



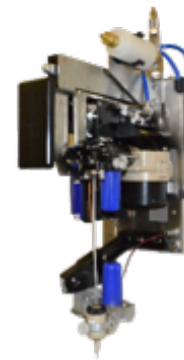
AEROSOL JET[®] PRINT ENGINE

From Low to High Volume Printed Electronics Manufacturing

The Aerosol Jet Print Engine is an evolutionary Aerosol Jet based printed electronics solution used for low to high-volume manufacturing. The Print Engine enables next generation product process development to factory floor production of 3D advanced packaging, sensors and circuits used in consumer mobile devices, automotive and medical electronics. The Print Engine, with advanced process controls and closely coupled print cassettes, is Optomec's most versatile and scalable Aerosol Jet platform to date. The Print Engine's physical footprint and payload is half the size of previous generations with improved ergonomics and ease of assembly. It provides improved process stability and material run-time by incorporating Aerosol Jet pneumatic and ultrasonic atomizers into a single platform with integrated process controls. The Print Engine's scalable architecture can support two printheads and is capable of supporting four or more simultaneous printheads by networking multiple Print Engines to meet high volume production requirements. This scalable Aerosol Jet architecture facilitates integration with both OEM and custom automation platforms.



Aerosol Jet Print Engine



Decathlon Print Cassette

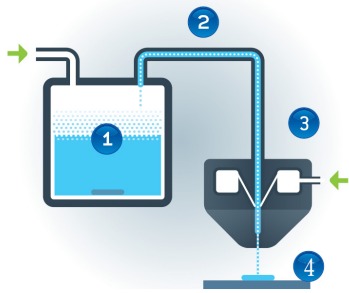
KEY FEATURES

- ▶ Scalable Process Architecture
- ▶ Rapid Change Print Module
- ▶ Production Proven Process Recipes
- ▶ Compact Design
- ▶ R&D to Production

APPLICATIONS

- ▶ R&D Planar and non-planar process development
- ▶ 2D to 3D Advance Packaging
- ▶ 3D Mobile Device Printed Antenna and Automotive MIDs
- ▶ 2D and 3D Medical Devices
- ▶ IoT enabling printed Sensors; Thermal, Creep, Strain, etc.

Aerosol Jet Process



How the Aerosol Jet Process Works:

- 1 An ink, such as a conductor or dielectric, is atomized within the Print Module creating a dense aerosol with a tight distribution of droplet sizing.
- 2 The aerosol is transported to the Print Head using high purity nitrogen as a carrier gas.
- 3 The aerosol is focused within the Print Head by an annular sheath of nitrogen focusing and accelerating the material onto the substrate as it travels through the nozzle.
- 4 The Print Head's in-line shutter facilitates fast feature termination. Interchangeable Print Heads with various nozzle geometries allow for feature size flexibility ranging from 10 microns to millimeters.

Aerosol Jet Print Engine System Specifications

	SPECIFICATIONS	AEROSOL JET PRINT ENGINE
PRINT CAPABILITIES	Minimum Line Width	10µm at 20µm pitch (Materials and Surface Dependent)
	Layer Thickness	100nm > 6µm (single print pass)
	Ink Viscosity	
	Ultrasonic Atomizer	1 to 15cP
	Pneumatic Atomizer	1 to 500cP
	Material Droplet Size	1 to 5µm Ø
	Nozzle Stand-off Height	Up to 5mm (nozzle tip to substrate surface)
PROCESS CONTROL	Process Controller	KEWA Interface Module + Flow Control Module
	Printheads	2 per process controller
	Integration Communications	Ethernet 802.3; 10/100MB
	Multiplexed Process Control	Yes, via ethernet. 4 or more printheads in a single configuration
	System Approx. Weight (kg)	150
	System Dimensions (mm)	19"rack mount units
	Electrical Requirements	110 or 220V, Single Phase, 50/60Hz, 10 Amps
	Gas Input to System	345 to 425 kPa (50-60 psi), >99.9% nitrogen gas, at 20 slpm

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>.