

QUICK RELEASE CARTRIDGE  
AUTOMATIC LOAD CARTRIDGE CALIBRATION AND LINEARITY CHECK  
**4000**  
ON-BOARD STATISTICAL RESULTS AND ANALYSIS PACKAGE

**ADVANCED BONDTESTING SOLUTIONS**

ADVANCED ELECTRONICS AND SOFTWARE CONTROL  
DAGE FRICTIONLESS SYSTEM  
ADVANCED ELECTRONICS AND SOFTWARE CONTROL

LEADERS IN BOND TEST TECHNOLOGY

SERIES  
**4000**

# Leaders in Bond

## Dage Introduce the Series 4000

An exciting development to meet a growing demand for bond testing within an industry where emerging technologies and diversifying applications are now commonplace.

As the market leader we have an ongoing policy to listen to feedback from our global support network and customers, and take up the challenge to meet their needs.

This feedback has resulted in the birth of a new generation of multi-purpose tester.

The Dage Series 4000.

### Operator Friendly

The Series 4000 has been specifically designed to be ergonomically adjustable for operators, thus helping to overcome problems associated with Repetitive Strain

Injury (RSI). Particular attention has been given to working heights, optics eyeline, arm rests and the position of controls. A range of adjustable controls are available including a six-button, operator configurable joystick that can be positioned on either the left or right-hand side of the machine depending on operator preference.

Series 4000 shown with optional 15" LCD Flat Panel Monitor



Advanced software features include an operator configuration with selection for:

- Operator name.
- Right-hand or left-hand joystick, or both.
- Joystick button preferences.
- Reference table of microscope position settings.

All of which can be stored and transferred with the operator to another machine for quick setup.

# Test Technology



## Image Capture

Image Capture can be ordered as an integral part of the Dage Series 4000 or alternatively as an upgrade retrofit kit.

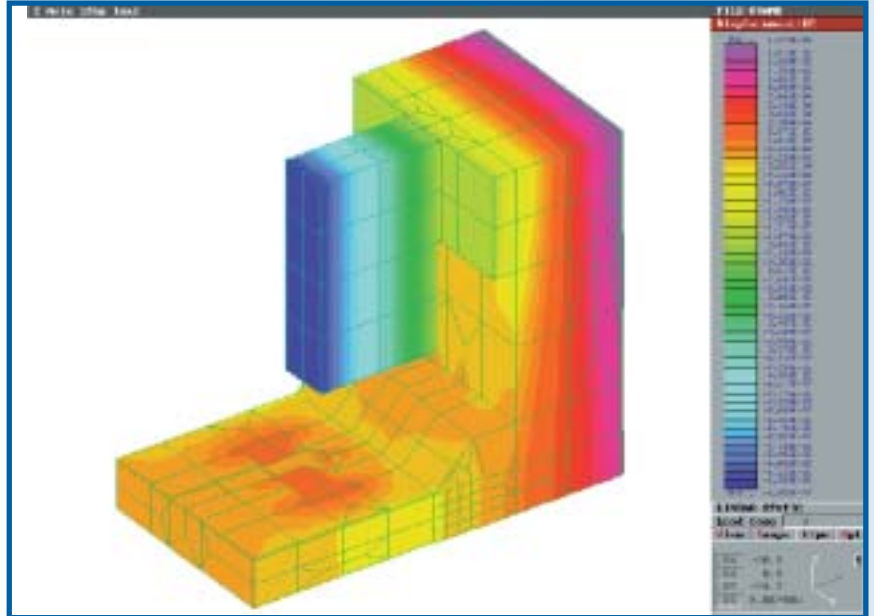
It's easy to use and a powerful failure analysis tool for R&D, process set up monitoring, quality control and defect code training.

- Mouse point and click image capture (JPG or BMP).
- E-mail captured images.
- 90X to 1800X magnification.
- Mono or colour to enhance picture definition.
- Onboard measurement capability.

## Comprehensive Range of Work Surfaces and Workholders

The Dage Series 4000 is available with a range of work surfaces including:

- Shuffle Base (for dedicated low cost pull requirements).
- Motorized X, Y Stage options:
  - 50mm x 50mm, 100kg
  - 50mm x 50mm, 200kg
  - 160mm x 160mm, 100kg
  - 240mm x 240mm, 20kg



FEA model showing deflections with 10kg vertical load applied.

- Heated and rotating worksurface available on request.
- 300mm Waffle Chuck. Available on request.
- Each work surface can be fitted with one of a number of universal or dedicated (application specific) workholders to accommodate leadframes, packages, substrates and wafers.

## System Rigidity

A monocoque frame developed using Finite Element Analysis software (FEA) enables design optimization achieving a mainframe rigidity in the vertical axis of better than 1 micron/kgf. This is particularly important for repeatable test conditions.

A secondary advantage of a Monocoque frame design is that it provides the electrical enclosure necessary for compliance with Electromagnetic Compatibility (EMC) to European CE regulations.

## Serviceability

Maximum machine uptime is ensured through use of:

- High reliability components.
- Minimum adjustments.
- Easy access to all machine components.



# Series 4000

## Quick Release Intelligent Load Cartridge System

### Featuring:

- Smart electronics to store and identify serial numbers and calibration details.
- Quick release load cartridge mechanism for fast changeover from one application to another (no tools required and changeover in less than 30 seconds).
- Minimum range selectable down to 5% of FSD.
- Quick release pull hook system for very fast load tool changes – no tools needed.
- Auto hook function for automatic repeatable hook to wire positioning.
- Wire loop height measurement.

## Dage Frictionless System

All load cartridges incorporate the Dage Frictionless System providing a repeatable, sensitive, robust measurement gauge for low maintenance, high reliability bond testing.

**Aspects of the Dage Series 4000 now have full Patent protection.**



- On-machine storage for two cartridges.
- All cartridges come complete with an automatic load tool protection guard that is activated as the load cartridge is removed from the machine, thus offering protection to the tool and transducer while not in use.
- High resolution low force capability to detect small loads during fine pitch bond testing.
- Up to ten software selectable load ranges per load cartridge (ten load cartridges in one), four ranges factory-set as standard with an additional optional six ranges programmable on request.

### Load Cartridge Options:

1. Wire Pull		
Maximum Pull Force	Cartridge 1	100g
	Cartridge 2	1kg
	Cartridge 3	10kg
2. Tweezer Pull/Peel / CBP		
Maximum Pull Force	Cartridge 1	100g
	Cartridge 2	5kg
3. Ball Shear		
Maximum Shear Force	Cartridge 1	250g
4. Shear		
Maximum Shear Force	Cartridge 2	5kg
	Cartridge 3	100kg
5. Materials Testing		
High Force Tweezer Pull up to 10kg		
Heated Bump Pull up to 10kg		
High Force Die Sheer up to 200kg		
High Force Pull up to 100kg		
Vertical Stud Pull up to 100kg		
Horizontal Stud Pull up to 200kg		

NOTE: Pneumatic chassis required with all shear and tweezer load cartridges.

## Cold Bump Pull

- An application enabling the pull testing of SnPb solder balls from chip scale style packages.

## Cavity Shear Testing

- Special shear tooling resulting in less ball deformation providing the ability to apply the maximum shear force possible.

## Vector Pull Testing

- Allows force vectors to be applied to the tab leads on packages.



## Results Repeatability Guaranteed

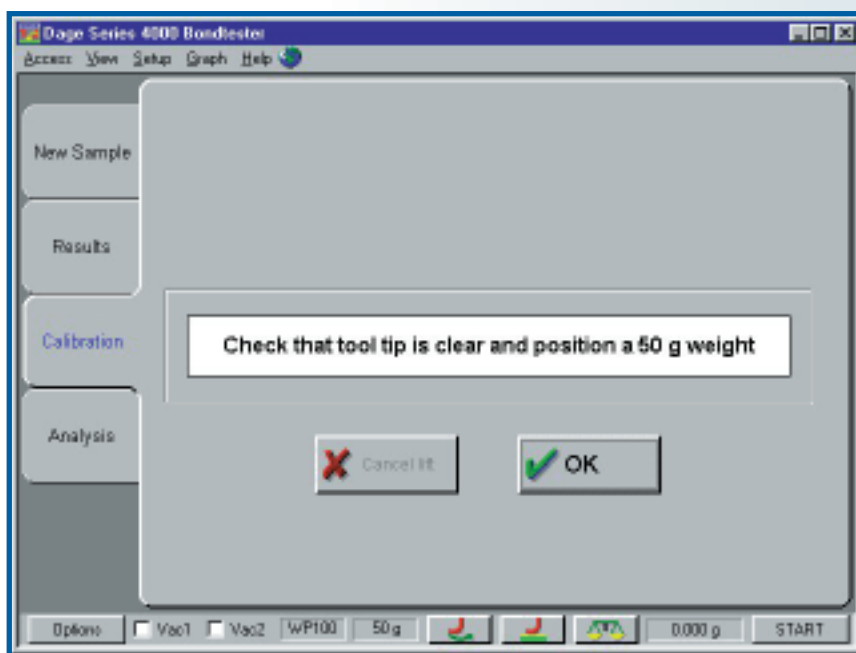
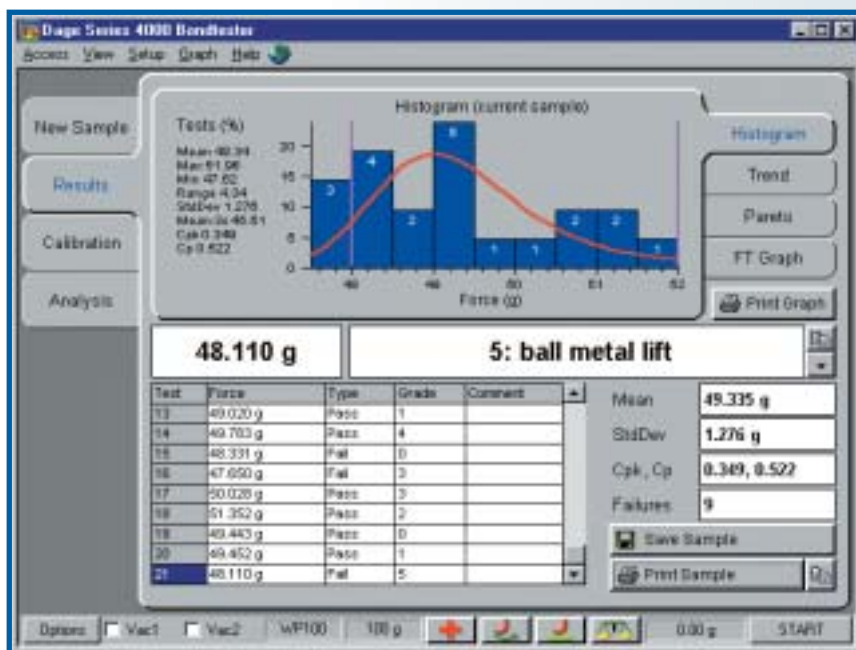
- Total system accuracy  $\pm 0.25\%$  of full-scale deflection of selected load range.
- Maximum load cartridge accuracy and repeatability to within 0.01% (100ppm), as tested and qualified by an independent calibration laboratory accredited by the United Kingdom Accreditation Service (UKAS).
- Total ballshear Z positioning accuracy of complete system  $\pm 1$  micron (qualified with laser measurements).
- Automatic alarm notification for load cartridges that have drifted outside their calibration tolerance band.
- Optional anti-vibration mount.

## Automation Features

A big problem with bondtesting small geometry bonds is the operator's ability to repeatably align the loadtool to the bond.

The Dage Series 4000 overcomes this problem with the optional automation feature. Once programmed the bondtester will automatically shear or pull to a test pattern.

- Program any number of tests by assisted self-teach.
- No camera alignment system necessary.
- Both fixed pitch and random position test sequences can be taught.
- Rotating shear cartridges (BS250R, BS5KGR).



Automatic load cartridge calibration using traceable weights.

## Calibration

- Automatic load cartridge calibration and linearity checks using weights directly traceable to National Standards. Calibration information is stored in the cartridge and a printout is also available.
- Automatic load cartridge check calibration without the use of weights.
- Calibration jigs can be used for machine GR+R qualification.

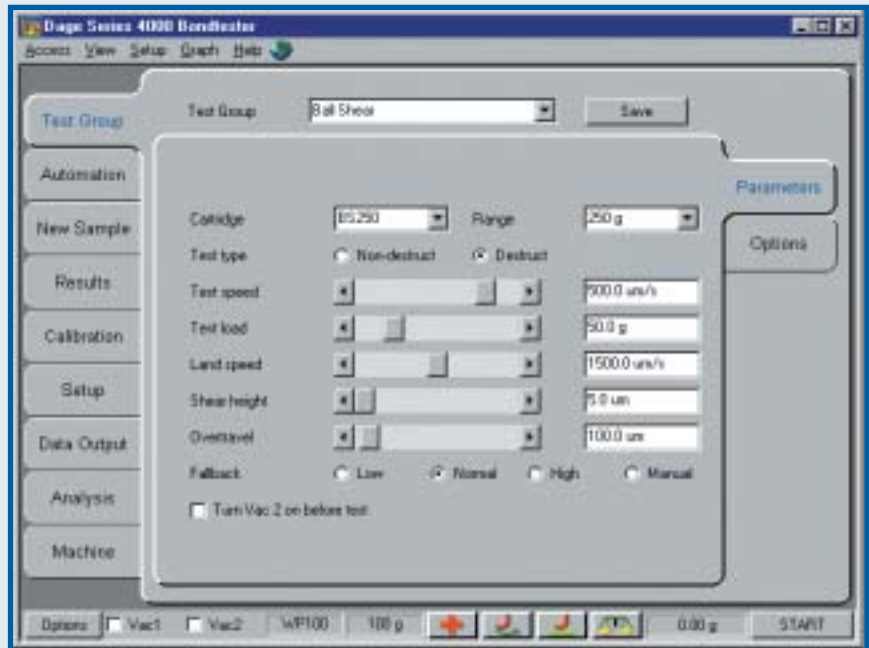
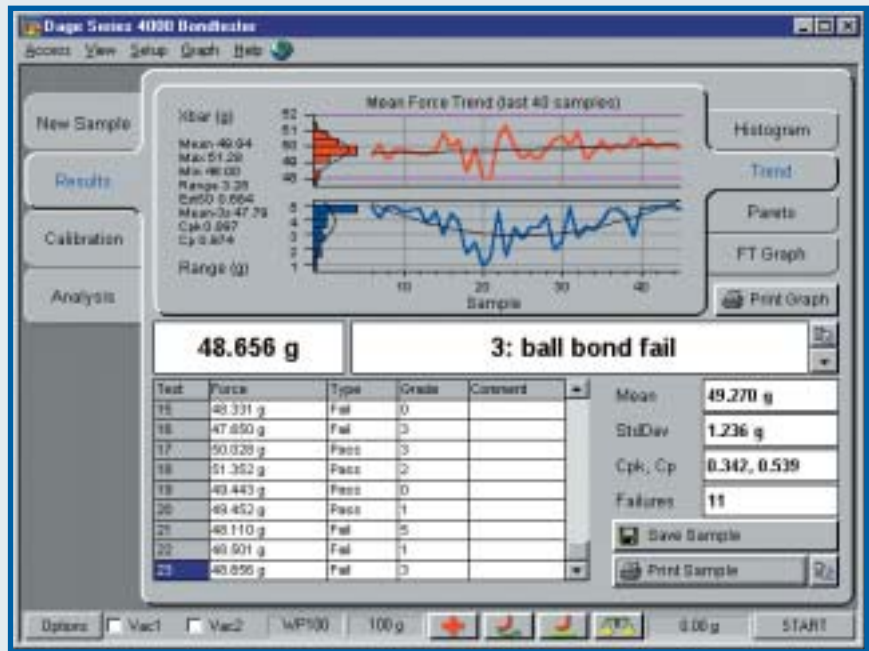
# Series 4000

## Advanced Electronics and Software Control

- The Dage Series 4000 is controlled via a remote tower PC with software compatible with Windows XP, 2000, ME, NT and 98. Our standard is Windows XP. It supports ODBC databases either locally or via a network link to a central database.
- Intuitive and local language operating screens enable quick test setup and editing of test parameters. Three level configurable password controls (operator, supervisor and engineer) ensure that data and test parameter integrity are maintained.

## Data Analysis

- The on-board statistical results analysis package provides test results by grade, mean load, standard deviation and CPK complete with distribution curve.
- RS232 output of test results including fixed fields option.
- CSV test result files are available.
- Results can be copied to clipboard and pasted directly into Microsoft Excel™.



# Specifications

## General

Machine footprint	W (including joystick, excluding PC/monitor) 425mm D (including front arm rest) 730mm H 670mm
Weight	45kg
Power Supply	Switchable 100/110V, 220/240V AC 50/60Hz
Pneumatic Supply (for machine)	4bar, 6mm OD/4mm ID plastic pipe
Vacuum Supply (for workholder)	min. 500mm Hg plastic pipe
International Certification	Compliant with European CE Regulations – EMC Directive, Low voltage Directive, Mechanical Safety Directive
Manufactured	In accordance with ISO 9002
PC (minimum requirement)	Please consult factory
Monitor	VGA/SVGA (Optional 15" LCD Flat Panel Monitor)

## Optics

Leica GZ6 and Stereozoom 6
Olympus SZ 3060
WILD MZ8
Nikon SMZ-1
MOTIC SMZ

See Price List for full configuration and magnifications.

## Axis

X, Y axis accuracy	±10 microns over 50mm	(50mm XY Table Option)
X, Y axis repeatability	±5 microns over 50mm	(50mm XY Table Option)
X, Y axis resolution	<1 micron	(50mm XY Table Option)
X, Y axis maximum speed	2mm/second	(50mm XY Table Option)
Y axis maximum force	100kg	(50mm XY Table Option)
X axis maximum force	5kg	(50mm XY Table Option)
Z axis travel	65mm	
Z axis accuracy over full travel	± 10 micron	
Z axis accuracy over 2mm	± 2 micron	
Total stepback accuracy of complete system for 250 gram shear cartridge over 25 micron of Z travel	±1 micron	
Z axis resolution	±0.125 micron	
Z axis maximum speed	7mm/second	
Z axis maximum test speed	5mm/second	
Z axis maximum force	10kg pull at 5mm/second	10kg push at 2.5mm/second
Workholder working envelope	X 220mm Y 220mm Z 50mm	

# Series 4000

The Dage Series 4000 conforms to and in some cases exceeds the following industry standards:

CBP/HBP	JEITA EIAJ ET-7407
BGA BUMP SHEAR	JEDEC JESD22-B117
AU BALL SHEAR	JEDEC JESD22-B116
BALL BOND SHEAR	ASTM F1269
WIRE PULL DT/NDT	MIL STD 883
DIE SHEAR	MIL STD 883
STUD PULL	MIL STD 883
FLIP CHIP PULL	JEDEC JESD22-B109



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# 4000

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## Global Presence, Global Support, Local Care

With 6 direct offices and 19 representatives worldwide, Dage can support you locally as well as internationally. Please contact your nearest Dage office if you require any further information or would like a demonstration of our Series 4000 system.

Our website: [www.dage-group.com](http://www.dage-group.com) will also give additional details on Dage and its range of products as well as the contact details for your local Dage representative.

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