Advanced Dispense Technology Introduction

Gu Eric
Application Manager China
2018.03

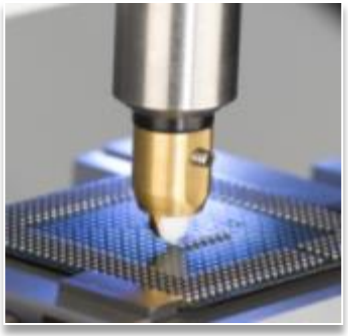
Nordson ASYMTEK

Nordson ASYMTEK is a part of Nordson Corporation

- Founded: 1954
- Direct Operations: 35 countries
- Employees: 6000
- Customers: 25,000+
- Headquartered in Cleveland, OH
- NASDAQ Symbol: NDSN
- CEO: Michael F. Hilton









Advanced Technology Systems

- Precision dispensing, fluid management, test, inspection and surface treatment products for electronics, medical and general industrial markets

Growth Drivers

- Mobile computing – smart phones, tablets
- Device convergence / migration to flip chips
- Circuit shrinkage / new architectures
- New consumers in emerging markets
- Medical needs driven by aging population
- Alternative energy high volume manufacturing
- General product assembly

End Markets

- Semiconductor packaging, testing, inspection, surface prep
- Printed circuit board assembly
- General electronic assembly
- Medical devices and procedures
- General industrial assembly
- Solar
- LEDs
- MEMS


Automated Dispensing


Semi Automated Dispensing



Test & Inspection


Medical Fluid Management


Consumable Tips, Cartridges & Connectors

Advanced Technology Systems

No other supplier offers Nordson's suite of dispensing, test & inspection and surface treatment technologies

Treatment → **Dispense** → **Cure** → **Inspect/ Test**



Nordson MARCH



Nordson ASYMTEK, Nordson EFD



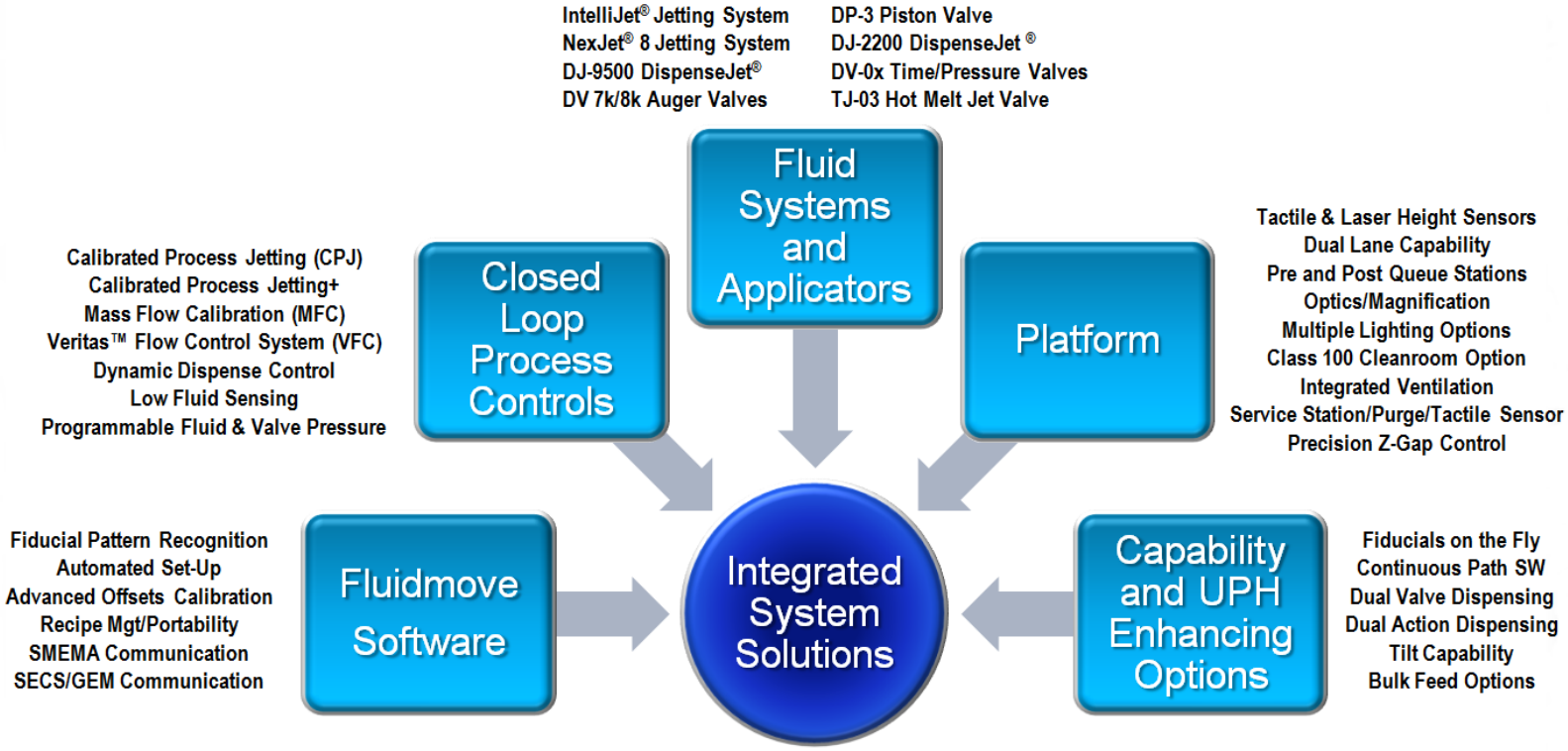
Curing Solutions



Nordson YESTECH, Nordson DAGE Matrix

Nordson ASYMTEK Mission Statement

Nordson ASYMTEK's mission is to be the leading worldwide supplier of solutions for the application of materials for assembly of semiconductor and electronic products. We strive to deliver leading performance to benefit our customers, employees, shareholders, and communities.



Global Solutions & Support

Application Development and Service Centers located in:

- Carlsbad, CA, USA
- Amherst, OH, USA
- Dongguan, China
- Maastricht and Duerne, the Netherlands
- Penang, Malaysia
- Seoul, Korea
- Shanghai, China
- Singapore
- Taipei, Taiwan
- Tokyo, Japan
- Torrington, CT, USA



Amherst Lab



Dongguan Lab



Maastricht Lab





Singapore Lab



Tokyo Lab



Shanghai Lab

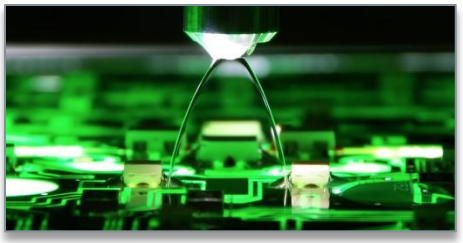


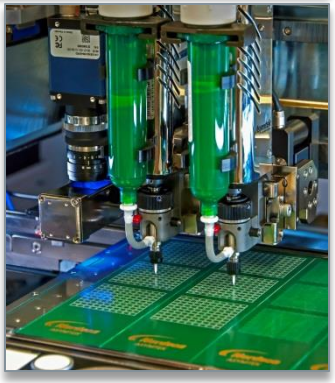
Seoul Lab

Nordson ASYMTEK

Solutions Focused

- PCB Assembly
- Semiconductor Packaging
- LED Assembly
- Electromechanical, including MEMS
- Flat Panel Display Assembly
- Life Science
- Alternative Energy







Nordson ASYMTEK

Worldwide Recognition for Products & Service

- Customer Service
  - 2016 Service Excellence Award from *Circuits Assembly* magazine, 11 times in 12 years
- Platforms
  - S-820, X-1022, S-920, S-930, Spectrum II, Quantum: Global Technology and NPI awards, *SMT China* Vision Award
- Applicators
  - NexJet® System with Genius™ Jet Cartridge: Global Technology and New Product Innovation awards
  - SC-280 Film Coater: *EM Asia* and *SMT* China Vision awards
  - Dispense Jet® DJ-100 New Product Innovation Award
  - Dispense Jet® DJ-9500 *SMT* Vision Award
  - Dispense Jet® DJ-9000 Product for the Future
- Technologies
  - CPJ+, *SMT China* Vision Award
  - Fids-on-the-Fly, *EM Asia* Innovation Award
- Organization
  - Corporate Recognition by IMAPS in 2010
  - Certified ISO 9001:2008

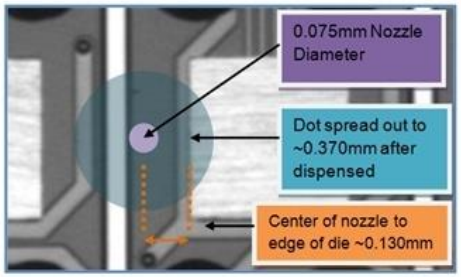


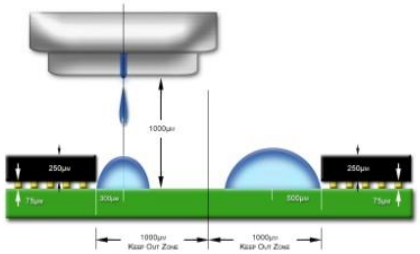


ISO International Organization for Standardization

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Requirements for Decreasing Volumes, Stream Widths, and Line Widths

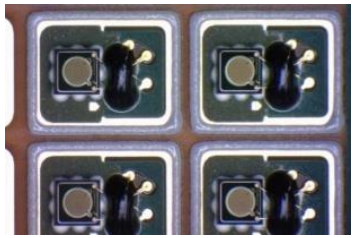




2015

2019

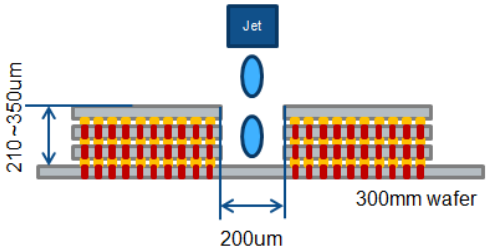
UF dots 3 nl volume
UF In-air width 100 um stream
Solder paste line 150um line widths

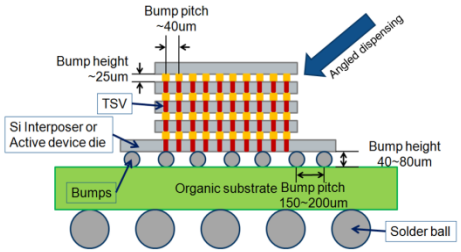


1 nl volume
80 um stream
100um line width

<1 volume
<50um stream
<100um line width

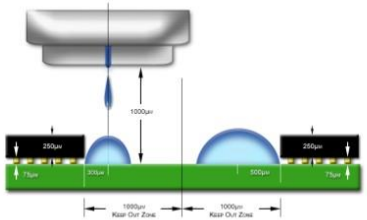
2017

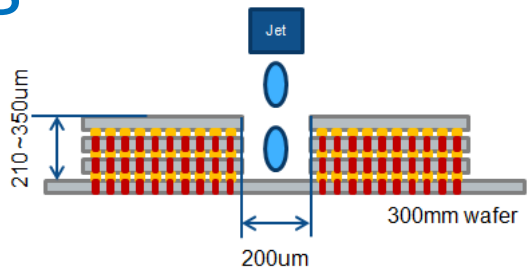




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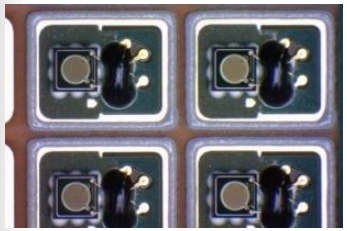
Requirements for Increased Placement Accuracy , Both Dots and Lines





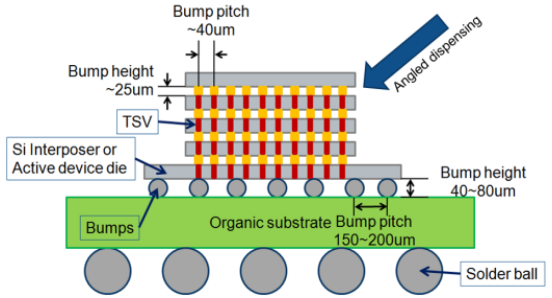
2015

±35um 3σ dots
±40um 3σ line offset



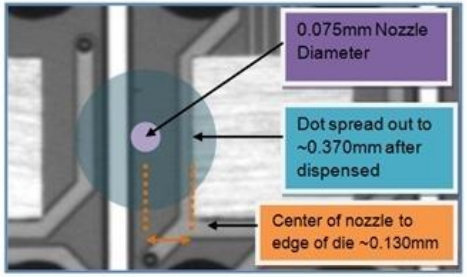
2019

±15um 3σ dots
±15um 3σ line offset



±25um 3σ dots
±25um 3σ line offset

2017



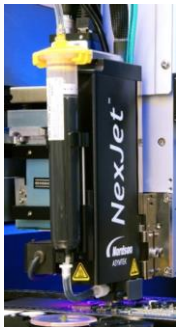
Nordson ASYMTEK

ASYMTEK System Technologies
Integrated Solution Philosophy

Fluid Delivery
(Dispense volume, size, width)

+

Platform
(Placement accuracy, Speed)



NexJet 8 Jetting System



Auger



IntelliJet Jetting System

Fluid Systems
Applicators, T-put

Process Control
CPJ, MFC

Algorithms
Calibrations

Platform, S/W
Motion, Robotics, T-put

Part Sensing
Vision, height

Part handling
Conveyance, Heating



Quantum®

Spectrum™ II Premier

Nordson ASYMTEK

Development of Solutions for Small KOZ, Small Gap Applications

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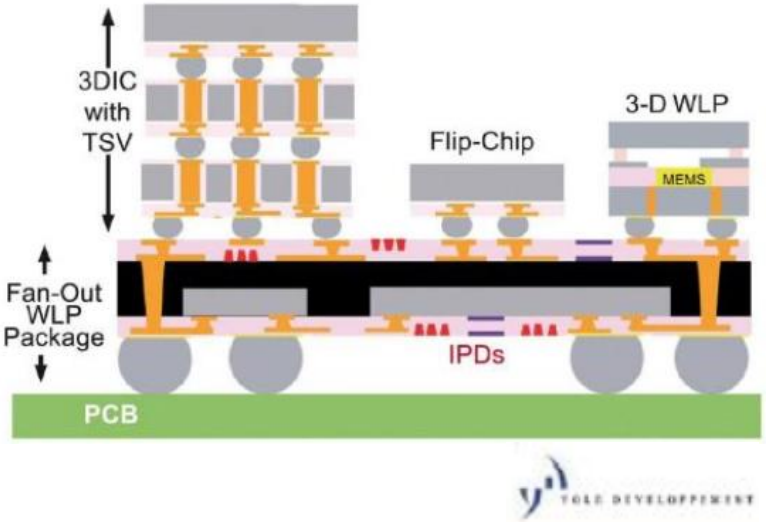
ASYMTEK Jetting System Solutions
In Production for Advanced Semi Packaging



Spectrum™ II
Dispensing Platform



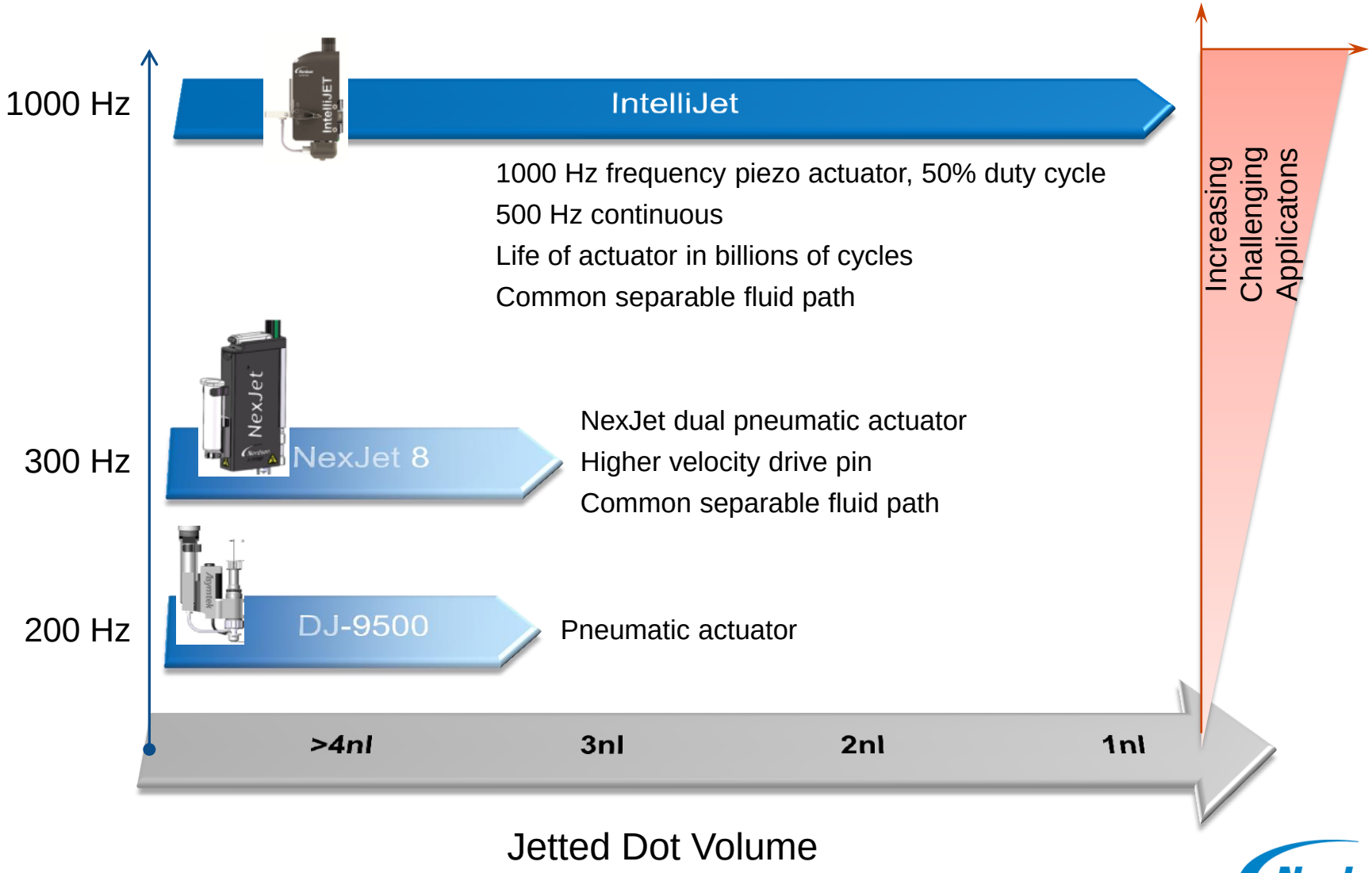
IntelliJet Jetting System
w/ ReadiSet™ Cartridge



- Smaller dot → tighter KOZ, jet into smaller gap
- High frequency → sustained output
- Modular cartridge → higher productivity

Nordson ASYMTEK

Jetting Technology Development

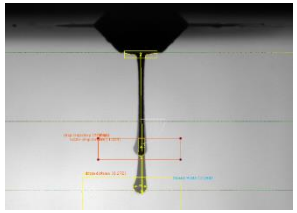


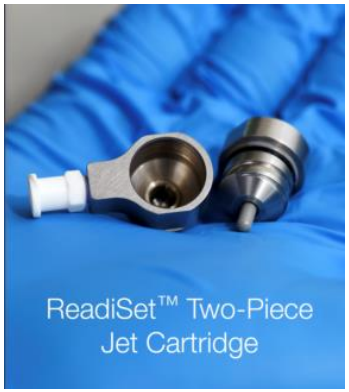
IntelliJet® Jetting System

Features

- **1000Hz peak frequency @ 50% duty cycle**
  - *Up to 1.8 million dots/hour*
  - *Increases throughput with very small dot volumes*
- **Self calibrating for stroke length**
  - *Reduces variation in stroke and velocity across parts sets and wear*
- **Automated system setup**
  - *Removes operator variation at startup*
- **Software programmable velocity profiles**
  - *Optimize fluid break off from nozzle to reduce satellites or splashing*
  - *Optimizes fluid velocity for jetted fluid stream width*
- **BIST**
  - Piezo stack temperature and closed loop cooling
  - Piezo stack electrical characteristic monitoring
  - Encoder based feedback for shot actuator verification
- **ReadiSet™ fluid cartridge system**
  - Simple to clean and replace worn parts



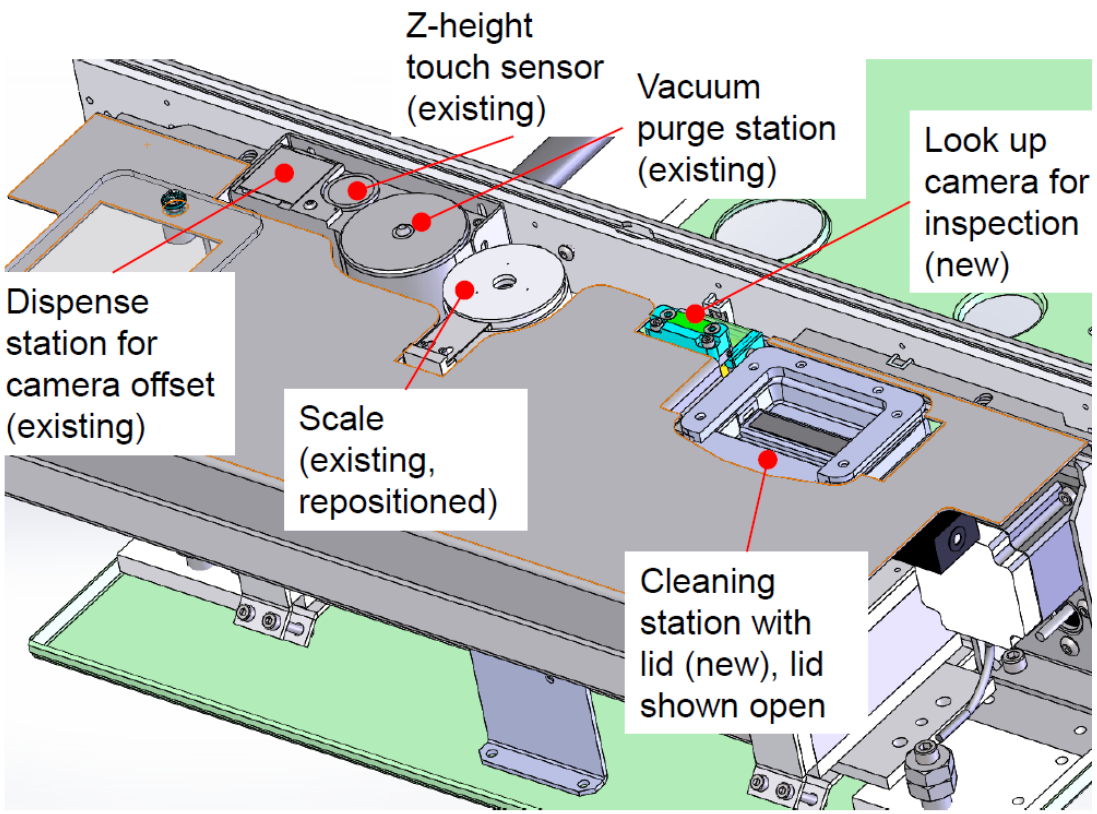




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Cleaning and Nozzle Inspection Station in Prototype Phase

*Autonomous nozzle cleaning and inspection with no user interaction during production. Result: Higher productivity and lower operator loading.



- Inspect nozzle at look-up camera (optional step)
  - Software determines if nozzle needs cleaning
  - Returns to normal operation if OK
- Open lid, wipe nozzle at cleaning station, close lid.
- Go to purge station to dry nozzle
- Inspect nozzle at look up camera
  - Return to normal operation if OK
  - Can automatically return for cleaning if needs further cleaning
  - Set alarm if multiple clean sequences fail – user configurable
- Standard single pass clean and inspect process <10 seconds.

10/11/2016 – Nordson ASYMTEK confidential – do not distribute without permission

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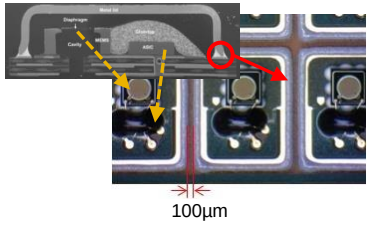
Vantage Platform & Software

Vantage Dispensing System

- A high speed/accuracy platform with dual IJ capable, new software, and process controls such as post-dispense inspection and flow monitoring
  - Unique subsystems on enabling motion and accuracy enablers
  - Common subsystems w/ Spectrum/Quantum on modules not enabling UPH or capability for target segments

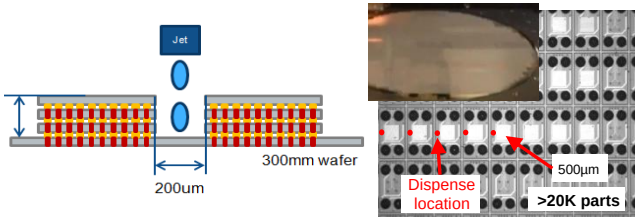
MEMS mic. cap sealing

Narrower (≤150µm) line & corner



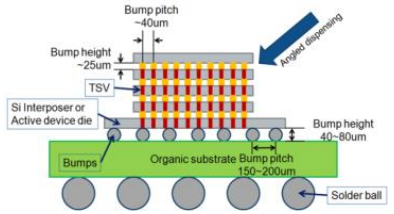
ASPA Underfill

400-200µm dispense gap; densely packaged



Complex 3D

More Axes, small KOZ



Best-in-class capability targeted at the most demanding ASPA and EMA applications

Nordson ASYMTEK

Platform Wet Dispense Accuracy Roadmap

+-15um

+-20um

+-25um

+-30um

+-35um

+-50um

+-75um

Increasing 3σ Accuracy

Pathfinding



Vantage



Quantum®

Spectrum™
II Premier

Increasing UPH

Nordson ASYMTEK

Post-Dispense Inspection Integration

Nordson ASYMTEK

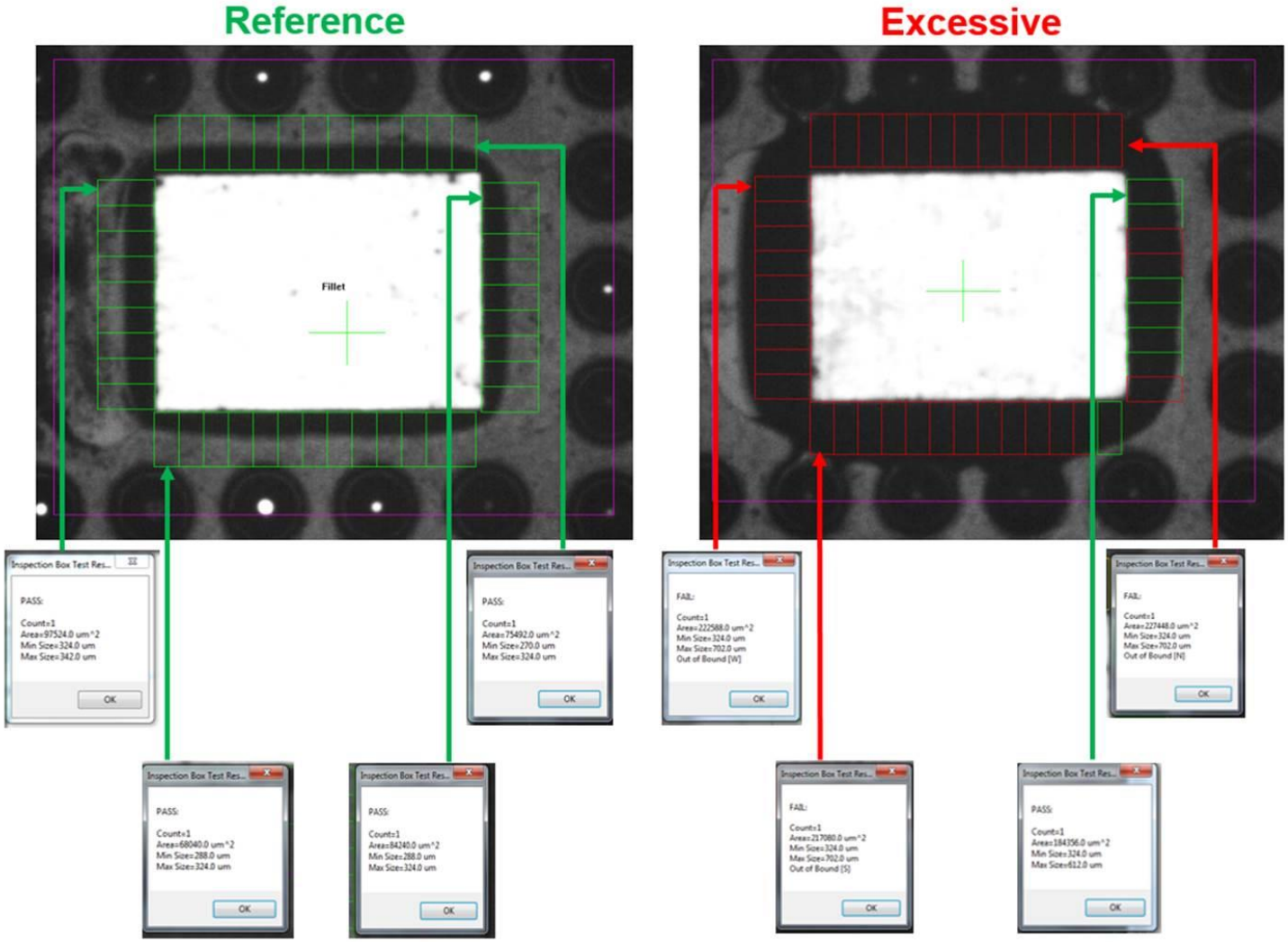
Overview

- Original concept: Asymtek develop inspection capability in Fluidmove
- After further discussions determined that Asymtek should focus on dispensing and leverage Yestech focus on inspection and test
- Current plan to integrate Yestech's proven AOI capabilities to run alongside Fluidmove's highly capable dispensing capabilities
- Stand-alone AOI is still recommended for 100% inspection and higher performance lighting and optics not offered on Spectrum



In Situ Inspection-

Yestech AOI SW Algorithms w/ Asymtek Vision System



Nordson ASYMTEK

Thank You