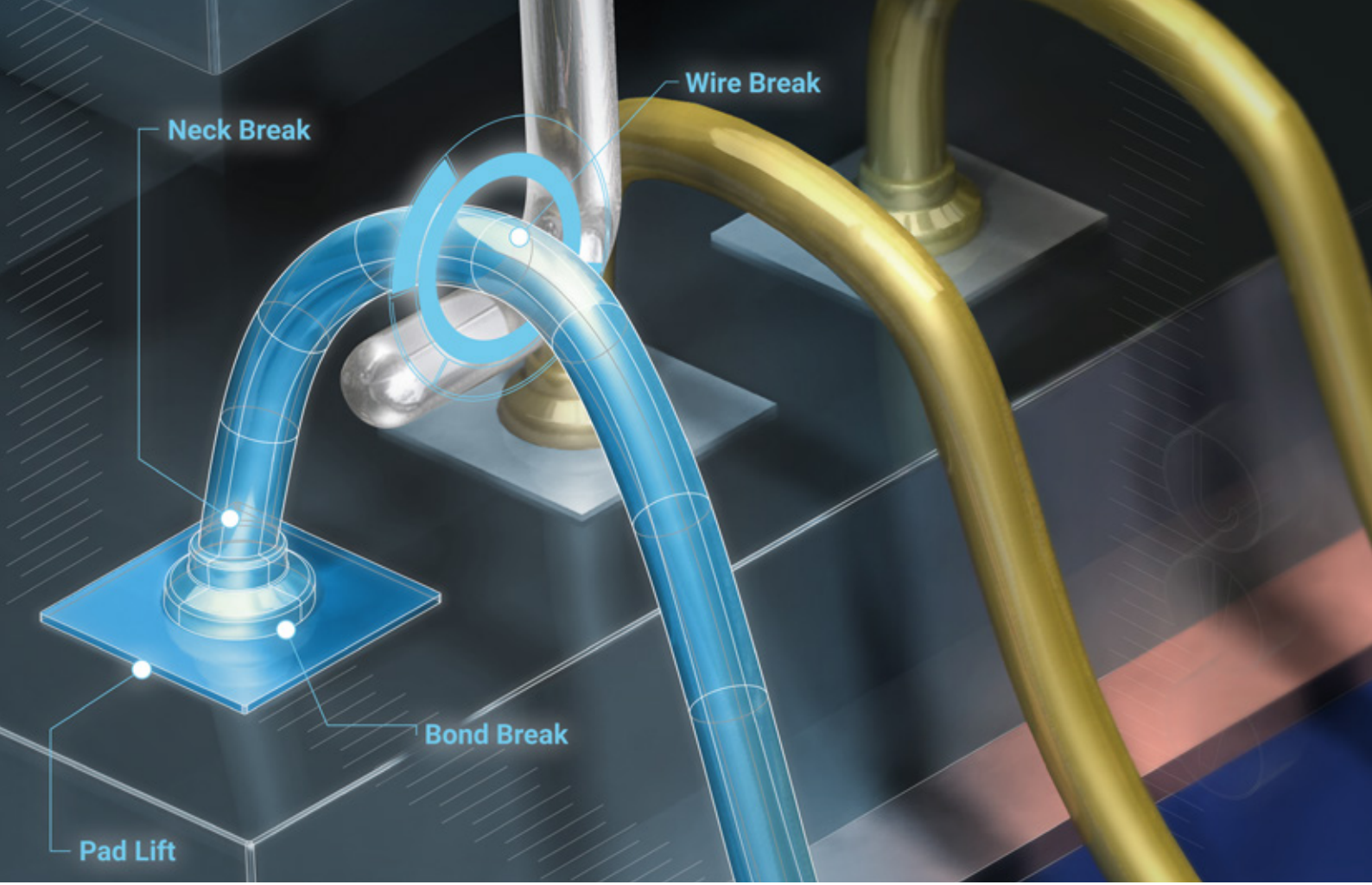


Bond Testing

Find Every Failure

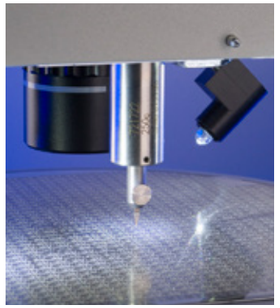
www.nordsondage.com

Nordson DAGE

Complete Integration

For over fifty years Nordson DAGE has been the market leading provider of award winning Bond Test Systems.

Produced at our state of the art production facility in Aylesbury, UK and engineered for excellence to ensure ultimate accuracy and repeatability, Nordson DAGE Bondtesters are at the forefront of technology to meet the wide range of applications required by our customers.



Pioneers of Bond Testing

1960s

DAGE established

First dedicated Bondtesters introduced

1970s

BST12 pull system launched with pull capability up to 100g

Introduction of Bondtesters with selectable destruct and non-destruct modes

Adjustable load rate introduced

1980s

MCT20/22 introduces microprocessor control

First intelligent tool landing and ball shear

BT22A increases load range to 20kg

1990s

First PC controlled Bondtester, the PC2400

Hot bump pull load cartridge invented by DAGE

Industry standard 4000 Bondtester launched

Series 5000 launched pioneering 25µm ultra-fine pitch

2000s

Cold bump pull test patented by DAGE

Patents granted on DAGE load cartridge

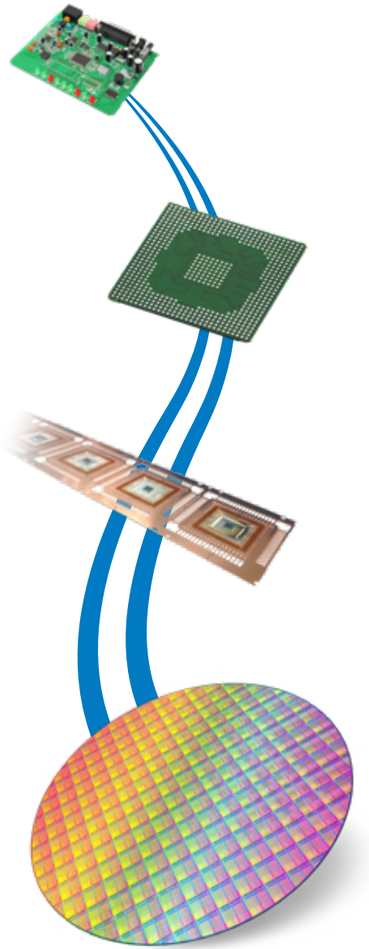
Rotating shear load cartridge introduced

2010

4000*Plus* Bondtester launched, industry first dual Bondtester and Micro-materials tester

Paragon™ software introduces camera assist automation

4800 INTEGRA™ with EFEM integration and SECS/GEM



The Right Product for the Right Application

Production

4000

The Gold Standard Bondtester

4000 OPTIMA

Production Bondtester

4000*PLUS*

Advanced Bondtester

Bond Testing

Operator-Free

4600

Automated Bondtester

4600-W, LF

Automated Parts Handler

4800 INTEGRA™

CLEAN ROOM

Semiconductor Wafer Tester

Automated Bond Testing

R&D

4000 HS

High Strain Rate Tester

4000*PLUS* - MATERIALS

Micro-Materials Tester

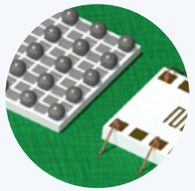
Materials Testing

Gold Standard Bondtester - Series 4000

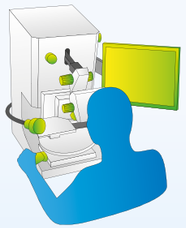
Fast set-up, easy to learn, maximum comfort.

> *"I spend a lot of time manually testing. I chose the 4000 as it is the most ergonomic and easy-to-use system."*

Simple PCBAs and components



Ergonomic and easy-to-use



High precision

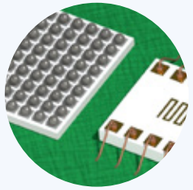
Advanced Bondtester - 4000*Plus*

Superior accuracy for complex samples and advanced test types.

4000 Optima for high accuracy production

> *"My samples are complex with a wide variety of components. The 4000Plus gives me the accuracy and flexibility I need."*

Complex and high density components



High accuracy and high flexibility

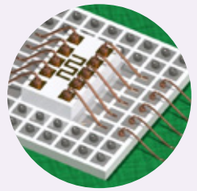
Very high precision

Automated Testing - 4600 Series

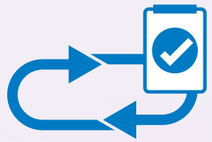
Maximum repeatability for the most demanding applications.

> ***"My interconnects are extremely small and it is crucial to remove operator influence. The 4600 ensures each test is 100% reproducible."***

Highest complexity products



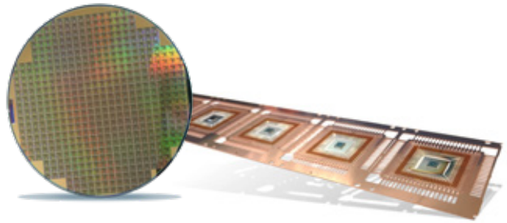
Maximum repeatability and accountability



Ultimate precision

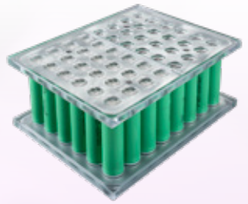
Automated Applications

Automatic parts handling with the 4600-W and 4600-LF.



Remove handling errors and operator influence with automated benchtop product handling. Applicable for lead frames and wafers up to 200mm.

Automatic battery cell inspection and testing - 4600 Battery.

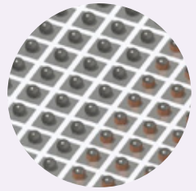


Test every connection before your batteries leave the factory. The 4600 Battery non-destructively tests 100% of welds.

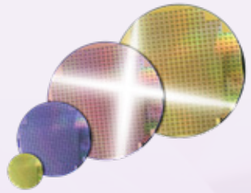
Dedicated Wafer Tester - 4800

High density interconnect quality control

Micro-bumps, micro pillars



50mm - 450mm wafers

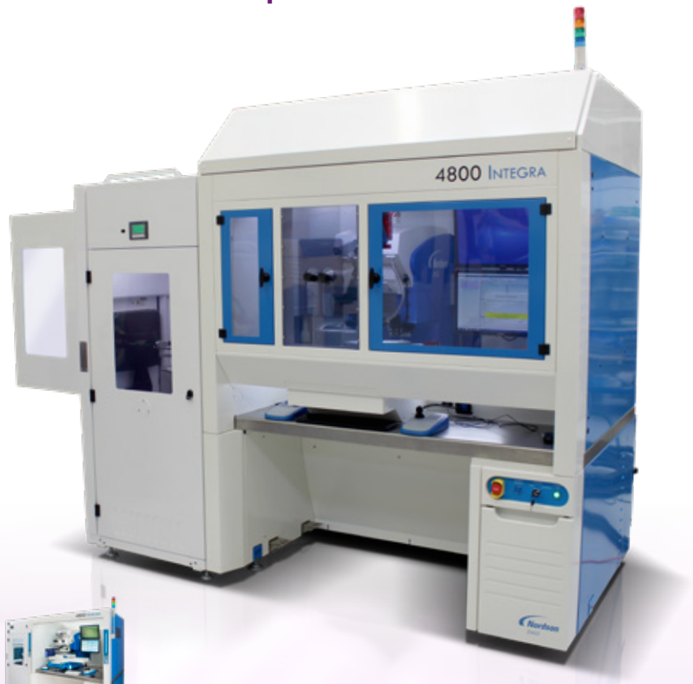


Ultimate precision

"I perform front end testing on bumps and pillars for a range of wafer sizes. The 4800 even handles my extremely warped wafers."

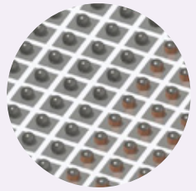
Semiconductor Wafer Tester - 4800 INTEGRA™

Integrated wafer handling that's clean room compatible.



Light curtain version

Micro-bumps, micro pillars



Island of automation

Extreme precision

Robotic handler

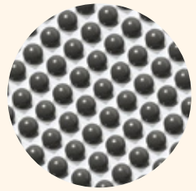
"I test a high volume of wafers and achieve the highest throughput with the 4800 INTEGRA."

High Strain Rate Tester – 4000HS

Characterize lead free solder and replicate board drop testing using high strain rate tests.

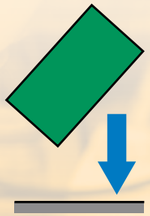
“I need to qualify the performance of new solder. I can only achieve this with high strain rate testing.”

Solder and bumps



Solder characterization

Drop testing simulator

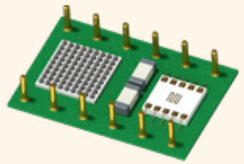


Find Every Failure – Materials Tester

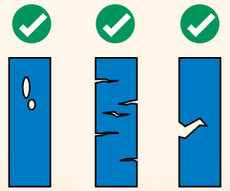
Bend, fatigue, creep testing and more with the advanced micro-materials tester.

“I qualify new devices and materials before they are transferred to production. Now I can characterize every component and even do lifetime testing.”

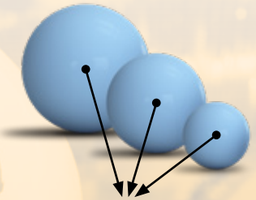
Entire PCBA



Find complex and unique failure modes



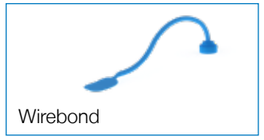
Feature size

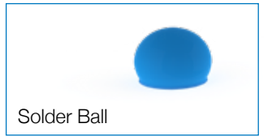


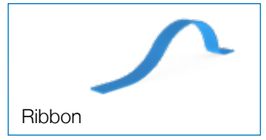
mm-µm

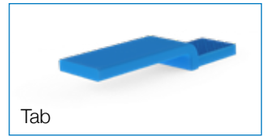
Find Every Failure

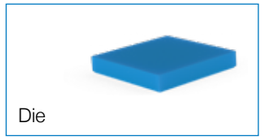
Test Components


Wirebond


Solder Ball

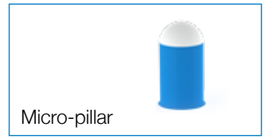

Ribbon


Tab

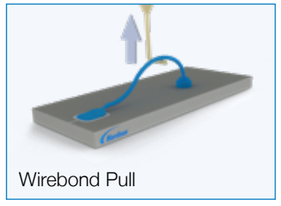

Die


Surface Mount Device

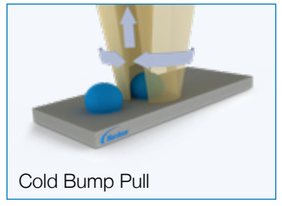

Surface Pad


Micro-pillar

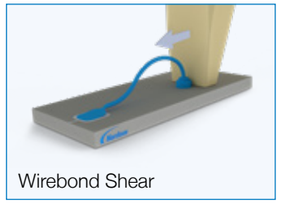
Standard Pull Tests

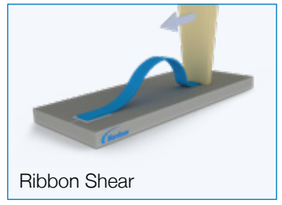

Wirebond Pull

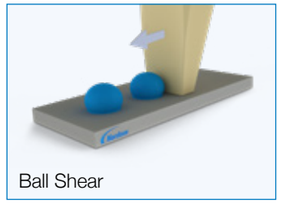

Ribbon Pull


Cold Bump Pull

Standard Shear Tests


Wirebond Shear


Ribbon Shear

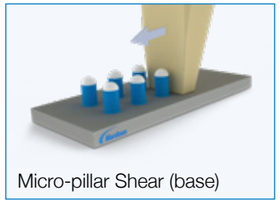

Ball Shear

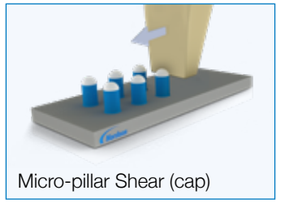
Advanced Tests

Variable heights and dimensions.

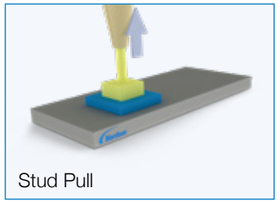

Cavity Shear

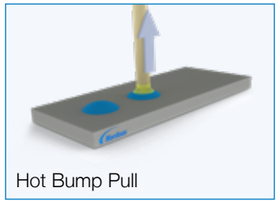

Passivation Shear

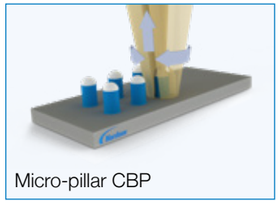

Micro-pillar Shear (base)


Micro-pillar Shear (cap)

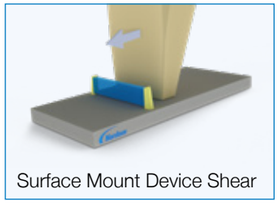
For difficult to grip or small dimensions.

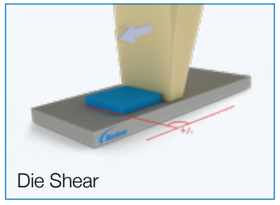

Stud Pull

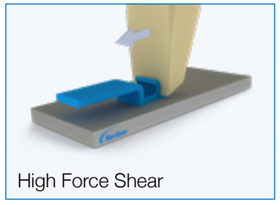

Hot Bump Pull

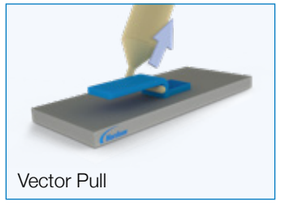

Micro-pillar CBP

Larger components and higher forces.


Surface Mount Device Shear

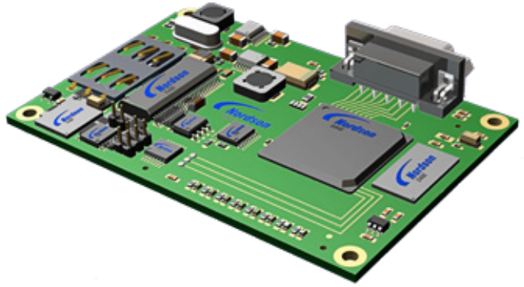

Die Shear


High Force Shear

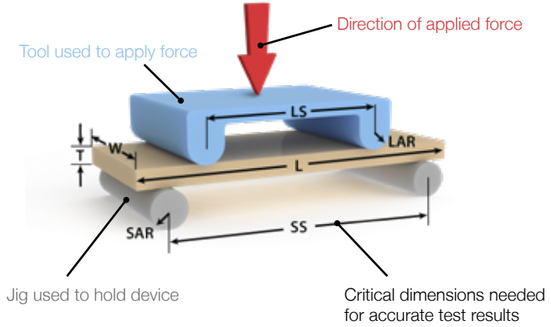

Vector Pull

Micro-Materials Testing

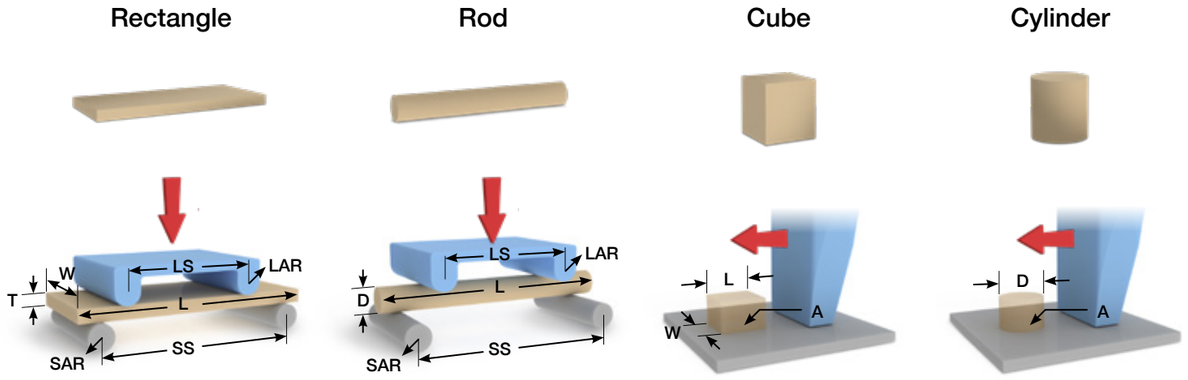
Component dimensions vary significantly for micro-materials testing (mm – µm).



Defining the test geometry and sample dimensions enables measurement of underlying materials properties.

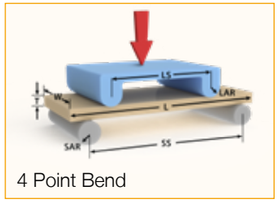


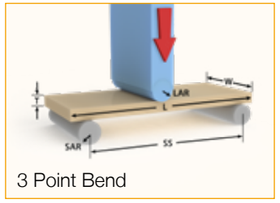
Knowing the sample shape and size is critical for data analysis.

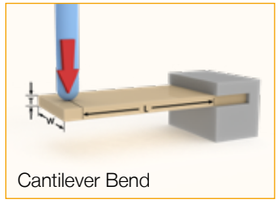


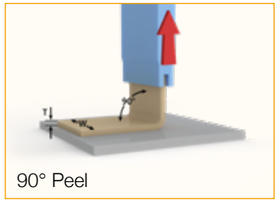
Micro-Materials Test Types

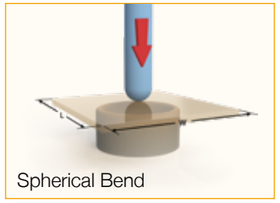
- Material Properties
- Component Lifetime
- Load and Displacement Control
- Stress and Strain
- Statistical Analysis

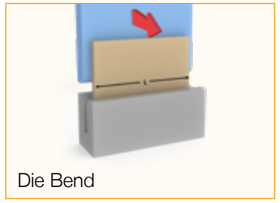

4 Point Bend

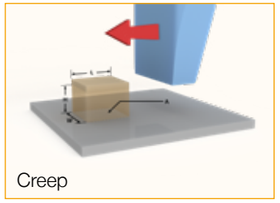

3 Point Bend

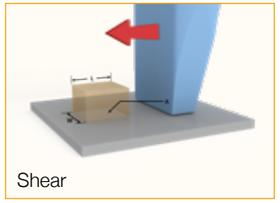

Cantilever Bend

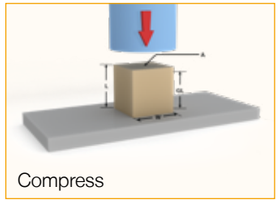

90° Peel

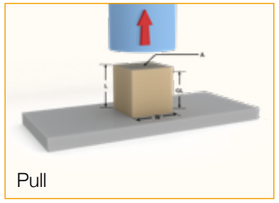

Spherical Bend


Die Bend


Creep

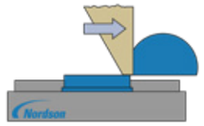
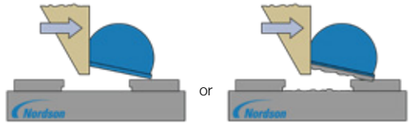
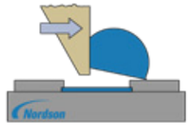
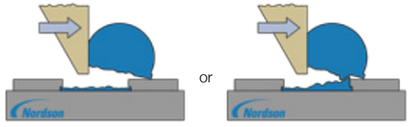

Shear


Compress

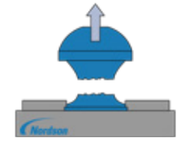
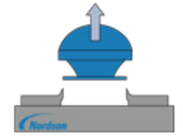
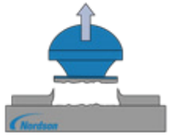
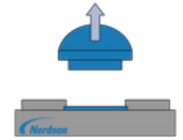
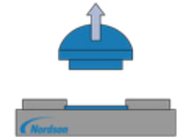
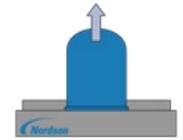

Pull

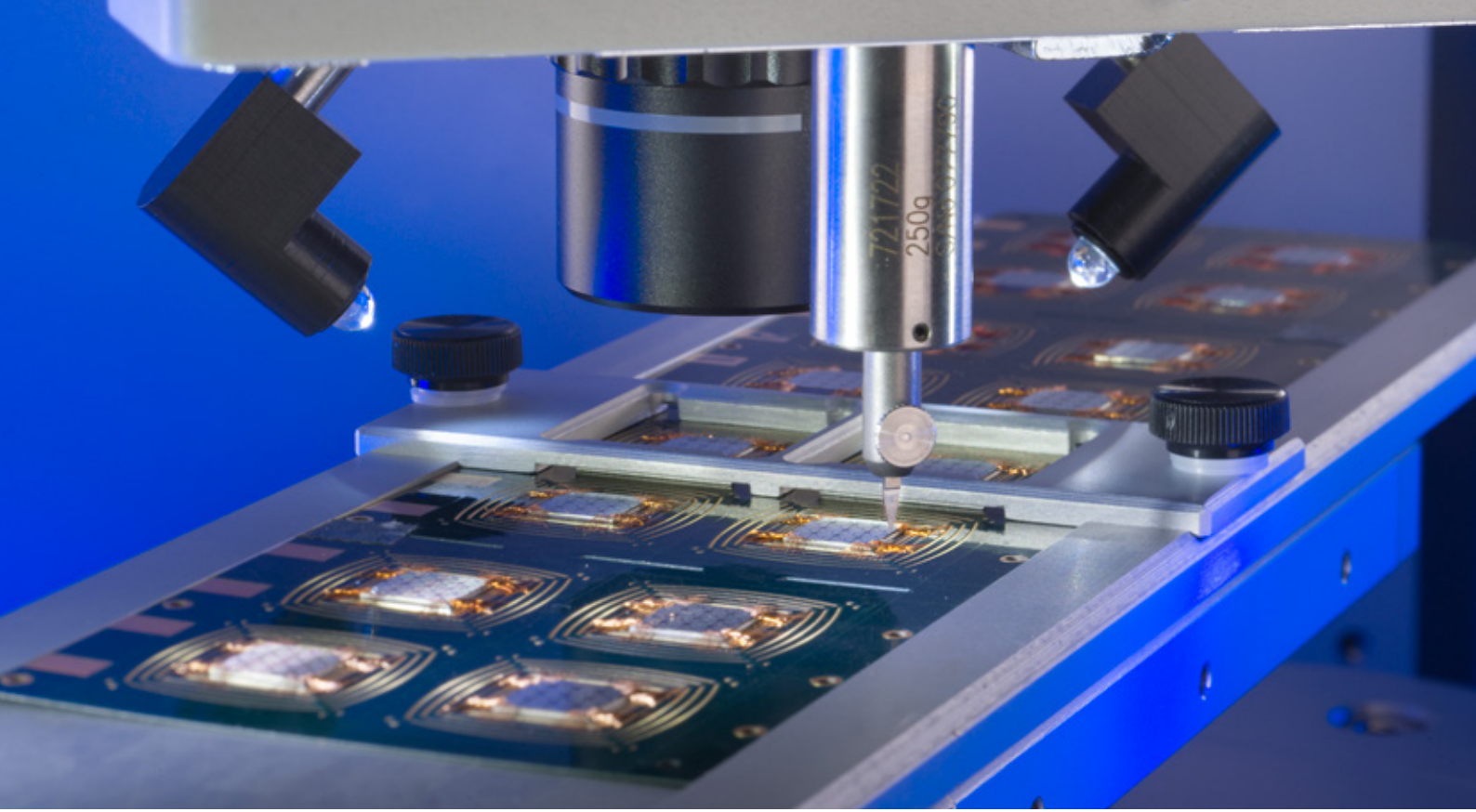
Bond Test Failure Modes

Solder Ball Shear Testing

Failure Mode	Description	Illustration
Ductile	Solder ball fracture at or above the surface of the solder mask within the bulk solder material.	
Pad Lift	Solder pad lifts with solder ball; lifted pad may include ruptured base material.	 Pad separation at base material or Lifted pad includes ruptured base material
Ball Lift	Solder ball lifts from pad; pad is not completely covered by solder/intermetallic and the top surface of the pad plating is exposed.	
Interfacial Break	The break is at the solder/intermetallic interface or intermetallic/base metal interface. The interfacial fracture may extend across the entire pad or be the dominant failure mode at the tool contact region.	 100% interfacial fracture or Dominant failure mode at tool contact is interfacial fracture

Solder Ball Pull Testing

Failure Mode	Description	Illustration
Type A: Ductile	A – Ductile: Solder ball fracture at or above the surface of the solder mask within the bulk solder material.	 Ductile (pad fracture surface view)
Type B: Quasi-Ductile	B – Quasi-Ductile: Mixed ductile/brittle fracture with the dominant failure mode (>50% area) being ductile.	Quasi-Ductile (pad fracture surface view)
Type A: Pad Lift Or Type B: Pad Crater	A – Pad Lift: Solder pad lifts with solder ball. B – Pad Crater: Lifted pad includes ruptured base material.	 Pad Crater  Pad Lift
Non-wet	Solder ball lifts from pad and any portion of the pad top-surface plating is exposed.	
Type A: Brittle	A – Brittle: The break is at the solder/intermetallic interface or intermetallic/base metal interface.	 Brittle (pad fracture surface view)
Type B: Quasi-Brittle	B – Quasi-Brittle: Mixed brittle/ductile fracture with the dominant failure mode (>50% area) being brittle.	Quasi-Brittle (pad fracture surface view)
Ball Extrusion	Solder ball is stretched but not fractured. Invalid failure – repeat test with replacement solder ball samples after appropriate adjustments.	



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