Aerosol Jet HD2
Resolution | Flexibility | Precision

The Aerosol Jet HD2 is a high-speed, precision automation platform. It is capable of printing traces as narrow as 10 microns with no contact force applied to individual die over a single large work area.

Resolution
- Down to 10 µm trace width, 20 µm spacing
- 0.1 µm motion resolution

Automation
- Programmable Sequencer Software
- Optional SMEMA In-line Conveyor

Process Advantages
- Zero bonding force applied
- Deep reach with up to 5 mm stand-off
- Material flexibility: conductors, dielectrics, resistors & more

Flexibility
- Heated vacuum chuck standard
- Optional 4th axis
- Optional Laser & UV Cure

Compliance
- SEMI S2/S8
- CE, CSA

Advanced Packaging Applications
- Microwave & RF Interconnects
- ASIC/logic interconnects
- Heterogenous integration
- RDL on die
- Wafer masking & dispensing

Application Examples

Stacked Die DRAM
Printed 3D Interconnects replace stitch bonds, lowering loop height & increasing use of active silicon area

Package Level Shielding
Printing of conductive inks & pastes directly onto packaged die for shielding

Wafer Level Packaging
Printed 3D Interconnects & RDLs directly on die enabling next generation packaging

Print on Un-packaged Die
High stand-off printing (up to 5 mm) for depositing/printing on non-planar parts

Preliminary specification, subject to change
The Aerosol Jet Process:

1. Atomization:
   Nano-particle based liquid inks are atomized into an aerosol.

2. Droplet Sorting, Densification:
   The aerosol is sorted, eliminating droplets too small or too large in order to maximize the output.

3. Aerodynamic Focusing:
   A nitrogen sheath is used to protect the nozzle while focusing & accelerating the Aerosol into a beam ranging from 10 µm to 1 mm. (Nozzle dependent)

4. High Stand-off Printing:
   The Aerosol beam exits the nozzle at up to 100 m/s and impacts the substrate with near zero force. Enabling conformal circuits to be printed at up to 5 mm stand-off.

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PERFORMANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>THROUGHPUT</th>
<th>ACCURACY / REPEATABILITY</th>
<th>PRINTED LINE DIMENSIONS</th>
<th>WORK AREA</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 point-to-point wires per second</td>
<td>+/- 5 µm over 25 mm</td>
<td>Variable range 10 to 860 µm</td>
<td>300 x 300 mm (XY)</td>
<td>Conductors: Ag, Cu, Au</td>
</tr>
<tr>
<td>Up to 48 wires per second on stacked die</td>
<td>+/- 2 µm over 25 mm</td>
<td>Pitch down to 20 µm</td>
<td>100 mm (Z)</td>
<td>Dielectrics: polyimide, UV curable acrylates</td>
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<tr>
<td></td>
<td></td>
<td>Thickness: &lt;1 to 10+ µm</td>
<td></td>
<td>Photo and etch resist</td>
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<table>
<thead>
<tr>
<th>MOTION SYSTEM</th>
<th>PROCESS CONTROL</th>
<th>SOFTWARE</th>
<th>VISION</th>
<th>ATOMIZERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>XY: Linear motor</td>
<td>Digital recipe control</td>
<td>CAD/CAM offline programming</td>
<td>Cognex Vision Tools: Blob, Edge, PatMAX</td>
<td></td>
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<tr>
<td>Z: Recirculating ball screw</td>
<td>Automated alarms for</td>
<td>Easy to program, automate process, motion &amp; Vision</td>
<td>12 MP USB 3.0</td>
<td>Ultrasonic (1-15 Cps)</td>
</tr>
<tr>
<td>Digital incremental encoders</td>
<td>Process monitoring</td>
<td></td>
<td>RGB LED Lighting</td>
<td>OR</td>
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<tr>
<td>0.1µm resolution</td>
<td></td>
<td></td>
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<td>Pneumatic (1-1000 Cps)</td>
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HARDWARE & FACILITY REQUIREMENTS

<table>
<thead>
<tr>
<th>POWER</th>
<th>200-250 VAC single phase 50/60 HZ</th>
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<tbody>
<tr>
<td>NITROGEN</td>
<td>50 PSI @ 28 SLPM (MAX)</td>
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<tr>
<td>DIMENSIONS</td>
<td>46 x 60 x 86 in. (1168 x 1525 x 2185 mm)</td>
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<tr>
<td>WEIGHT</td>
<td>1250 LBS. (567 KG)</td>
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<tr>
<td>FLOORING</td>
<td>4” (102 mm) continuous pad thickness</td>
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