中国系统级封装大会
SiP Conferences China 2017
2017年10月19-20日 深圳蛇口希尔顿南海酒店
扫一扫，关注大会动态
诺信 SIP封装的创新解决方案

Nordson’s Innovative Solutions for SIP
Advance Packaging

Dispensing – Conformal Coating – X-Ray – Bond Tester - Plasma Treatment - AOI

Desmond Hor Nordson Advance Technology
何建锡, 诺信高科技事业部 desmond.hor@nordson.com
Nordson at a Glance
A premier industrial technology company focused on precision dispensing, fluid control and related processes

- Founded in 1954
- FY16 sales = $1.8 billion USD
- 6,100 employees
- Direct presence in 35+ countries
- Best-in-class technology

“My hope for Nordson is that we continue to be a venturesome company, operating somewhere out on the leading edge... we must encourage innovators and entrepreneurs.”
Eric Nord

“To be truly fit, we must exercise our ‘giving’ muscles.”
Evan Nord

Nordson Values: Customer Passion | Energy | Excellence | Integrity | Respect for People
Nordson at a Glance - End Markets Served

Adhesive Dispensing Systems: consumer non-durable market focus

Advanced Technology Systems: electronics, medical and industrial market focus

Industrial Coating Systems: durable goods and industrial market focus
Nordson Advanced Technology Systems

- Nordson MARCH Plasma Cleaning & Coating
- Nordson ASYMTEK Dispensing, Conformal Coating
- Nordson Dage Bondtester
- Nordson Dage High Resolution X-Ray
- Nordson MatriX Inline X-Ray
- Nordson Yestech Semi/SMT/Conformal Coating AOI
- Nordson Select Selective Soldering
Global Solutions & Support
Application Development and Service Centers:

• Carlsbad, CA, USA
• Amherst, OH, USA
• Concord, CA, USA
• Aylesbury, UK
• Durne, Netherlands
• Dongguan, China
• Maastricht, the Netherlands
• Munich, Germany
• Penang, Malaysia
• Seoul, Korea
• Shanghai, China
• Suzhou, China
• Singapore
• Taipei, Taiwan
• Tokyo, Japan
• Torrington, CT, USA

Global Data Base
Heterogeneous Integration: Market Growth

System Integration

High Density

Small Size

Low Cost

Package / CAAGR

- SiP (17%)

- WLP - FOWLP (Bumping) (39%)

- WLP - WLCSP

- QFN (7%)

Source: ASE
SIP Markets

- Internet of Things to Internet of Everything
- Smart Devices Everywhere
- Data to the Cloud, Data Centers & Networking
- Autonomous Driving & Automotive Electronics
Advanced Technology - Electronic Systems (AT-ES)

诺信高科技的一体化解决方案

**PROCESS SYSTEMS**
Build in Quality

- Nordson ASYMTEK
- Nordson MARCH
- Nordson DIMA

Dispensing
• CSP/FC Chip Underfill

Plasma
• Descum
• PI/PBODielectric Etching
• Metal oxide removal
• Mold flash etching

Hot Bar Solder

Bond Test
• Bump / Pillar Shear & Pull

AOI

**TEST & INSPECTION**
Verify Quality

- Nordson DAGE
- Nordson YESTECH
- Nordson DAGE
- Nordson MATRIX

X-Ray
• Bump / Pillar / TSV Inspection

X-Ray

Key Market Segments
- PCB manufacturing
- PCB Assembly
- LED Manufacturing
- Semiconductor Packaging
- Wafer Level Packaging

- Hot Bar Solder
- VFlex Test & Inspection

- TEST & INSPECTION
- Process Systems Build in Quality

- FO-WLP PoP
- DRAM Logic

- PROCESS SYSTEMS
  - Dispensing
  - Plasma
  - Hot Bar Solder
  - Bond Test
  - AOI

- TEST & INSPECTION
  - X-Ray MXI
  - X-Ray AXI

- Key Market Segments
  - PCB manufacturing
  - PCB Assembly
  - LED Manufacturing
  - Semiconductor Packaging
  - Wafer Level Packaging
Without Plasma Treatment:
- Non-uniform underfill fluid flow
- Uneven fillet height and distribution

With Plasma Treatment

Fillet Width Verification
The Spectrum II Series sets the standard for a wide variety of dispensing applications in SIP

- Flip Chip & CSP Underfill
- Spray Flux
- EMI Spray Shielding
- PCBA Conformal Coating
- Surface Mount Adhesive
- FPD Cell Assembly
- Silver Epoxy - Die Attach
- Solder Paste Dispensing
- High Brightness LEDs
- Wafer-Level Packaging
- Life Science - Reagent Dispense
- Hard Disk Drive Assembly

3D Semi Package Capillary underfill

| July 2016 | Confidential | 10 |
The Challenges for Dispensing WLP

- High density => narrow dispense gaps
- High wafer per hour (WPH)
- High yield
- Wafer handling
  - Bare wafers vs Framed wafers
  - Wafer warpage/flatness
- Dispense pattern mapping
March Plasma - Semiconductor Segment

- Plasma Processes
  - Surface Activation
  - Contamination Removal
  - Etch
  - Crosslinking
- Semiconductor Packaging
  - Wirebond
  - Mold
  - Flip Chip Underfill
- Wafer Level Packaging
  - Dielectric Etch
  - Photoresist Descum
  - Wafer Bumping
- Product
  - Leadframe
  - SIP
  - CIS
  - Substrate
  - PCB
  - Etc.
Contamination Removal: Wire Bonding; Molding; Underfill; Coating

- Plasma Processing Removes Trace Contamination and Oxidation From Substrates
  - Metal
  - Ceramic
  - Plastic
- Wire Bond Strength Significantly Increased
- Throughput Increased: Lower Pressure Required
AP Series

Trak Series
Via Series – for PCB Manufacturing

MaxVIA

RollVIA

FlexVIA
NordsonMARCH MesoSPHERE

等离子除胶

De-Scum

Oxide Removal

Round or square wafer/substrate up to 480mm

Photo Resist Ashing Process
Spray Coating for EMI Shielding

Nordson Asymtek

Before

Ag type

Cu type

Thickness

Top(um)

10

Surface Resistivity (mΩ)

50

Before After

Ag-Coated

Cu type

Thickness & Surface resistance

Top(um) 10

Side(um) 7

Surface Resistivity (mΩ) 50 60

Cross section

Nordson

Asymtek

100 μm
Result 1 – Visual Quality

5 mm fixed pitch results:
- Continuous coverage over top, sidewall, and corners of components
- No pinhole failures observed
- Good adhesion to both FR4 and Mold compound materials

Variable pitch results:
- Good coverage on samples with \( \geq 2 \) mm pitch
- Low surface roughness from coating
Conclusion

Target goals:
1. $\leq 15 \, \mu m$ top coating thickness
2. $\geq 7 \, \mu m$ side wall coating thickness
3. Minimize pitch between devices

- Tilt spray with Tatsuta AE5000A material has met all targets
- $\geq 2 \, mm$ spacing between components is required for achieving $> 50\%$ sidewall coverage
- Good coverage for top surface, sidewalls, and corners of devices was observed
- Initial electrical performance indicates good EMI shielding performance
## Industry Leading Nordson for Semiconductor Test & Inspection

### Front End Process Nordson Tools

<table>
<thead>
<tr>
<th>Automated X-Ray Wafer Metrology XM-8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-throughput In-line X-Ray wafer measurement of voiding and fill levels, overlay, critical dimensions X-ray metrology and defect review system for both optically hidden and visible features of TSVs, 2.5D and 3D IC packages, MEMS and wafer bumps.</td>
</tr>
</tbody>
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<tr>
<th>Wafer Testing 4800</th>
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<td>Provides the ultimate flexibility for wafer map creation allowing for quick and precise set-up of test patterns; with virtual images for each test pattern</td>
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<th>4000W Wafer Handling System</th>
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<td>This wafer handling system provides automatic loading from the cassette, bump testing (shear or pull), and then unloading of the six or eight inch wafers.</td>
</tr>
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</table>

### Back End Process Nordson Tools

<table>
<thead>
<tr>
<th>Bond Testing Platforms 4000 Series</th>
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<td>Camera assist automation system ideally suited for applications such as pull and shear testing of wafer interconnections, lead frames, hybrid microcircuits or automotive electronic packages.</td>
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<th>Automated Optical Inspection M1M</th>
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<td>high-speed microelectronic device inspection with exceptional defect coverage. With 5 micron pixel resolution and telecentric optics, the M1m provides complete inspection, all within a footprint less than 1 sq. meter.</td>
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<tr>
<th>Off-Line Advanced Failure Analysis X-Ray Inspection Quadra Series</th>
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<tr>
<td>Ultra-high resolution, off-line X-ray system offering the highest feature recognition at full power. Oblique Viewing, 3D Inspection Planes and micro CT capable all in one package.</td>
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<tr>
<th>In-Line or Cell Based Automated X-Ray Wire Bond Inspection X2.5#</th>
</tr>
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<tr>
<td>Automatic X-ray inspection solutions for semiconductor application on substrate-level (component backend) capable to allow a 100% all wires on substrate inspection based on CAD input and chip model library</td>
</tr>
</tbody>
</table>

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Automated Inspection For:
- Bond Wire and Small SMT Part Defects
- Die Inspection
- Lead Defects
- Bump Inspection
- Bond Wires
- Paste
- Underfill run out inspection
- Dispensed Materials
- Contamination

sub-micron resolution
Yestech M1m Application

- Die Bonding Inspection
- Wire Bonding Inspection
NordsonMATRIX 全自动X-RAY在线检测

- Wire-Bond Test for Semi-Backend Applications
  - In line or off-line w/ magazine loader/unloader
  - CAD input or “Teach & Go”
  - Inspect for:
    - Missing Wire
    - Disturbed Wire
    - Broken Wire
    - Missing Bond Balls
    - Missing Wedge Bond
  - Up to 100 wires per second!
  - Bar Code scan
  - Defect Marking / Part Sorting
  - SecsGem – Full Traceability

Any Vertical Angle, Any Lateral Rotation with NO Limitation.

To Deliver Best Possible 2.5D Inspection.

High-Res Angle-shot with automatic sweep analysis
Matrix Application in Micro Electronics

- Wire Bonding Inspection
- IGBT Void Inspection
NordsonDAGE X-RAY

Better Clarity
Up to 6.7 MP images provides incredible brightness, contrast, spatial resolution, depth of field and grey scale for clearer images and easier analysis.

Inspect Quicker
Live enhanced inspection technology up to 30 fps means real-time image processing giving the best images quickly to maximize throughput.

Stay Sharp
The QuadraNT X-ray tube provides unbeatable images with high resolution at high magnification. With up to 10 W target power at 0.1 μm feature recognition or up to 20 W target power at 0.3 μm feature recognition the QuadraNT delivers sharp clear images.

Easy to use
The ergonomically designed cabinet is tailored to optimize how a user interacts with the system. The intuitive Gensys inspection software enables operators to be up and running in seconds.

Nordson
Traditional Bond testing (Plus More…)

4000
- Traditional Product
- Industry standard

4000 Optima
- New Production work horse
- Paragon Software
- MFC Cartridge
- Supports most 4000 & 4000+ cartridges

4000Plus
- High End Product
- High Force
- Camera Automation
- Materials Testing
- Complete Range of Cameras

Confidential
NordsonDAGE BT 4800
全自动晶圆推拉力检测机

Virtually Operator Free Testing
Successfully Test Warped and Thin Wafers
Flexible Wafer Map Creation
Unparalleled Versatility
Thank You

Questions or Comments?