



Micro Materials Testing

Take a Closer Look

With over 30 years' experience in small geometry testing, Nordson DAGE is a pioneer in micro materials testing, offering unrivalled expertise and capability across a range of materials and applications.

Having developed several unique and patented test techniques, our dedicated team of materials test specialists ensure our customers are supported by people who understand their needs and share their technical know-how.

The 4000*Plus* micro materials test system is unique in offering a fully integrated solution to meet the challenges of small scale testing.

Take a Closer Look at Small Scale Materials Testing

Small geometry testing has its own unique set of challenges. It is not a case of simply taking a test with a larger sample and scaling it down to measure small loads and displacements. A complete system approach must be taken.

View With such small geometries it is often not possible, with the naked eye, to see the sample under test. Integrated imaging systems allow you to view, measure and record failure mechanisms.

Sense Alignment is critical, requiring precise control in all three orthogonal axes and feedback to prevent damage to the sample due to tool impact.

Grip The wide range of geometries across micro materials samples presents unique gripping challenges. Specialist micro gripping techniques allow tests to be performed in an accurate repeatable manner.

Test From creep to cyclical fatigue, small displacements and loads need to be accurately controlled and recorded, ensuring that for each test type reliable data is obtained.

Specialists in Micro Materials Testing

Key Applications

- Tension
- Compression
- Flexural
- Fatigue
- Brittle fracture
- Peel
- Torsion
- Creep
- High speed pull & shear

The Solution - An Integrated Micro Materials Test System

Sense
Unique intelligent sample protection & positioning technology

View
Integrated optics for alignment & inspection

Grip
A wide range of solutions for gripping small samples

Test
Dedicated micro materials test system with proven capability across a wide range of materials & applications

View – Sense – Grip – Test

The Nordson DAGE 4000*Plus* micro materials test system with Paragon™ software is fully optimised for small scale testing. Complete system capability is delivered from the imaging systems, precise positioning technology and gripping through to the diverse range of tests and post-test reporting.

View with optics and integrated camera solutions for alignment and inspection. Static images and video can be recorded for detailed post failure analysis.



Viewing and recording front and side views of test



Integrated image capture system providing top down view of failure

Sense with unique intelligent sample protect and positioning technology including surface detection and automatic step back for accurate shear measurements.



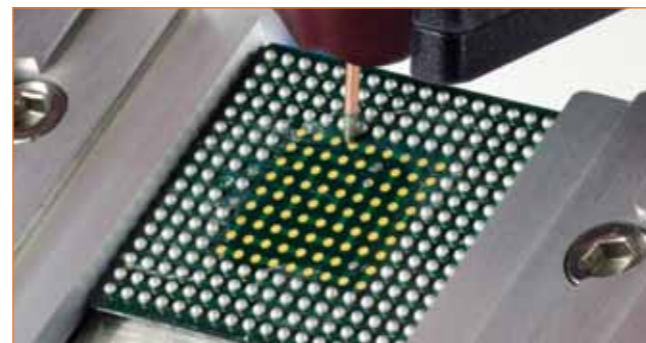
Accurate shear heights are guaranteed by light touch down control



Collision detection minimises the possibility of damaging the sample or hook

4000*Plus* - The Complete System for Micro Materials Testing

Grip using an extensive range of solutions including jaws, tweezers, hot probes and hooks. These micro gripping techniques enable testing of samples down to 20µm. The high precision XY stage options allow for ultra-fine positioning of load tools to the sample.



Unique Hot Probe Attach



Micro tweezers

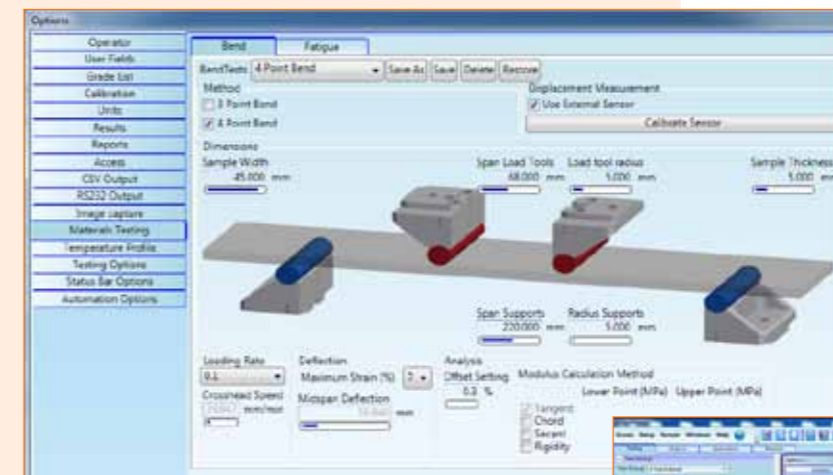


Micro shear tools



Micro hooks

Test using a dedicated micro materials test system to have complete confidence in your test results. You can be assured of accuracy and repeatability in your small scale tests. The system's powerful and highly configurable Paragon™ software enables the test parameters to be saved to a test profile, which can be used for subsequent measurements.

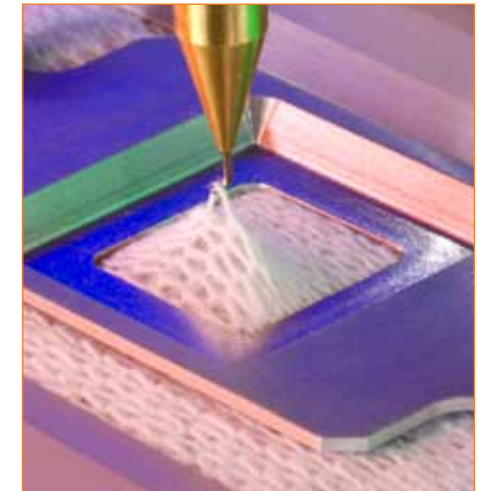


Paragon™ simplifies test set up

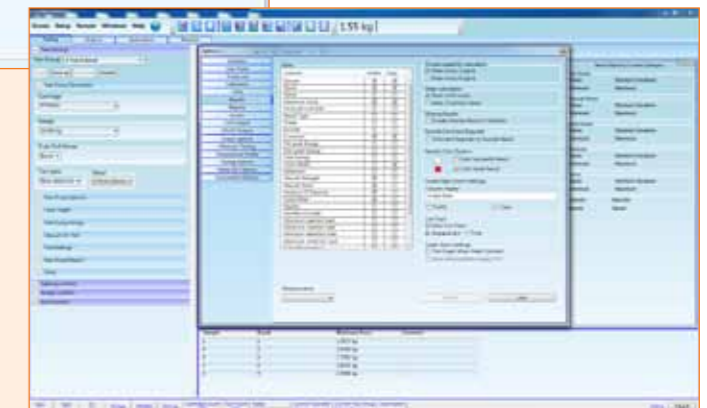
Intelligent Materials Test Software

Our Paragon™ test software provides a powerful and intuitive interface for the user to quickly set up and perform tests. The easy-to-use graphical approach separates the different test modes, and allows test parameters to be input such as sample dimensions, strain rate and the method of analysis to be applied. At test completion the material properties are automatically calculated and saved to Paragon's database.

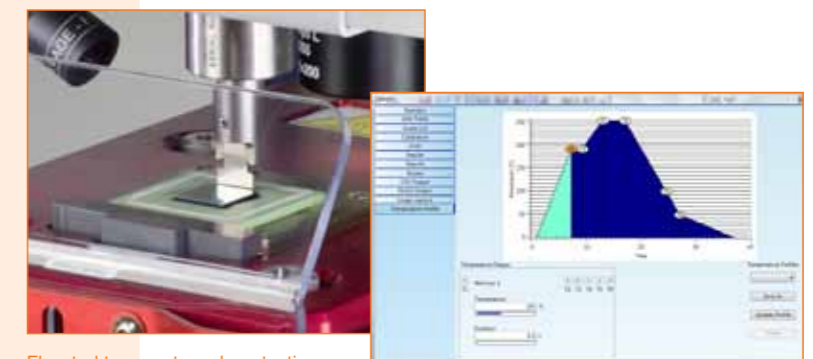
You can output test results into industry leading SPC packages and save them directly to Microsoft®, Excel, Word, as well as Adobe® Acrobat.



A wide range of hooks and load cells for pulling fine fibres



Easy to configure Test Group parameters



Elevated temperature shear testing

Nordson DAGE has an in-depth understanding of the challenges presented by small geometry testing and solves them through knowledge built upon decades of expertise and experience in microelectronics testing.

Tension and Compression A wide range of tooling permits tensile or compressive loads to be applied to small often difficult to grip samples. Forces from <math><0.01\text{N}</math> to 1000N (500N compression) can be applied. At low loads compliant load cells can be used to better control loading rate making it possible to perform non destructive tests on very small and stiff samples.



A wide range of tooling addresses a wide range of static test needs

Shear testing requires precise control of shear height and this is achieved through our unique clamping and sample surface detection capabilities. At low loads, our patented air bearing technology enables the tool to be clamped with precise control of position. Forces from <math><0.01\text{N}</math> to 2000N can be measured.

A heated work holder is available for making elevated temperature shear measurements, up to 400°C.



Shear tests can be performed on samples from microns to centimetres in size

Elevated shear testing up to loads of 200Kg

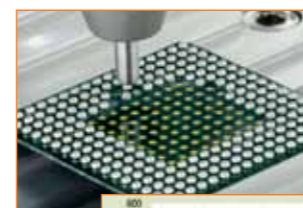
Small Geometry Testing Across a Diverse Range of Materials

Flexural testing is used for measuring the properties of materials, particularly composites and polymers. Available test methods include both three and four point bend. External sensors can be used to sense displacement or strain. In the case of printed circuit boards, electrical resistance can be used to terminate the test once a connection has failed.

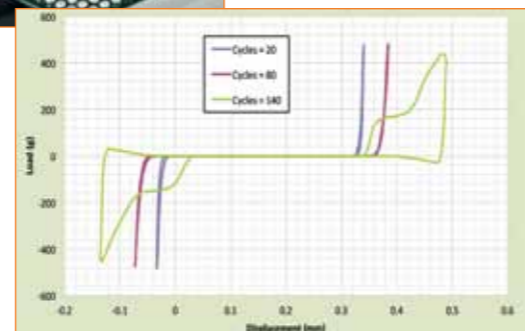


Assessing the flexural modulus and strength of composites using a three point bend test

Fatigue The Nordson DAGE 4000Plus test system can repeatedly apply cyclic strains. Failure by fatigue is a major factor in reliability and fatigue testing provides valuable data to compare materials for resistance and assess a component's lifetime. Paragon™ test software provides a range of fatigue tests to determine fatigue life.



Bi-directional shear loading of an individual solder ball

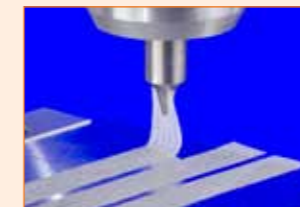


Brittle Fracture Brittle components, such as glass, are severely weakened by micro cracks. The low force capabilities of the Nordson DAGE 4000Plus test system combined with our specialist tooling, permit micro bend measurements to assess the severity of these defects. Three and four point and spherical bending can be performed with sample sizes as small as a 1mm square.



Custom tooling for micro bend eases sample placement and produces repeatable data

Peel testing can be performed on the Nordson DAGE 4000Plus test system. Its high precision multi axis stage, together with a wide range of specialised tweezers, enables testing to be performed on micro samples. The advanced Paragon™ test software provides frictionless control of the peel angle, whilst recording force and displacement data for subsequent analysis.



Pneumatic tweezers automatically grip small samples



Wider tweezers provide better grip on wide samples

Creep Time dependent deformation is an important failure mechanism. Our experience with solder has led us to develop methods for applying loads to small samples and measuring the tiny movements that take place over extended time periods.



Slow deformation of solder at room temperature



Torsion Components can be bent and twisted using a specifically designed work holder, which converts our standard linear drive to rotary motion.



Subjecting the legs of a connector to bend and twist

High Speed Pull and Shear The Nordson DAGE 4000HS test system can be used for testing at high strain rates, providing a maximum shear velocity of 4m/s and pull rate of 1.3m/s.

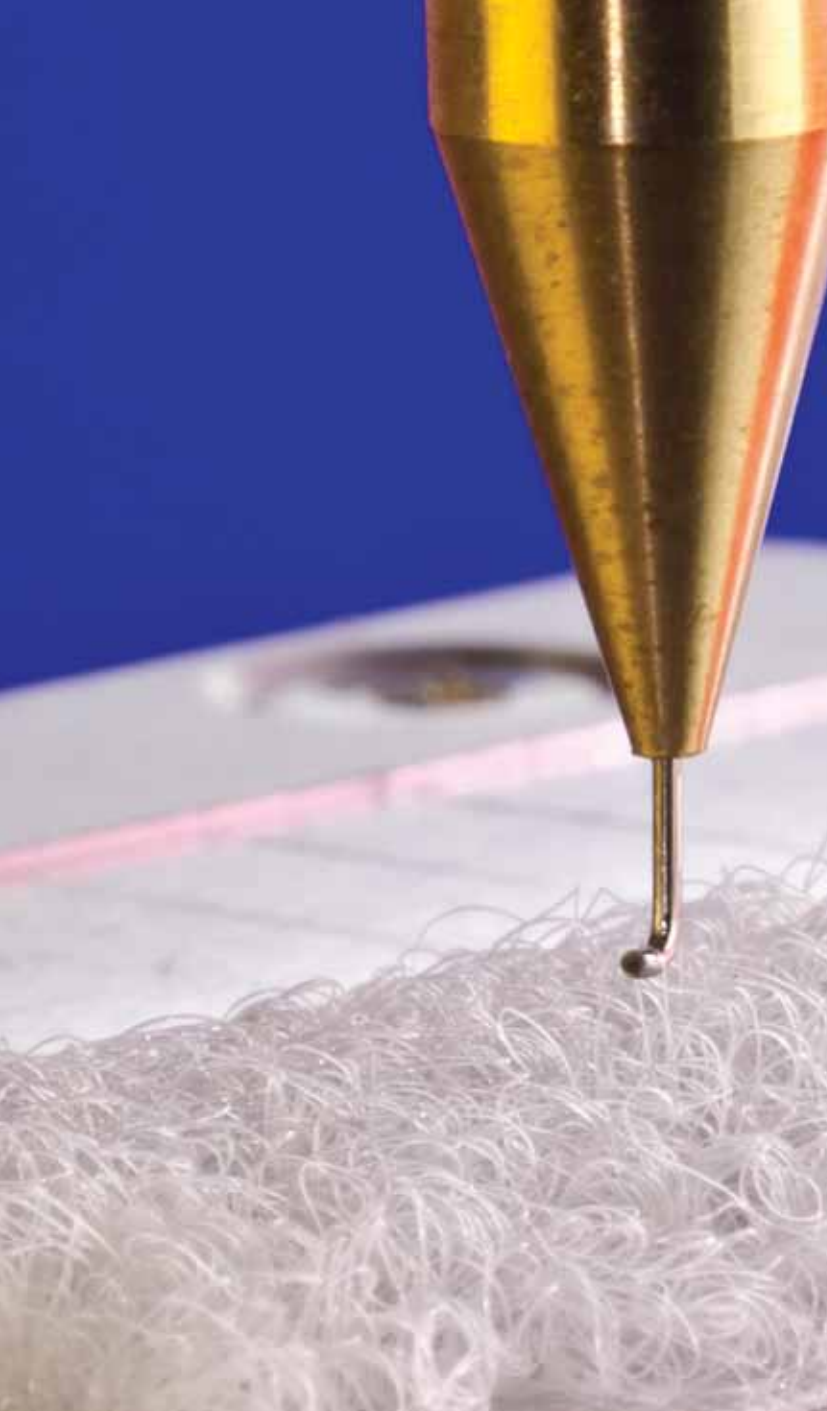
The 4000HS test system is ideal for determining the effect of strain rate on ductile-brittle transitions.



Sample firmly gripped for high speed pull test



Ultra stiff tooling used to shear solder balls at high speed



A Partner You Can Trust

Nordson DAGE is the market leading provider of award winning test and inspection systems for destructive and non-destructive mechanical testing of electronic components and are experts in small geometry testing, taking pride in delivering support to multinational organisations globally. Founded in 1961, with global headquarters in Aylesbury, UK, Nordson DAGE is part of the Nordson Corporation which has direct operations in more than 30 countries.

With over 6,000 test systems installed globally, we use our extensive experience and application know-how to provide test systems and support that you can rely upon.

Nordson DAGE continues to invest significantly in research and development to remain at the cutting edge of test and inspection technology and is recognised as the industry standard for test and inspection technology.

For more information on the Nordson DAGE 4000*Plus* micro materials test system, please contact your Nordson DAGE regional office or speak with your Nordson DAGE representative, all of which are listed on www.nordsondage.com.

Americas

Tel: +1 510 683 3930
email: sales@nordsondage.com

China

Tel: +86 512 6665 2008
email: sales.ch@nordsondage.com

Germany

Tel: +49 7021 950690
email: sales.de@nordsondage.com

Japan

Tel: +81 432 995851
email: sales.jp@nordsondage.com

South East Asia

Tel: +65 6796 9500
email: sales.sg@nordsondage.com

United Kingdom

Tel: +44 1296 317800
email: globalsales@nordsondage.com



FM 57424 BS EN ISO 9001 2008

Specifications subject to change without prior notice.

Copyright © Nordson DAGE. Other products and company names mentioned are trademarks or trade names of their respective companies.

4000*Plus* Patent Pending.

BR-MAT-EN-040413-V1