CellScale
biomaterials testing

BIOTESTER

CATALOGUE

2026

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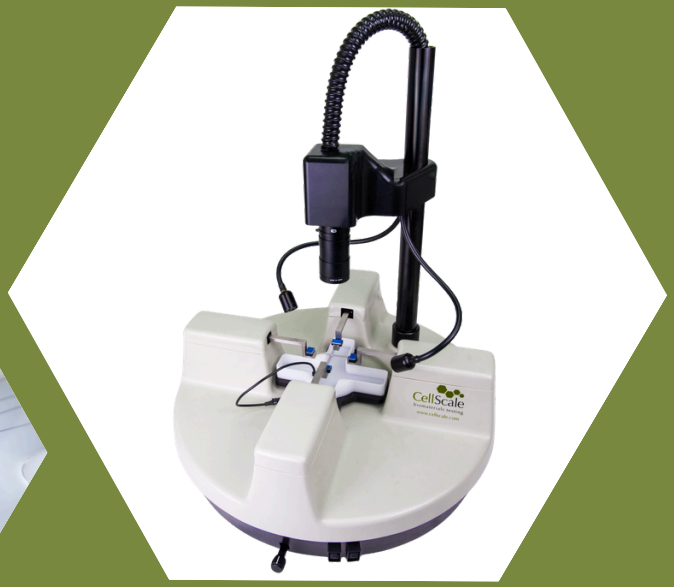
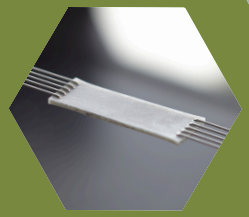
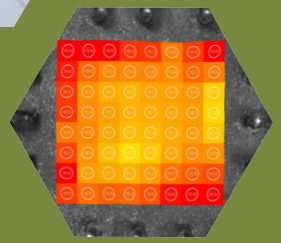
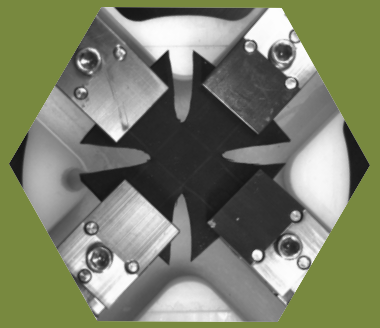
A Precision Biaxial Materials

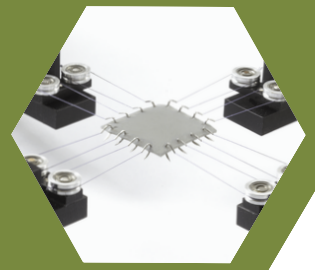


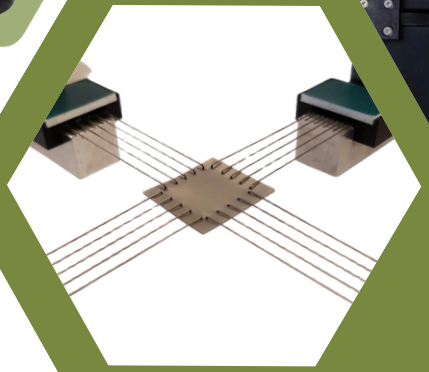


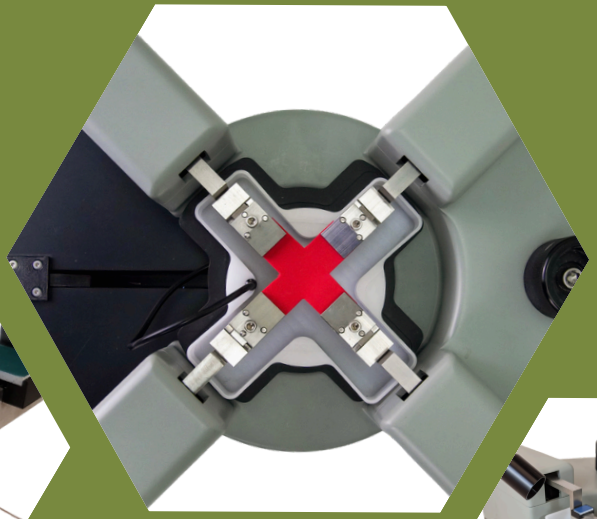


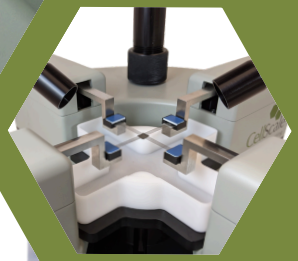


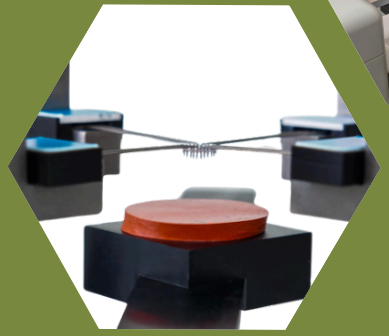
Tester for Your Lab Bench

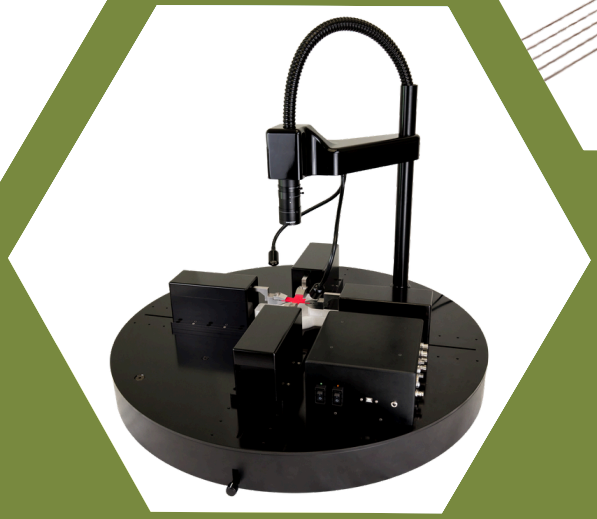












BioTester Series

Benchtop Biaxial Tension Testing Instruments

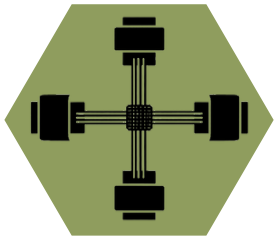
The BioTester series of biaxial testing instruments are designed to deliver accurate and reproducible mechanical property data for natural and engineered soft tissues and materials.

Designed for versatility and ease of use on the benchtop, the BioTester supports a wide range of experimental needs in soft tissue biomechanics and biomaterials research. It's purpose-built for planar biaxial testing and can also be configured for uniaxial testing, giving researchers flexibility across different sample types and study designs. Interchangeable load cells allow users to optimize sensitivity and accuracy for their application, while multiple specimen mounting options support delicate tissues, compliant biomaterials, and stronger soft tissue samples.

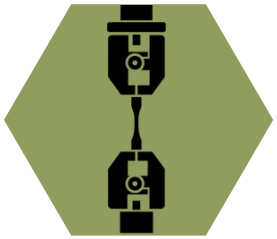
Integrated imaging and strain analysis capabilities allow researchers to capture deformation behaviour alongside force data, while heated media bath configurations support testing in hydrated and physiologically relevant conditions. These features make the BioTester well-suited for evaluating anisotropy, nonlinear response, regional strain patterns, and other materials properties in soft tissues, biomaterials, engineered constructs, and other soft planar materials.

The system's compact footprint and research-focused design make advanced mechanical testing accessible to laboratories that need high-quality biaxial and tensile data in a benchtop format. Intuitive software for testing and post-test analysis, configurable hardware, and efficient workflow options help maximize productivity in both dedicated and shared lab environments.

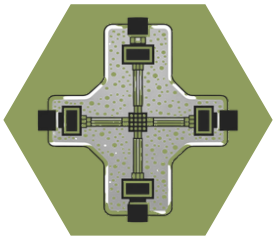
Capabilities



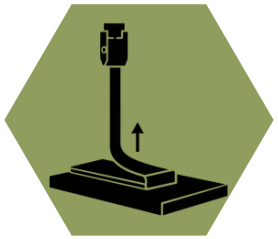
Biaxial Testing



Tensile Testing



Hydrated & Temperature Controlled Testing



Peel Testing

Viscoelastic & Time-Dependent Testing

Micro Mechanical Testing

Digital Image Correlation

CellScale

BioTester Series

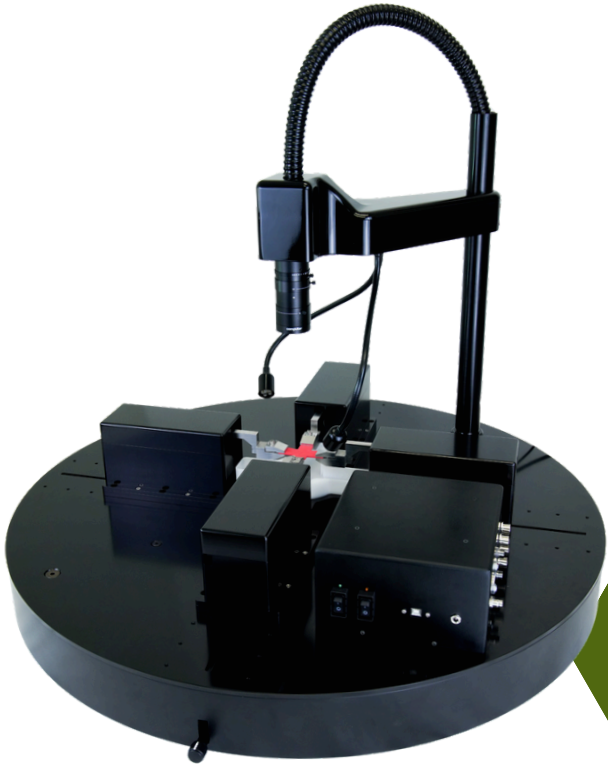
The BioTester series includes three research-ready mechanical testing systems designed for planar biaxial tensile testing of materials such as soft tissues, biomaterials, and engineered constructs. All three models share the same core testing approach, with differences in the standard features, force capacity, specimen size accommodation, and upgrade flexibility.

Choose the Right Device for Your Testing Needs

The BioTester 3000 is a compact, modular entry-level system with optional upgrades for imaging, heated bath testing, higher force, and advanced control modes. The BioTester 5000 includes imaging, strain analysis, a temperature-controlled bath, and full-featured testing capability as standard, while the BioTester 6000 extends the platform to higher forces, larger specimens, and adjustable actuator placement for larger samples and more demanding applications.

BioTester 3000

BioTester 5000



BioTester 6000

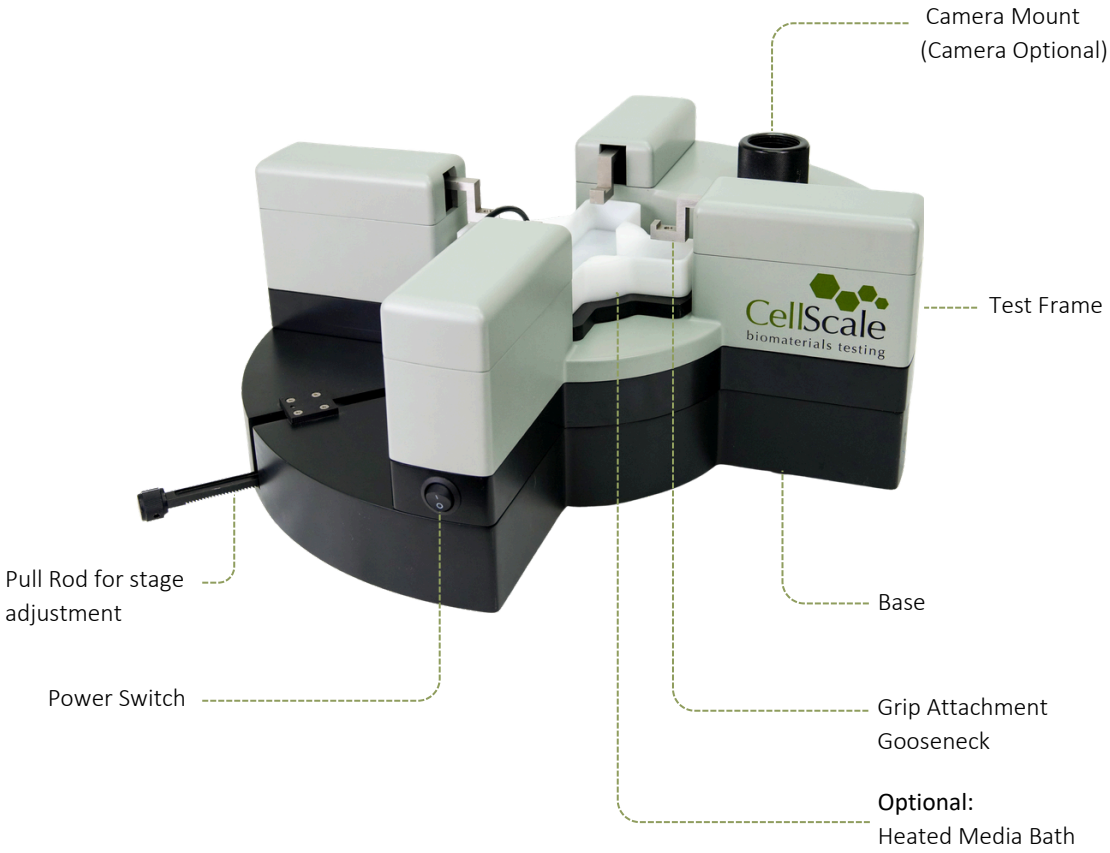
BioTester 3000

BioTester 3000

The BioTester 3000 is a compact planar biaxial testing system for labs that need a flexible starting point for soft tissue and biomaterials mechanics research. Its modular design supports low-force biaxial and uniaxial tensile testing at setup, with upgrade options that allow the system to expand as research needs evolve.

Application Examples

- Small soft tissue mechanical testing
- Hydrogels and soft biomaterials
- Corneal and ophthalmic tissues
- Intervertebral disc lamellae and annulus samples
- Thin membranes and electrospun scaffolds
- Early-stage tissue engineering research
- Labs needing a compact system with upgrade flexibility



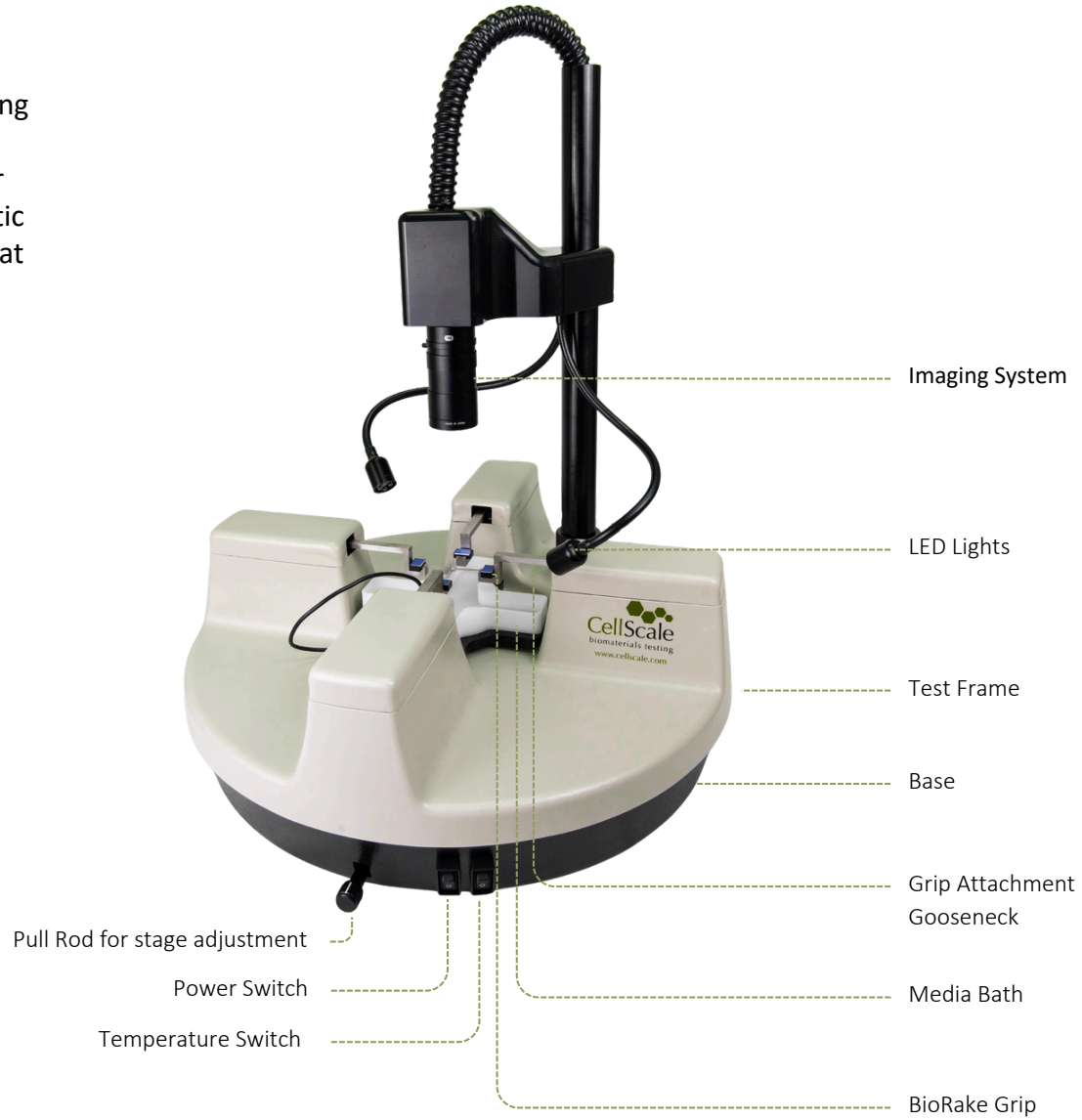
BioTester 5000

BioTester 5000

The BioTester 5000 is the standard full-featured BioTester system, combining planar biaxial loading with integrated imaging, strain analysis, and a temperature-controlled bath. It is well suited for hydrated soft tissue testing, cyclic and viscoelastic studies, and routine biomechanics workflows that require optical strain measurement and physiologically relevant conditions.

Application Examples

- Heart valve and cardiovascular tissue mechanics
- Vascular tissue and graft characterization
- Lung, pleura, and pulmonary tissue biomechanics
- Myocardium and cardiac tissue testing
- Cornea, sclera, and other ocular tissues
- Tissue-engineered matrices and decellularized scaffolds
- Hydrated biomaterials and engineered soft tissues



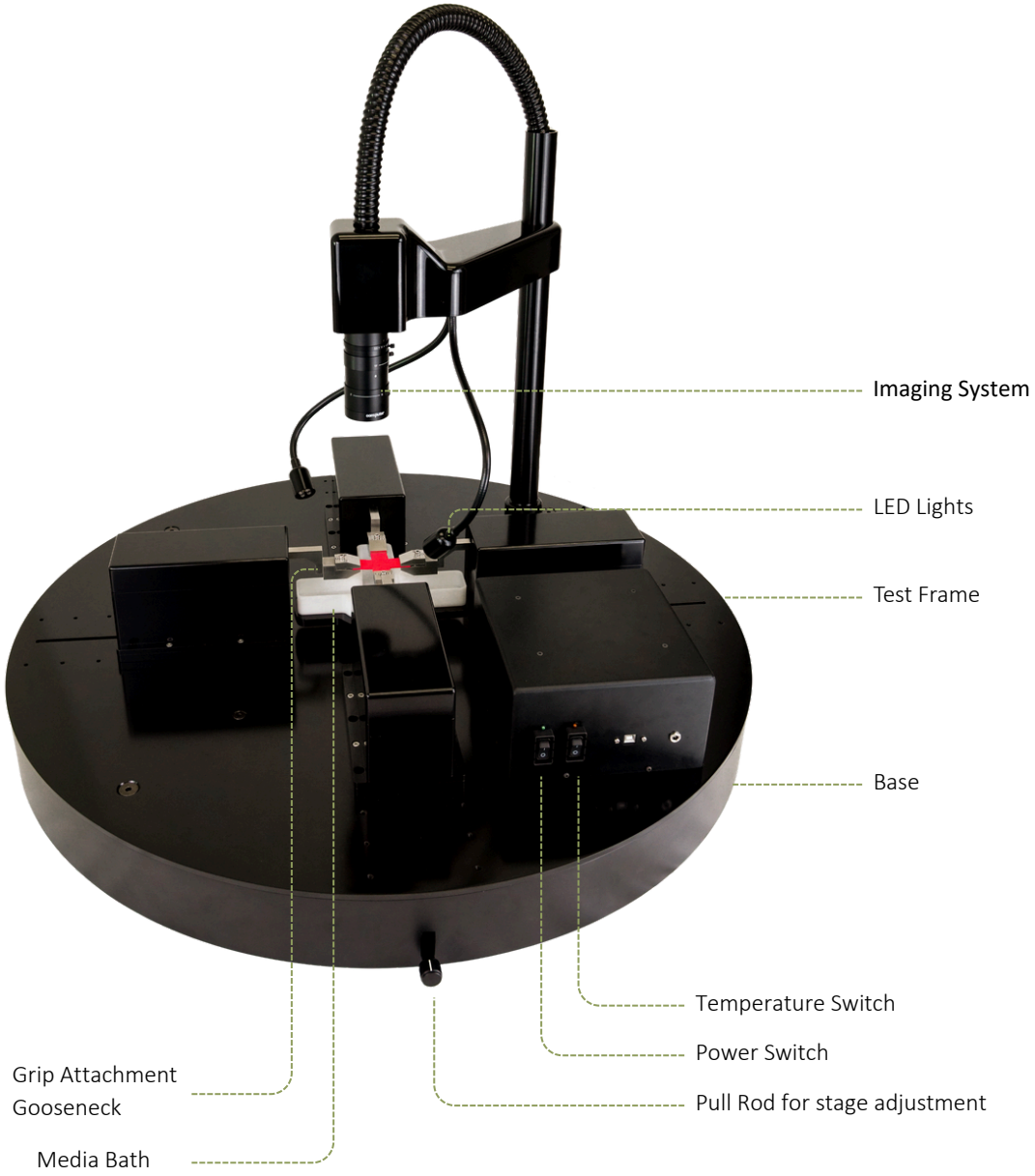
BioTester 6000

BioTester 6000

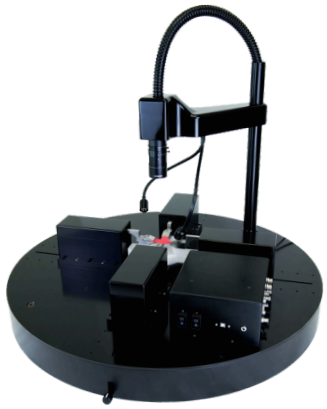
The BioTester 6000 extends capabilities to higher-force testing and larger specimen geometries while maintaining integrated imaging, strain analysis, and heated bath testing. It is ideal for researchers working with stronger tissues, larger biomaterial samples, and applications that benefit from broader force range and adjustable actuator placement.

Application Examples

- Larger vascular specimens
- Stronger tissues and reinforced biomaterials
- Large engineered tissue constructs
- Electrospun mats and filtration materials
- Polymer and elastomer sheet materials
- Device and implant material testing
- Research requiring higher force capacity up to 200 N



BioTester Comparison



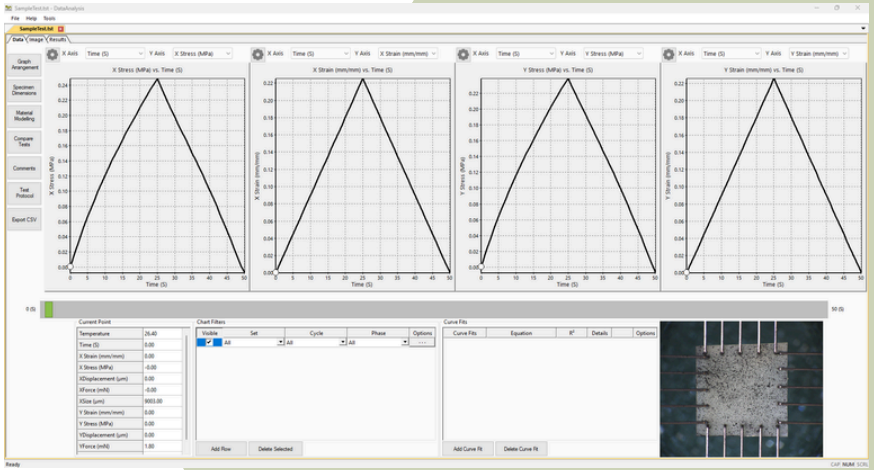
Specification		3000	5000	6000
Dimensions	**(cm)**	46 x 46 x 13	60 x 60 x 80	84 x 84 x 80
Weight	**(kg)**	6 (base model)	18	35
Force Capacity	**(N)**	10 (23 optional)	23	200
Load Cell Range	**(N)**	0.5 - 10 (23 optional)	0.5 - 23	0.5 - 200
Max Grip Separation	**(mm)**	50	80	300 (90 mm stroke)
Max Velocity	**(mm/s)**	20	20	20
Max Data Rate	**(Hz)**	10 (100 optional)	100	100
Media Bath		Optional	Standard	Standard
Imaging		Optional	Standard	Standard
Imaging Frequency	**(Hz)**	Optional (5 or 15)	15	15
Test Control Modes		Displacement (Force optional)	Force & Displacement	Force & Displacement

STANDARD FEATURES

Every BioTester system is delivered as a complete testing platform, with the core hardware, software, and support needed for testing and analysis from day one. Standard features include the BioTester test frame and controller, software, support, warranty coverage, and core biaxial testing hardware, while imaging, heated bath capability, and additional features vary by model and configuration.

Included with the BioTester

- BioTester Test Frame & Controller
- 2 Load Cells (X and Y Axes)
- 5 sets of BioRakes or 1 set of Clamps
- 1 set of Gooseneck Grip Attachments
- 10 Hours of Remote Installation and Training
- Lifetime License to LabJoy Test Control Software
- Lifetime License to Data Analysis Software
- Lifetime Technical Support
- 12 Month Warranty



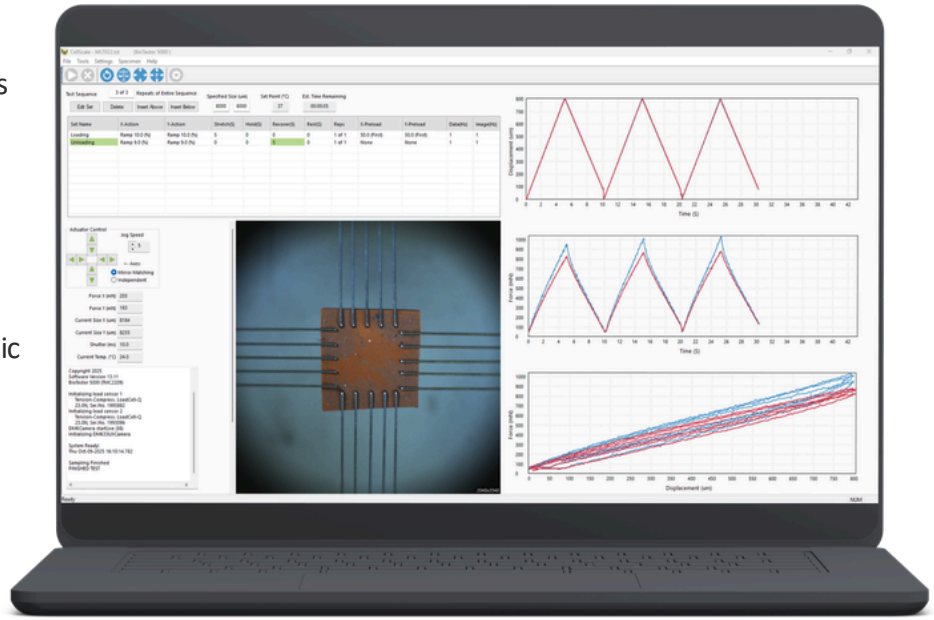
LabJoy Test Software

Our LabJoy Test Control Software is the test execution environment used to design, run, and monitor mechanical testing protocols on the BioTester. It is separate from Data Analysis Software and focuses on protocol setup, real-time control, and synchronized capture of mechanical data and images during testing.

NOTE: A Windows 11-based PC with 2x USB 3.x ports is required to run LabJoy software and connect to the BioTester

What It Does:

- Creates and runs standard and custom test protocols using a table-based parameter editor
- Provides real-time monitoring of force, displacement, and test progress during setup and testing
- Saves repeatable methods using protocol files and reusable templates



Protocol Design and Control:

- Supports common test phases such as ramps, holds, recovery, and cyclic segments
- Control capabilities vary by model and configuration, and can include displacement control, force control, and image-based strain control

Imaging & Data:

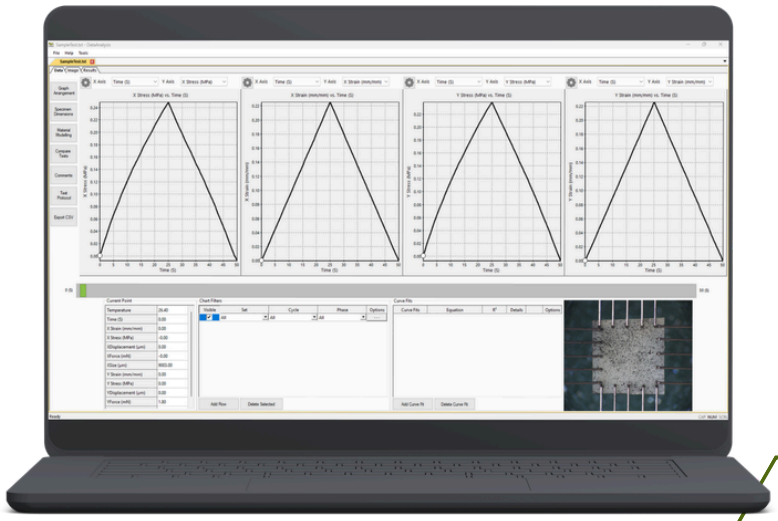
- Captures time-stamped force and displacement test data to CSV for analysis and reporting
- Supports synchronized image capture during testing for playback, documentation, and image-based strain/deformation analysis
- For the BioTester 5000 and 6000, the Imaging System is included as standard; for the BioTester 3000, it is available as an upgrade

Data Analysis Software

The BioTester Data Analysis Software is a post-test analysis environment for interpreting mechanical testing results, turning time-synchronized force, displacement, and image data into stress-strain curves, curve fits, and publishable material properties. It supports comparison across repeated tests and can synchronize mechanical datasets with captured images for clearer interpretation, reporting, and strain-based analysis.

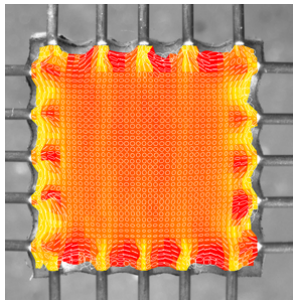
What It Does:

- Post-test mechanical testing data analysis for force, displacement, stress, and strain
- Generation and comparison of force-displacement and stress-strain curves across multiple tests
- Material property extraction tools, including calculation of stiffness, modulus, and other derived parameters
- Viscoelastic analysis support for creep, stress relaxation, hysteresis, and cyclic testing



Visualization and Comparison:

- Comparison of repeated tests or grouped datasets for clearer interpretation
- Customizable graphs for reporting, figure preparation, and publication workflows
- Synchronized review of mechanical data and captured images



Imaging and Export Tools:

- Image-based review and feature measurement tools
- Export of CSV data, images, and video outputs for sharing, reporting, and publication workflows

With Imaging System:

- Non-contact strain measurement using image-based tracking and DIC analysis
- Full-field strain visualization and localized deformation mapping

IMAGING & STRAIN MEASUREMENT

The BioTester helps researchers understand how specimens deform during mechanical testing. With the Scientific Imaging System, the BioTester supports image-based strain measurement, strain and deformation mapping, and optical validation during biaxial and uniaxial tests. These tools are especially useful for soft tissues, biomaterials, and engineered constructs where local deformation, anisotropy, grip behaviour, or hydrated testing conditions make actuator displacement alone an incomplete representation of true specimen strain.

Scientific Imaging System

Digital Image Correlation

The BioTester Scientific Imaging System is a high-performance camera and optics package for the BioTester that enables quantitative image tracking during mechanical testing. It supports image-based strain measurement and strain mapping in CellScale's LabJoy and Data Analsysis software for workflows where non-contact deformation measurement, optical strain validation, and localized strain analysis are important.

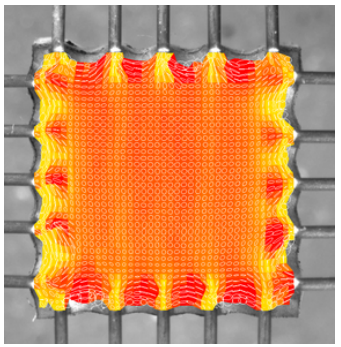
NOTE: The Scientific Imaging System is included with the BioTester 5000 and 6000; available as an upgrade for the BioTester 3000

Scientific Imaging System

With 2048 × 2048 pixel imaging and up to 15 FPS full-frame capture, the Scientific Imaging System supports real-time strain-controlled testing, post-process strain validation for large deformation fields, and repeatable reporting across users and protocols.

Key Features

- Enables image-based strain measurement and strain mapping directly in LabJoy and Data Analysis software
- Supports real-time strain analysis for strain-controlled testing protocols
- High resolution scientific camera: 2048 × 2048 pixels, USB 3.0 connectivity
- Capture performance: up to 15 FPS full-frame, with higher rates for regions of interest
- Varifocal lens with manual adjustment for flexible field of view
- Improves confidence in results by revealing non-uniform deformation, rotation, and grip slip
- Compatible with media bath use where consistent optical tracking is needed



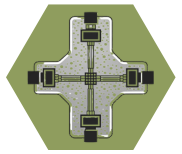
Common Uses

- Digital Image Correlation (DIC) and image-based tracking for non-contact deformation measurement and full-field or ROI strain mapping in soft tissues, hydrogels, scaffolds, membranes, and engineered constructs
- Tensile testing with image-derived strain to validate alignment, detect grip slip, and improve data quality in heart valve, vascular, ocular, and other delicate specimens
- Testing of anisotropic soft tissues where regional strain measurement helps quantify directional mechanical response
- Creep, cyclic, and stress relaxation studies where optical strain improves confidence when actuator displacement is not fully representative of specimen strain
- Hydrated and temperature-controlled testing where synchronized imaging supports strain analysis in physiologically relevant conditions for soft biomaterials and biological specimens

MEDIA BATHS

The BioTester supports mechanical testing in hydrated, temperature-controlled conditions that better reflect *in vivo* research environments. With media bath configurations available across the BioTester series, researchers can test soft tissues, biomaterials, and engineered constructs while maintaining immersion and controlled temperature during biaxial and uniaxial workflows. This is especially important for studies where hydration, thermal conditions, and biologically relevant testing environments influence measured mechanical response.

Media Bath



Hydrated & Temperature Controlled Testing

BioTester media baths enable immersed mechanical testing for hydrated biological specimens and soft biomaterials. With integrated heating up to 40 °C, a media bath comes standard with the BioTester 5000 and 6000 and is available as an upgrade for the BioTester 3000.

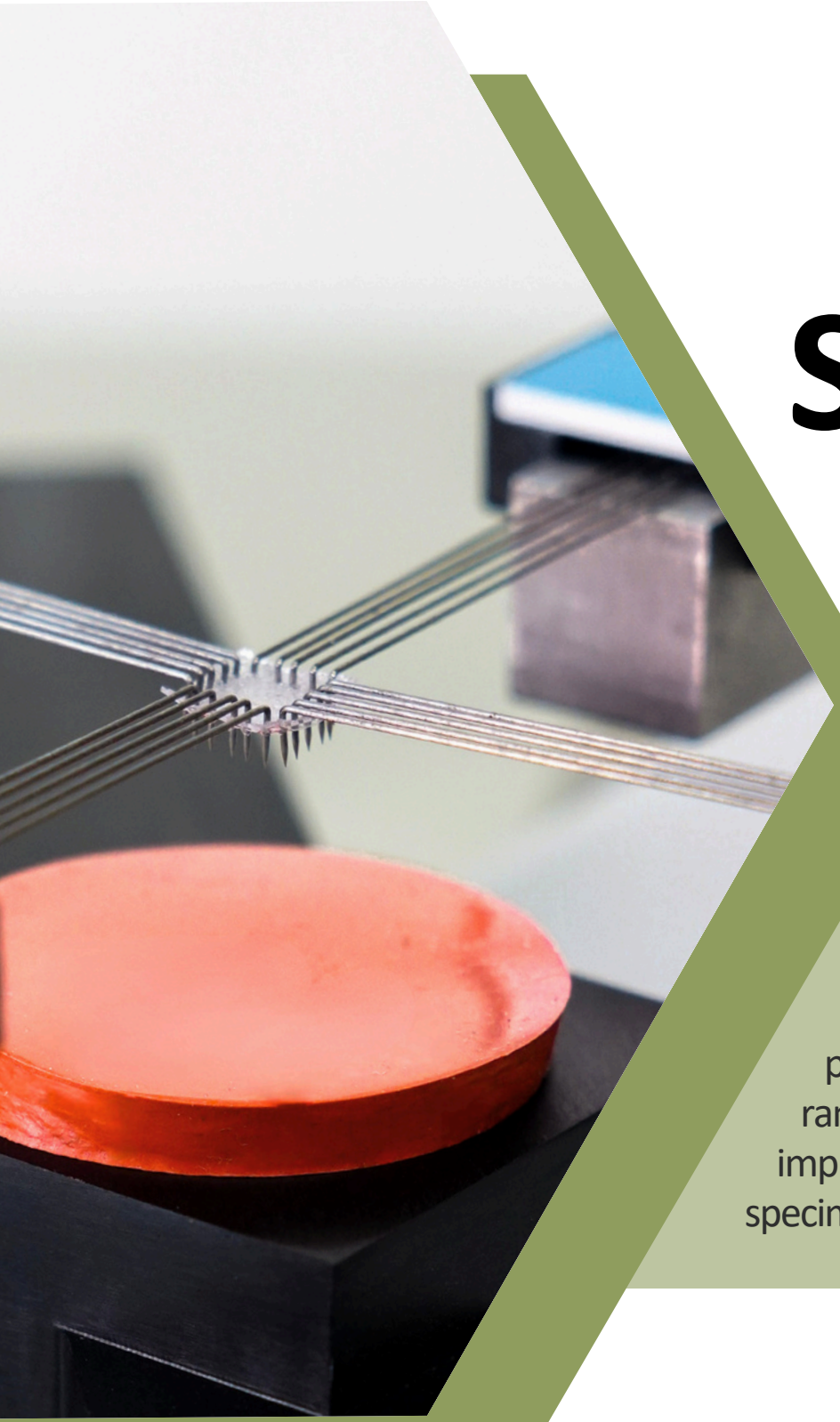
BioTester Media Bath

Key Features

- Simple system to adjust media bath height for sample loading
- Integrated temperature sensor for monitored test conditions
- Media heating up to 40 °C
- BioTester 5000/6000 media bath capacity: 200 mL
- BioTester 3000 media bath capacity: 170 mL
- Compatible with biaxial and uniaxial mechanical testing workflows
- Useful for physiologically-relevant testing
- Supports hydrated testing for soft tissues, biomaterials, and engineered constructs

Common Uses

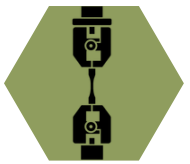
- Hydrated biaxial testing of cardiovascular tissues, heart valves, and vascular samples
- Uniaxial tensile testing of soft tissues under immersed conditions
- Mechanical characterization of cornea, sclera, and other delicate ocular tissues
- Testing of hydrogels, engineered tissues, and decellularized matrices in fluid environments
- Cyclic, viscoelastic, and stress relaxation studies where hydration affects mechanical response
- Comparative testing before and after treatment, incubation, or modification in fluid media
- Research workflows where immersion helps preserve specimen integrity during longer tests

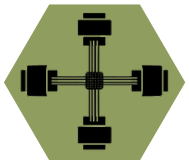


SAMPLE MOUNTING SYSTEMS

BioTester mounting systems are designed to help researchers secure samples with attachment methods that better match specimen geometry and mechanical behaviour. With BioRakes, clamp-based mounting, and pulley-based attachment options, the BioTester supports a wide range of workflows while reducing grip-related artifacts, improving repeatability, and helping preserve more meaningful specimen deformation during testing.

BioRake Mounting


Tensile Testing


Biaxial Testing

BioRakes are patented CellScale devices designed for soft tissues, biomaterials, and engineered specimens that are difficult to secure with conventional clamps. By puncturing and anchoring the sample with fine tungsten tines, BioRakes help reduce grip-induced shear while supporting more natural deformation during loading.

NOTE: A set of 5 BioRakes is included with your BioTester 3000 or 5000 purchase, available as a BioTester 6000 option

BioRake Overview

BioRakes engage the specimen using multiple fine tines, creating a secure attachment that is especially useful for soft, slippery, hydrated, and delicate samples. This mounting approach helps distribute load across the specimen edge, while supporting accurate deformation of the central test region, making it easier to test small biological samples that may tear, slip, or deform unevenly in traditional grips.

Benefits

- Supports more natural specimen deformation during biaxial and uniaxial loading of soft specimens
- Useful for soft, slippery, hydrated, and difficult-to-clamp materials
- Helps improve test repeatability and central-region loading consistency
- Multiple tine spacing options available to better match specimen size
- Suitable for small biological tissues, biomaterials, and engineered constructs

Common Uses

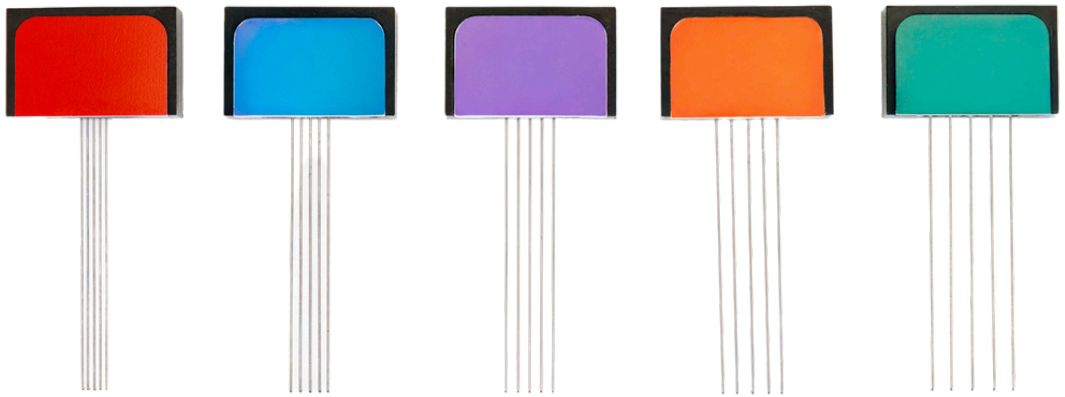
- Planar biaxial testing of heart valve, vascular, lung, skin, and ocular tissues
- Testing of hydrogels, engineered tissues, and decellularized matrices
- Uniaxial tensile testing of soft tissue strips and delicate biological samples
- Hydrated testing where friction-based clamps are less reliable
- Studies where reducing grip artifacts improves strain interpretation and repeatability

BioRake Sizes

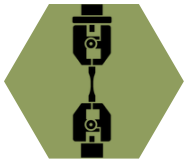
BioRakes are available in multiple tine spacings to help match mounting geometry to specimen size. Selecting the appropriate spacing helps improve attachment quality, central test region definition, and repeatability across soft tissue and biomaterials workflows.

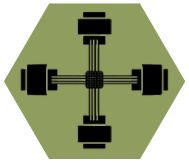
	Tine Spacing (mm)	Total Width (mm)	Specimen Size Guide (mm)	Standard Puncture Depth (mm)
Red	0.7	3.0	3.5-5.0	1.4
Blue	1.0	4.3	5.5-7.0	1.9
Purple	1.3	5.5	7.0-9.5	1.9
Orange	1.7	7.1	9.5-11	1.9
Green	2.2	9.1	11-14	2.4
XL BioRake	3.3	13.5	17-23	2.4
XXL BioRake	4.9	19.9	23-28	2.4

**Custom BioRakes are also available for specialized specimen geometries, thicknesses, and research needs

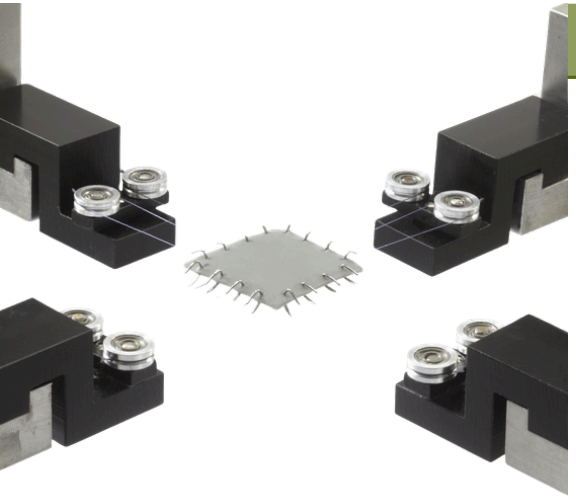


Pulley Mounting


Tensile Testing


Biaxial Testing

The Balanced Pulley Mounting System is a specialized BioTester attachment option for samples that benefit from suture-based or low-shear loading. By using a balanced pulley configuration with puncture attachments, it helps reduce shear at the specimen boundary and supports more controlled loading of delicate tissues, engineered constructs, and custom sample setups.



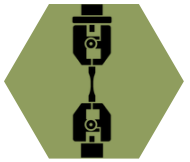
Balanced Pulley Mounting System

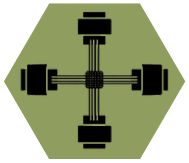
This mounting option is especially useful when conventional edge gripping is not ideal or when researchers want to preserve more natural deformation during loading. It can support specialized tensile workflows involving soft tissues, compliant biomaterials, and custom-mounted specimens where minimizing grip artifacts and boundary-induced shear is important.

Common Uses

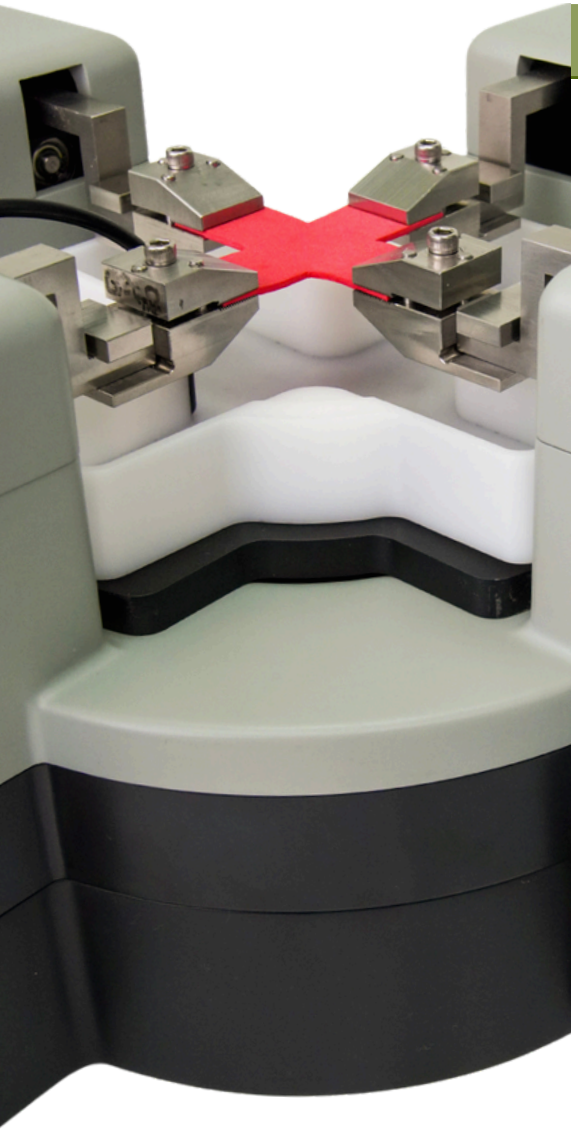
- Suture-based attachment of delicate soft tissue specimens
- Biaxial testing workflows where minimizing shear at the sample boundary is important
- Samples that are difficult to secure directly with BioRakes or clamps
- Custom fixture setups for devices, implants, or attached components
- Repeat-test workflows where specimens may need to be removed and re-mounted
- Imaging-enabled studies where cleaner boundary conditions improve strain interpretation
- Specialized research applications involving anisotropic tissues or non-standard geometries

Clamp Mounting


Tensile Testing

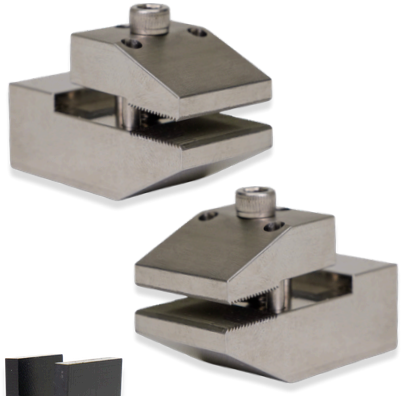

Biaxial Testing

The BioTester Clamp Sample Mounting System provides a non-puncture mounting option for specimens that are better secured by surface gripping than by tine attachment. It is well suited for strips, sheets, and structured biomaterial samples used in uniaxial and selected biaxial testing workflows.



Clamp Mounting System

Clamp mounting is especially useful for specimens that should not be pierced, or for materials with enough edge integrity to benefit from broader-area gripping. The BioTester offers both screw-closure stainless steel clamps for firmer mechanical hold and spring-closure polymer clamps for faster mounting and gentler specimen handling.



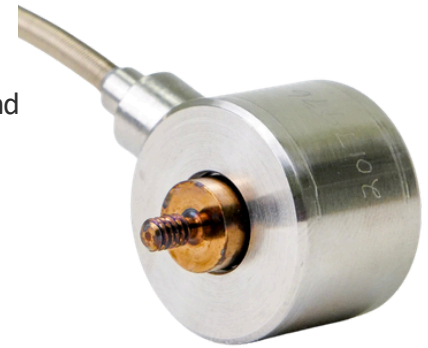
Common Uses

- Biaxial testing of flat scaffold or sheet-like materials with sufficient strength (requires cruciform specimen)
- Uniaxial tensile testing of tissue strips and rectangular specimens
- Testing of biomaterial sheets, films, and electrospun scaffolds
- 3D printed soft materials and engineered constructs
- Ocular, pericardial, and other biological strips that can’t be easily punctured
- Hydrated and temperature-controlled testing of clamp-compatible specimens
- Samples where broader gripping surfaces help improve handling or setup
- Workflows requiring either firmer screw closure or faster spring-loaded mounting

FORCE RANGE & LOAD CELLS

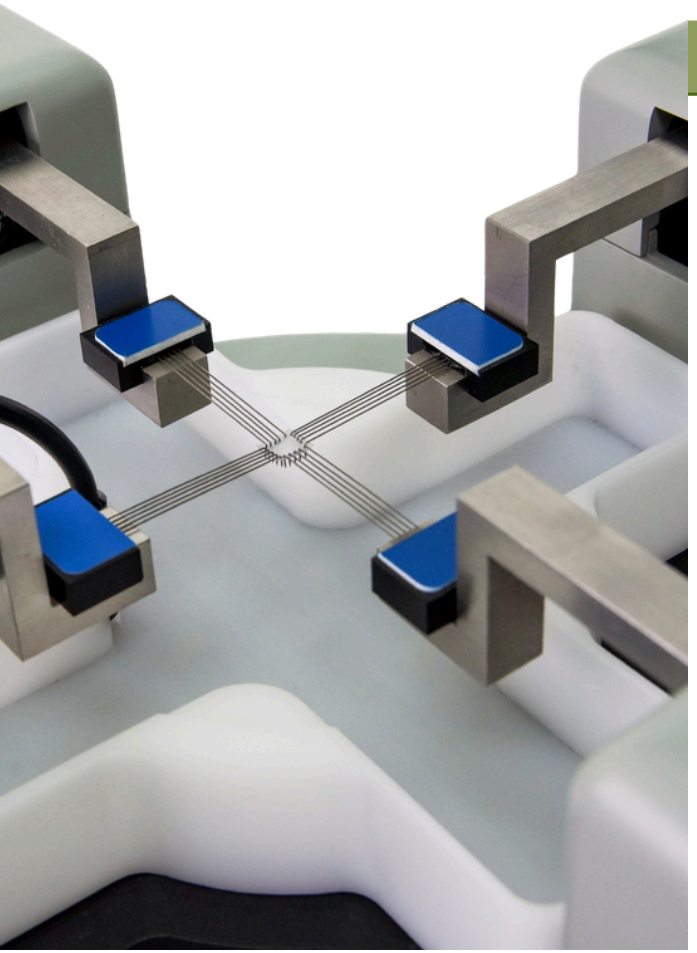
The BioTester force range and load cell options are designed to help researchers select the right balance of sensitivity and force capacity for their application. Using two load cells for biaxial testing, the BioTester supports accurate force measurement across delicate low-force specimens as well as larger and stronger samples on the BioTester 6000.

Low Force Load Cells



BioTester Low Force Load Cells are designed for sensitive measurement of delicate soft tissues, biomaterials, and engineered specimens where low-capacity force measurement and high signal sensitivity are important. They support precise tension testing on the BioTester for the force range most commonly used in soft tissue biomechanics and biomaterials research.

NOTE: A set of 2 Load Cells (one for X axis, one for Y axis) is included with your BioTester purchase



Low Force Load Cells

These load cells cover the 0.5 N to 23 N range used across all models of the BioTester series for low-force applications. Designed for sensitive measurement of soft tissues, biomaterials, and engineered constructs, they help researchers capture low-force tensile response with confidence and precision.

Features & Specifications

- Force range: 0.5 N to 23 N
- Linearity / non-linearity: ±0.15% full scale
- Hysteresis: ±0.15% full scale
- Repeatability / non-repeatability: up to ±0.1% full scale
- Optimized for tensile testing of soft tissues and biomaterials
- High sensitivity for delicate specimens and low-force measurements

Low Force Options

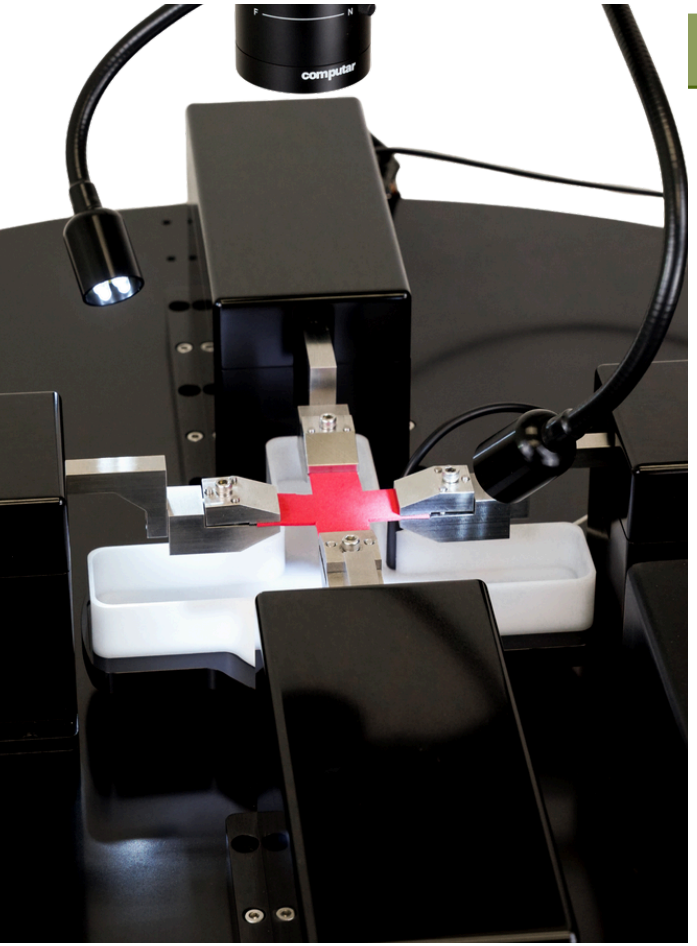
- **0.5 N**
- **1.5 N**
- **2.5 N**
- **5 N**
- **10 N**
- **23 N**

±0.2% overall accuracy

High Force Load Cells

BioTester High Force Load Cells extend measurement capability for stronger tissues, larger specimens, and higher-force biomaterials workflows on the BioTester 6000. They are designed for research applications where greater force capacity is needed while maintaining precise force measurement during biaxial and uniaxial tensile testing.

NOTE: A set of 2 Load Cells (one for X axis and one for Y axis) is included with your BioTester purchase



High Force Load Cells

These load cells cover the 45 N to 200 N range (available on the BioTester 6000 only) for higher-force applications. They are well suited for larger soft tissue specimens, reinforced biomaterials, engineered constructs, and sheet materials that require greater loading capacity than the standard low-force range.

Features & Specifications

- Force range: 45 N to 200 N
- Overall non-linearity: ±0.15% full scale
- Hysteresis: ±0.15% full scale
- Repeatability / non-repeatability: ±0.05% full scale
- Designed for stronger tissues, larger specimens, and higher-force materials testing
- Optimized for higher-force tensile testing on the BioTester 6000

High Force Options

- **45 N**
- **110 N**
- **200 N**

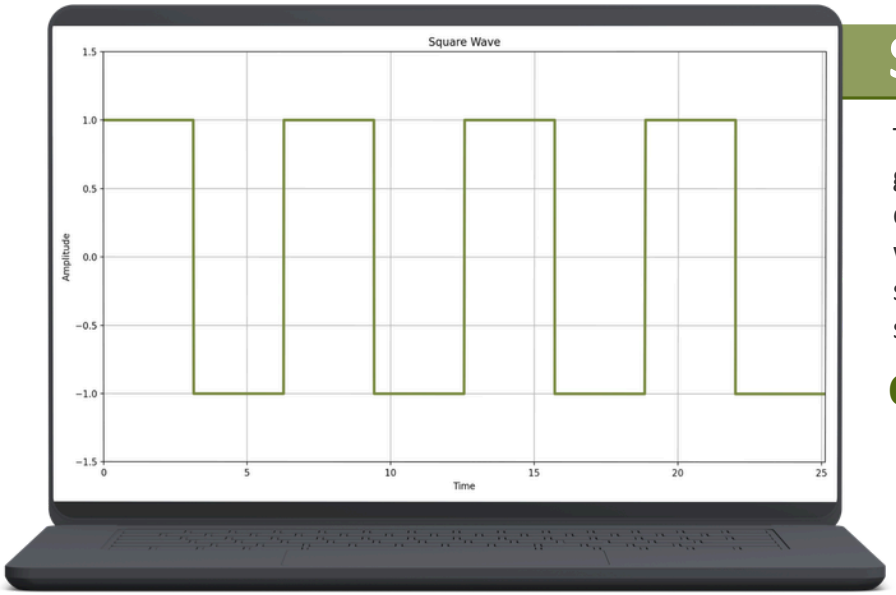
±0.2% overall accuracy

BUILD UPGRADES

BioTester build upgrades allow researchers to expand system capability as testing needs evolve. This is especially important for the BioTester 3000, where upgrade options can add imaging, environmental control, higher force capacity, faster data collection, and advanced control modes, helping the system scale toward more advanced soft tissue and biomaterials workflows.

Sync Pulse Upgrade

The Sync Pulse Upgrade adds a sync pulse output and programmable virtual COM port to enable precise timing alignment between BioTester tests and external equipment. It is intended for integrated experiments where mechanical loading must be triggered or synchronized with imaging, sensors, DAQ systems, or automated rigs, and is available for the BioTester 3000, 5000, and 6000.



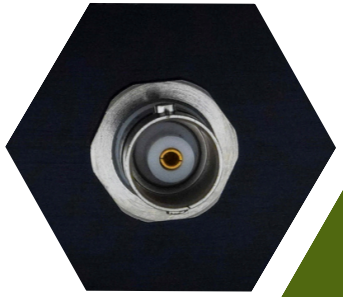
Sync Pulse Upgrade

The Sync Pulse upgrade adds connectors and software for generating a configurable sync pulse or command string during BioTester testing. It enables time-aligned experiments where BioTester force, displacement, and image data must be synchronized with other instruments or external control systems.

Common Uses

- Synchronizing BioTester tests with external cameras, sensors, or data acquisition systems
- Aligning BioTester test timing with third-party measurement equipment
- Triggering external acquisition or recording devices during a test
- Coordinating mechanical test data with electrical, optical, thermal, or physiological measurements
- Integrating the BioTester into custom automated lab setups
- Enabling communication with external instruments through the programmable virtual COM port
- Simplifying multi-instrument experiments by improving timing alignment across devices
- Supporting custom research workflows that require synchronized control and data logging

View of the Sync Pulse port



BioTester 3000 Imaging & Environment Upgrades

BioTester 3000 Imaging & Environment Upgrades allow researchers to expand the system with imaging and hydrated, temperature-controlled testing capabilities for more advanced soft tissue and biomaterials workflows. These upgrades help the BioTester 3000 support synchronized image capture, strain analysis, and immersed testing conditions that are especially useful for delicate biological specimens and engineered constructs.

NOTE: These upgrades are only for the BioTester 3000 (already included with the 5000 & 6000), and can be purchased individually

Imaging & Environment Upgrades

Available upgrades include the Scientific Imaging System Upgrade and Heated Media Bath Upgrade. These options allow the BioTester 3000 to move beyond basic mechanical testing and support image-enabled workflows, hydrated testing, and more physiologically relevant experimental conditions.

Benefits

- Extends the useful range of the platform as project needs grow
- Helps scale the BioTester 3000 toward more advanced research applications
- **Scientific Imaging System Upgrade**: adds synchronized image capture during testing
  - Supports image-based strain measurement and strain mapping workflows
- **Media Bath Upgrade**: enables immersed testing for hydrated specimens and soft biomaterials
  - Supports temperature-controlled media testing up to 40 °C
- Improves support for soft tissues, hydrogels, engineered tissues, and other delicate samples
- Enables more advanced image-linked interpretation of mechanical test results

Upgrade Options

Scientific Imaging System Upgrade

Media Bath Upgrade

BioTester 3000 Performance & Capability Upgrades

BioTester 3000 Performance & Capability Upgrades allow researchers to expand the force range, data collection speed, image rate, and control options of the system as testing requirements change over time. These upgrades help the BioTester 3000 support a broader range of soft tissue, biomaterials, and engineered construct workflows.

NOTE: These upgrades are only for the BioTester 3000 (already included on the 5000 & 6000), and can be purchased individually

Performance Upgrades

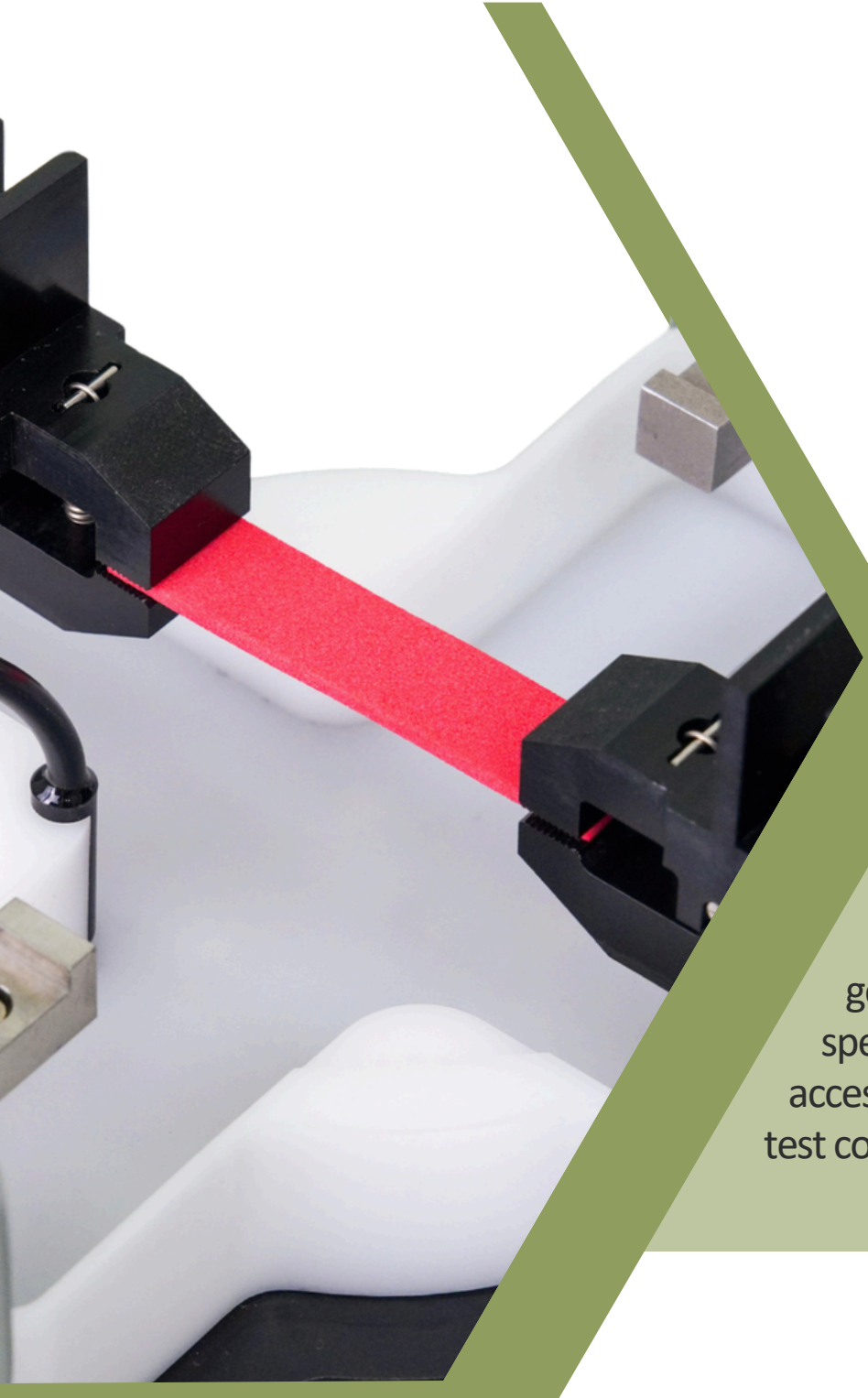
Available upgrades include the 23 N Force upgrade, 100 Hz Data Rate upgrade, 15 Hz Image Rate upgrade, and Force Control upgrade. These options allow the BioTester 3000 to move beyond basic low-force testing and support faster, higher-force, and more demanding experimental protocols.

Upgrade Options

- **23 N Force Upgrade**
- **100 Hz Data Rate Upgrade**
- **15 Hz Image Rate Upgrade**
- **Force Control Upgrade**

Benefits

- Extends the useful range of the platform as project needs grow
- Helps scale the BioTester 3000 toward more demanding research applications
- **Force Upgrade**: Expands BioTester 3000 force capacity up to 23 N (from 10 N)
  - Supports testing of stronger tissues, larger specimens, and more robust biomaterials
- **Data Rate Upgrade**: Increases data collection speed (from 10 Hz to 100 Hz) for faster or more dynamic workflows
- **Image Rate Upgrade**: Enables 15 Hz image rate capturing with the Scientific Imaging System (purchased separately)
- **Force Control Upgrade**: Adds force control capability (in addition to displacement control) for additional protocol flexibility
  - Supports more advanced cyclic, viscoelastic, and custom test methods



ACCESSORIES

BioTester accessories support day-to-day testing workflows, specimen preparation, and hardware replacement across the BioTester platform. From replacement goosenecks matched to BioRake size and force range, to specimen cutters that help standardize sample geometry, these accessories help researchers maintain repeatable setup and reliable test conditions.

Accessories

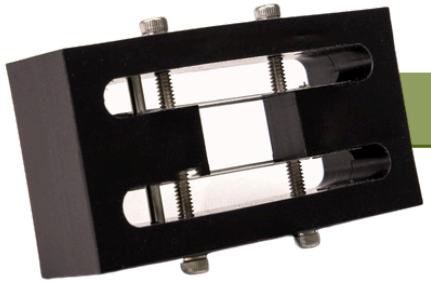
Goosenecks and sample preparation tools help support consistent BioTester setup before testing begins. Together, they help researchers match mounting hardware to specimen geometry and prepare samples with dimensions suited to repeatable biaxial and tensile workflows.

Goosenecks

Goosenecks are matched to specific BioRake sizes, and are provided with the BioTester purchase. The goosenecks listed here are available as replacement hardware for your BioTester system.

Gooseneck Sizes

- Low Force (BioTester 3000, 5000, and 6000):
  - Set of 4 Goosenecks for:
    - 0.7mm-2.2mm BioRakes
    - 3.3mm-4.9mm XL BioRakes
- High Force (BioTester 6000):
  - Goosenecks for High Forces (45 N to 200 N)

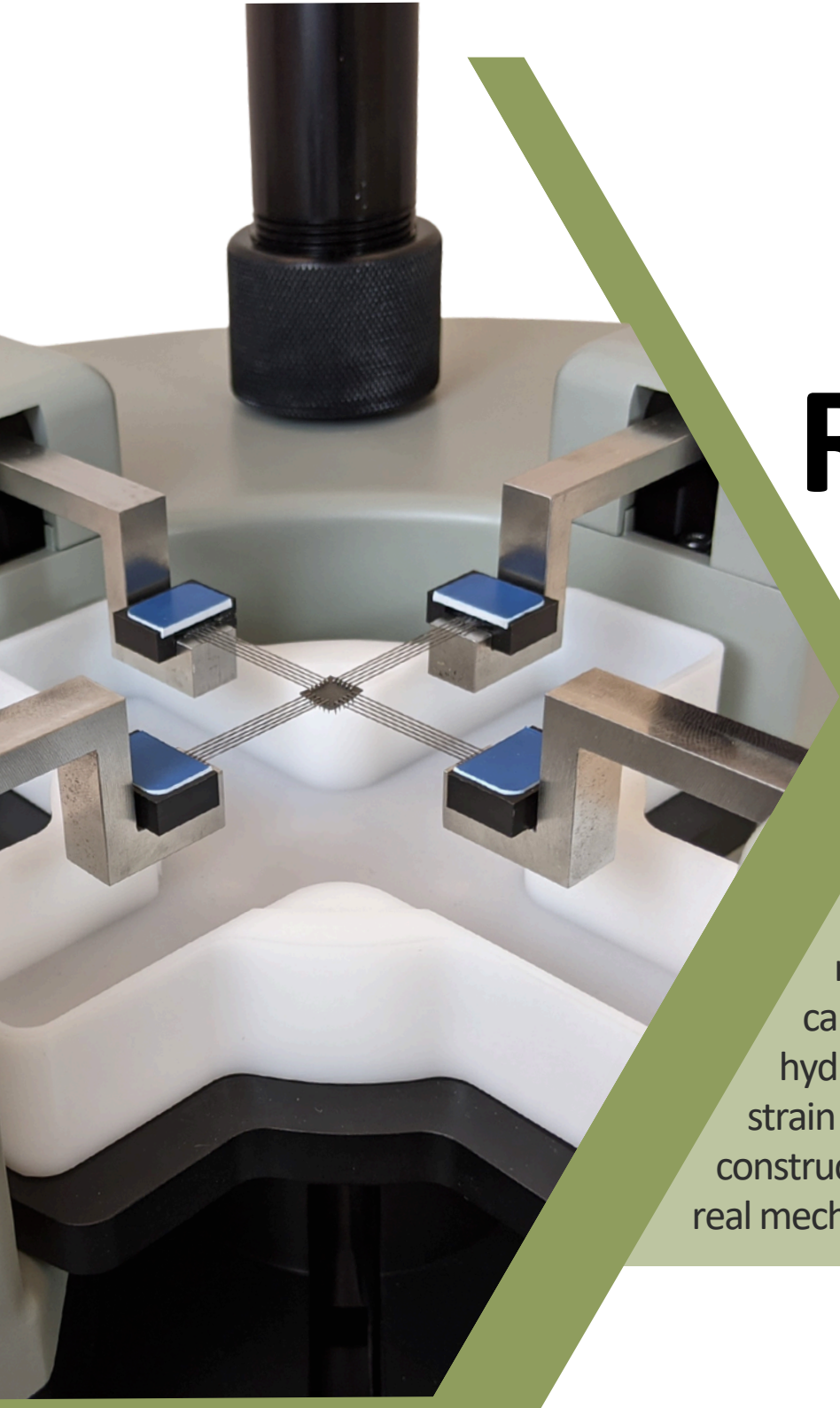


Sample Preparation Cutters

Sample Preparation Cutters are matched to standard BioRake sizes and are available to help produce specimens with more consistent size and geometry before testing. Standardized sample dimensions can improve repeatability across studies, support more uniform mounting, and simplify comparison across specimens and cohorts.

Cutter Sizes

- 4.4 mm
- 6.2 mm
- 8.0 mm
- 10.4 mm
- 13.4 mm



RESEARCH APPLICATIONS

The BioTester supports a wide range of biomechanics, biomaterials, and tissue engineering applications where accurate force measurement, controlled loading, and meaningful specimen deformation are important. With capabilities for planar biaxial testing, uniaxial tensile testing, hydrated and temperature-controlled workflows, imaging, and strain analysis, it helps researchers study native tissues, engineered constructs, and soft biomaterials under conditions that better reflect real mechanical behaviour.

Applications & Sample Types

The BioTester is used in many biomechanics, biomaterials, and tissue engineering research labs where accurate force measurement, controlled loading, and measured specimen deformation are critical. The BioTester helps researchers study both native tissues and engineered materials under physiologically relevant conditions.

Cardiovascular Tissue Mechanics

Aortic tissue, myocardium, vascular grafts, arteries, arterial remodeling, veins, calcified vessels, vascular implants, cardiovascular patch materials

Heart Valve Biomechanics

Native and engineered valve leaflets, leaflet anisotropy, tissue remodeling, replacement biomaterials

Skin and Wound Healing Biomechanics

Native skin, wound repair materials, electrospun patches, mechanically active healing environments

Tendon and Ligament Mechanics

Tendon, ligament, aponeurosis, other aligned collagenous tissues with direction-dependent response

ECM and Decellularized Matrix Mechanics

Decellularized tissues, extracellular matrix scaffolds, mechanically preserved biological templates

Hydrogels and Biomaterials

Hydrogels, soft polymers, membranes, thin films, conductive materials, compliant engineered constructs

Mechanobiology

Studies linking structure, loading, stiffness, strain, remodeling across tissues and engineered systems

Microtissue and Organoid Mechanics

Small engineered tissues, fused microtissue constructs, tissue mimetics, delicate *in vitro* models

BioTester Use Cases

Researchers use the BioTester to characterize both biological tissues and engineered materials under loading conditions that better reflect real mechanical behaviour. Across published studies, the platform is commonly used to evaluate anisotropy, nonlinear tensile response, viscoelasticity, regional strain, and the effects of disease, preservation, processing, or material design on mechanical performance.

Native Tissue Biomechanics

Used for soft tissue mechanics in heart valves, blood vessels, myocardium, lung and pleura, annulus fibrosus, cornea, sclera, tendon, ligament, skin, and pelvic tissues

Engineered Tissues and Regenerative Materials

Used to evaluate tissue-engineered matrices, decellularized scaffolds, vascular grafts, cartilage constructs, corneal patches, and engineered soft tissue replacements

Hydrogels, Membranes, and Soft Biomaterials

Used for hydrogels, electrospun scaffolds, elastomers, soft polymers, thin films, adhesive materials, and other compliant biomaterials where low-force measurement and optical strain tracking are important

Constitutive Modeling and Simulation Inputs

Used to generate stress-strain and strain-mapping data for constitutive modeling, finite element simulations, inverse characterization, and machine learning-based material modeling

Comparative and Treatment Studies

Used to compare native versus diseased tissues, preserved versus fresh tissues, treated versus untreated biomaterials, and pre- versus post-modification mechanics

Image-Enabled Soft Tissue Workflows

Used in studies where synchronized imaging, DIC-style strain analysis, and hydrated testing improve interpretation of anisotropic or heterogeneous deformation

CellScale
biomaterials testing

www.cellscale.com
+1-519-342-6870
5-564 Weber Street N
Waterloo, ON N2L 5C6
Canada