pass Layer Thickness	100 nanometers to 2+ um
Ink Viscosity Range	1 to 10cP
Ultrasonic Atomizer	1 to 1000 cP
Pneumatic Atomizer	1 to 1000 cP
Optional Product: Print Module	50-200cP
Droplet size	1-5 um \emptyset
Nozzle Stand-off height	Up to 5mm (nozzle tip to substrate surface)
Work Area	200mm x 300mm x 200mm (x, y, z)
Position Accuracy	$\pm 10\mu\text{m}$ (100mm range)
Position Repeatability	+ 2microns per X, Y, Z Axes
Rotational and Pivot Axes:	
Rotational position accuracy	80 arc sec
Rotational repeatability	03 arc sec
Pivot axis position accuracy	80 arc sec
Pivot axis repeatability	03 arc sec
System dimensions	1020mm x 1375mm x 2240 mm (Does not include dimensions for ErgoArm and monitor)
Stand alone system weight	~835 kg
Electrical	110/220V, 50 or 60Hz, 40 Amps (10 Amp at continuous operation, typical)
Utilities	28 LPM Nitrogen Gas

Aerosol Jet Printing Examples



Smart Phone Main Antenna



Phased Array Antenna



Strain gauge on Aluminum Structure

Courtesy: Fraunhofer IFAM

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>.