

HERCULI

PRODUCT BROCHURE

Biaxial Multichannel
Mechanical Testing System

Contact Information:

+44 (0) 7961844975
herculi@herculi.com
www.herculi.com

John Eccles House,
Robert Robinson Avenue,
Oxford Science Park,
Oxford, OX4 4GP, England

NEW METHODS
FOR MECHANICAL TESTING



COMPANY PROFILE

HERCULI, headquartered in Oxford, UK, specializes in the R&D, manufacturing, sales, and servicing of mechanical testing instruments, offering total solutions for both static and dynamic testing.

The HERCULI Biaxial Multichannel Coordinated Loading Testing System is widely applied in aerospace, ocean engineering, construction, and transportation. Through coordinated loading, it characterizes material strength, deformation, and failure under biaxial stress, making it an essential tool for engineering design and scientific research.

The system ensures precise load and displacement control for reliable data. It incorporates overload, power-failure, and emergency-stop protection to safeguard operators. Designed for easy operation and maintenance, it also integrates Digital Image Correlation (DIC) technology to enhance efficiency and measurement accuracy.

4^{NPU}
Professors

20+
Systems Delivered

1000+
Biaxial Test Cases

5000+
Professionals Served

Table of Contents

01

Vertical Biaxial
Testing Machine

09

Hydraulic
Vertical Biaxial
Testing Machine

13

Biaxial Testing Machine
for Biomaterials

15

environmental chamber

21

Multi-channel coordinated
loading system & 3D-DIC

05

Tabletop Biaxial
Testing Machine

11

In-Situ
Benchtop Biaxial
Testing Machine

14

Biaxial Fatigue
Testing Machine

17

Customized Products

23

Test Cases

NOIA

Flagship Model

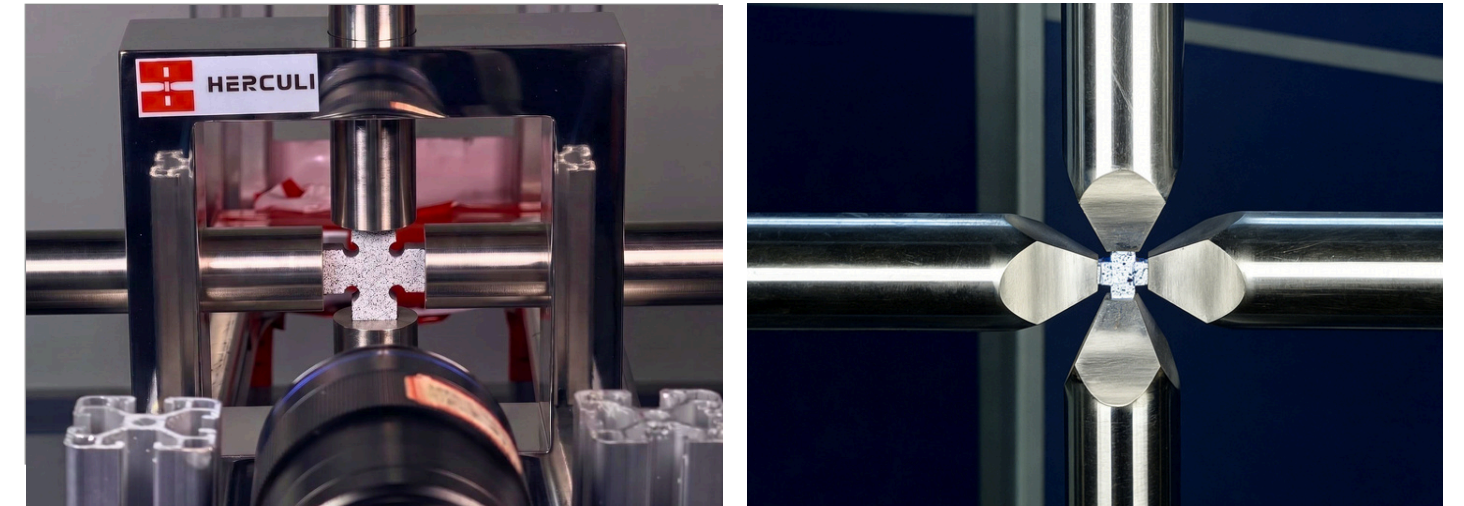
Vertical Biaxial Testing Machine

Performance Features

- Load capacity up to 500 kN
- Applicable to metals, composites, ceramics, and concrete
- Multiple loading modes: T-T, T-C, C-C
- Optional strain gauges and DAQ for variable-ratio loading at designated positions, and compatible with optical strain measurement systems

NOIA - Vertical Biaxial Testing Machine

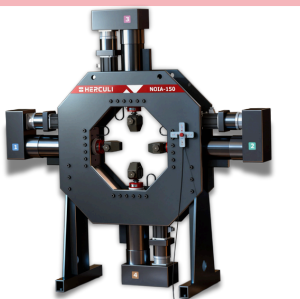
Product Gallery



Technical Specifications

| Model | NOIA-50 | NOIA-150 | NOIA-250 | NOIA-300 | NOIA-500 |
|-------------------------------------|---------|----------|----------|----------|----------|
| Load kN* | 50 | 150 | 250 | 300 | 500 |
| Stroke mm* | 50-200 | 50-200 | 50-200 | 50-200 | 50-200 |
| Load Accuracy % | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Displacement Accuracy μm | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Maximum Speed mm/min* | 10 | 10 | 10 | 10 | 10 |

Note: Parameters marked with * can be customized according to user requirements and specific applications.



MANTIS

Reliable and Lightweight Tabletop Biaxial Testing Machine

Performance Features

- Lightweight, compact
- Tension/compression, quasi-static & low-cycle fatigue testing of planar specimens
- Multiple loading modes: T-T, T-C, C-C
- All-digital control for precise, stable load/displacement ratio

MANTIS - Tabletop Biaxial Testing Machine

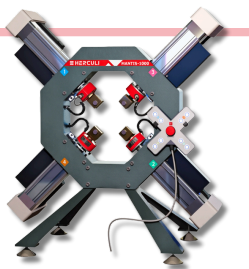
Product Gallery



Technical Specifications

| Model | Mantis-100 | Mantis-200 | Mantis-500 | Mantis-1000 | Mantis-3000 |
|-------------------------------------|------------|------------|------------|-------------|-------------|
| Load kN* | 1 | 2 | 5 | 10 | 30 |
| Stroke mm* | 50-100 | 50-100 | 50-100 | 50-100 | 50-100 |
| Load Accuracy % | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Displacement Accuracy μm | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Maximum Speed mm/min* | 10 | 10 | 10 | 10 | 10 |

Note: Parameters marked with * can be customized according to user requirements and specific applications.



AQUA

The New Hydraulic Vertical Biaxial Testing Machine

Performance Features

- Load capacity up to 500 kN
- Applicable to metals, composites, ceramics, and concrete
- Multiple loading modes: T-T, T-C, C-C
- Optional strain gauges and DAQ for variable-ratio loading at designated positions, and compatible with optical strain measurement systems

AQUA - Hydraulic Vertical Biaxial Testing Machine

Product Gallery



Hydraulic Unit

Technical Specifications

| Model | Aqua-10T | Aqua-30T | Aqua-50T |
|-------------------------------|----------|----------|----------|
| Load kN* | 100 | 300 | 500 |
| Stroke mm* | 50-200 | 50-200 | 50-200 |
| Load Accuracy % | 0.1 | 0.1 | 0.1 |
| Displacement Accuracy μ m | 0.1 | 0.1 | 0.1 |
| Maximum Speed mm/min* | 10 | 10 | 10 |

Note: Parameters marked with * can be customized according to user requirements and specific applications.

XIS

The New In-Situ Benchtop Biaxial Testing Machine

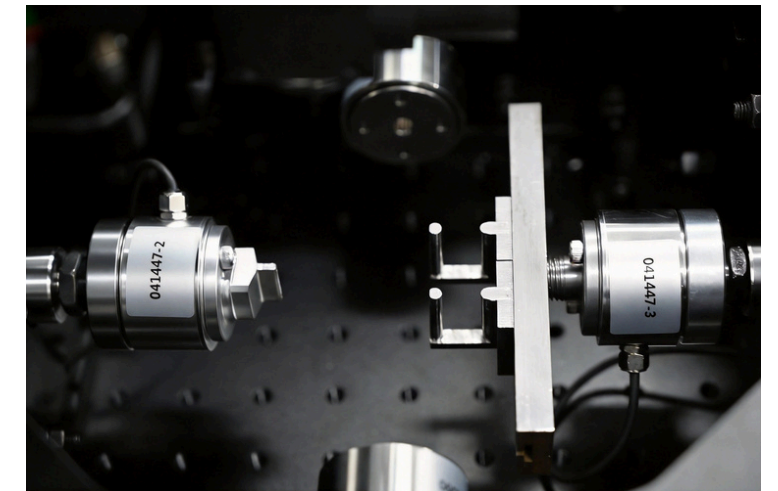
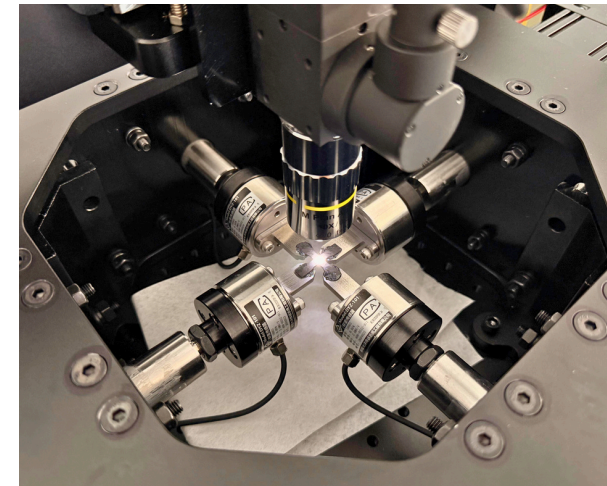
Performance Features

- Lightweight, compact
- Supports in-situ microscopy for real-time observation
- Tension/compression, quasi-static & low-cycle fatigue testing of planar specimens
- All-digital control for precise, stable load/displacement ratio

XIS -

In-Situ Benchtop Biaxial Testing Machine

Product Gallery



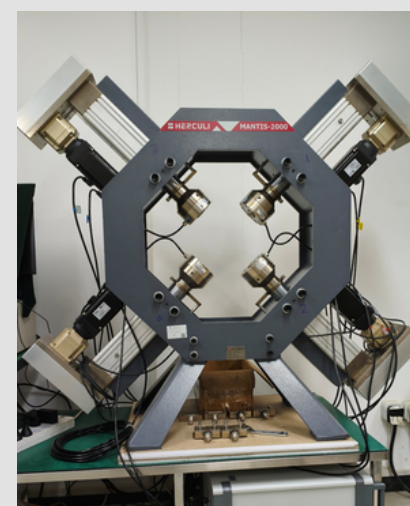
Technical Specifications

| Model | XIS-50 | XIS-500 | XIS-1000 |
|-------------------------------------|--------|---------|----------|
| Load kN* | 50 | 500 | 1000 |
| Stroke mm* | 50-100 | 50-100 | 50-100 |
| Load Accuracy % | 0.1 | 0.1 | 0.1 |
| Displacement Accuracy μm | 0.1 | 0.1 | 0.1 |
| Maximum Speed mm/min* | 10 | 10 | 10 |

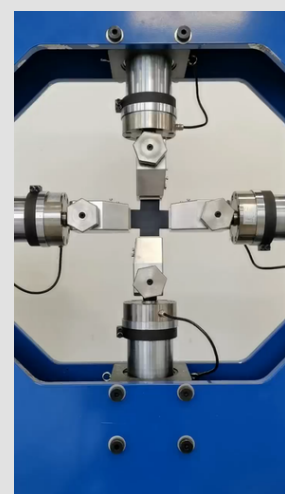
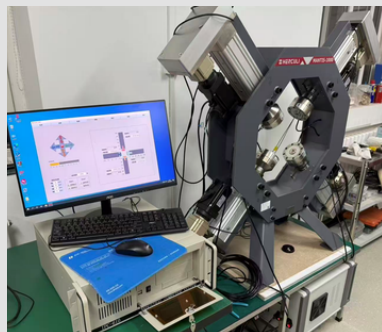
Note: Parameters marked with * can be customized according to user requirements and specific applications.

Delivery Cases

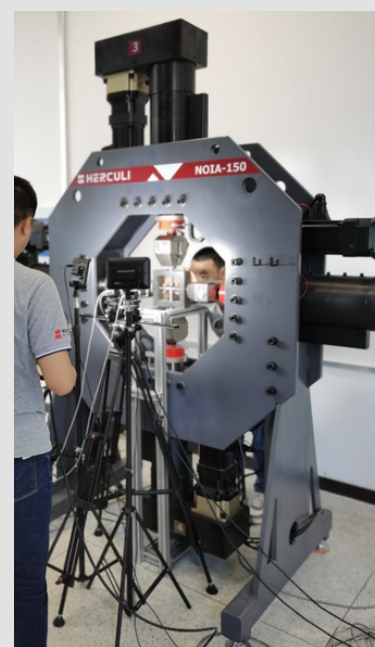
Partnering with leading institutions to advance mechanical testing in the digital-intelligent era.



MANTIS - 2000
Chang'an University
2026 March



NOIA - 50
Northwestern
Polytechnical University
2022 January



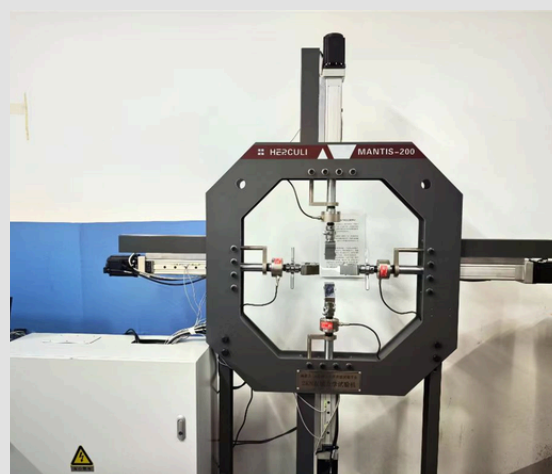
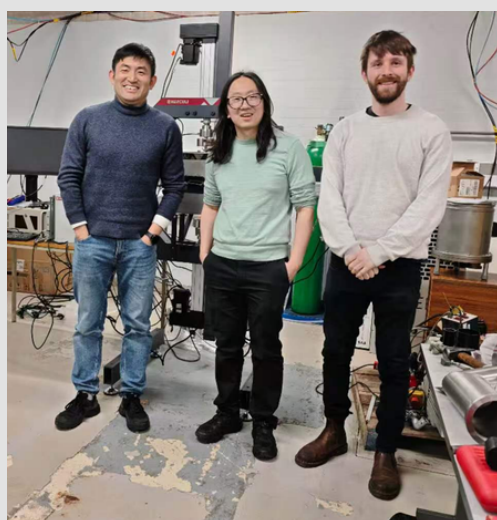
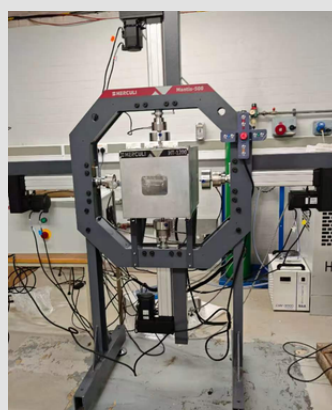
NOIA - 150
Northwestern
Polytechnical University
2022 October



NOIA Pending
Delivery
Deep-
Sea

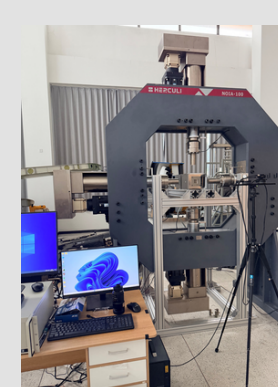
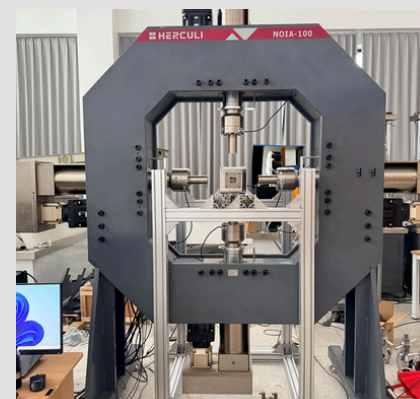


MANTIS - 2000
University of Birmingham
2026 February

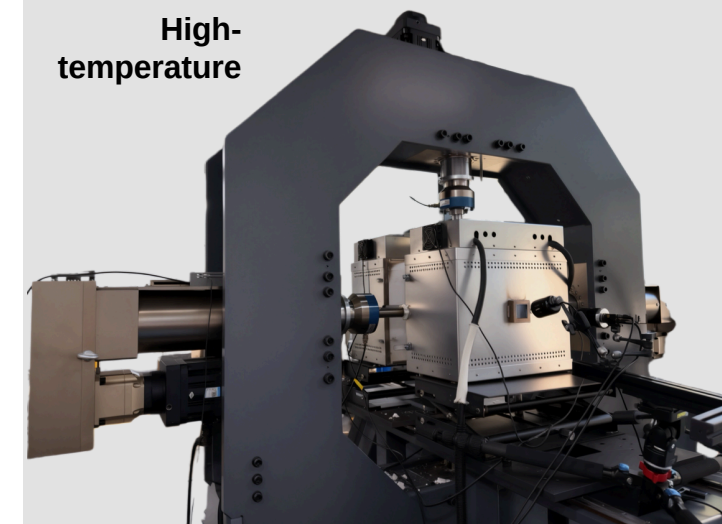


MANTIS - 200
Beijing Institute of Technology
2024 December

NOIA - 100
Donghua University
2025 October



NOIA Pending Delivery
High-
temperature

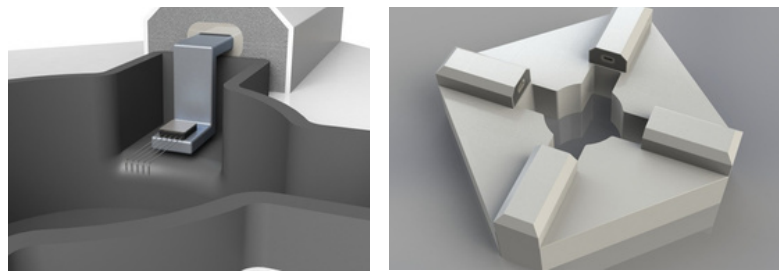


Other Testing Machines

DragonFly - Biaxial Testing Machine for Biomaterials

Performance Features

- Biaxial testing of biomaterials, soft tissues, films, and more
- Optional biological grips with magnetic fixation for easy in-situ exchange
- Compatible with water baths, heated liquids, and other environments



DF-25 Biaxial Testing Machine – Overall and Detail Views



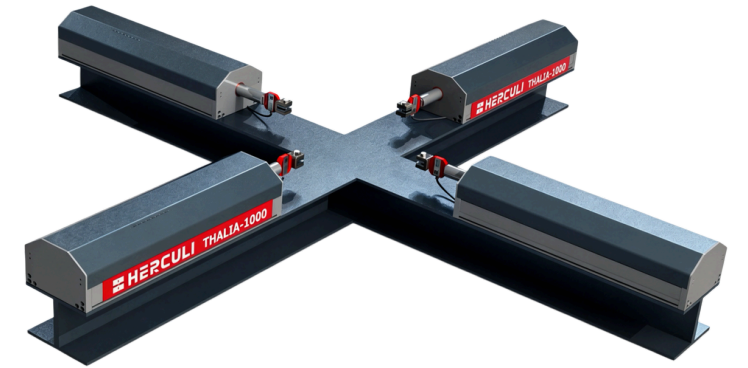
| Model | DF -5 | DF-10 | DF-15 | DF-25 | |
|-------------------------------------|--------------|--------|--------|--------|---------|
| Load N* | Static Load | 5-20 | 5-60 | 5-80 | 5-100 |
| | Dynamic Load | 50-200 | 50-600 | 50-800 | 50-1000 |
| Stroke mm* | 0-30 | 0-30 | 0-30 | 0-30 | |
| Load Accuracy % | 0.1 | 0.1 | 0.1 | 0.1 | |
| Displacement Accuracy μm | 0.1 | 0.1 | 0.1 | 0.1 | |

Note: Parameters marked with * can be customized according to user requirements and specific applications.

THALIA - Biaxial Fatigue Testing Machine

Performance Features

- Suitable for high-strength materials such as miniature metals and standard-sized plastics
- Compatible with various grips for tensile and compression testing
- Equipped with a next-generation linear motor actuator for high-frequency symmetric fatigue loading



| Model | Thalia-100 | Thalia-1000 | Thalia-5000 |
|-------------------------------------|------------|-------------|-------------|
| Load N* | 100 | 1000 | 5000 |
| Stroke mm* | 50-300 | 50-300 | 50-300 |
| Cyclic Loading Frequency HZ | 0-200 | 0-200 | 0-200 |
| Load Accuracy % | 0.1 | 0.1 | 0.1 |
| Displacement Accuracy μm | 0.1 | 0.1 | 0.1 |
| Maximum Speed mm/min* | 20 | 30 | 35 |

Note: Parameters marked with * can be customized according to user requirements and specific applications.

DragonFly
Biaxial Testing Machine for Biomaterials

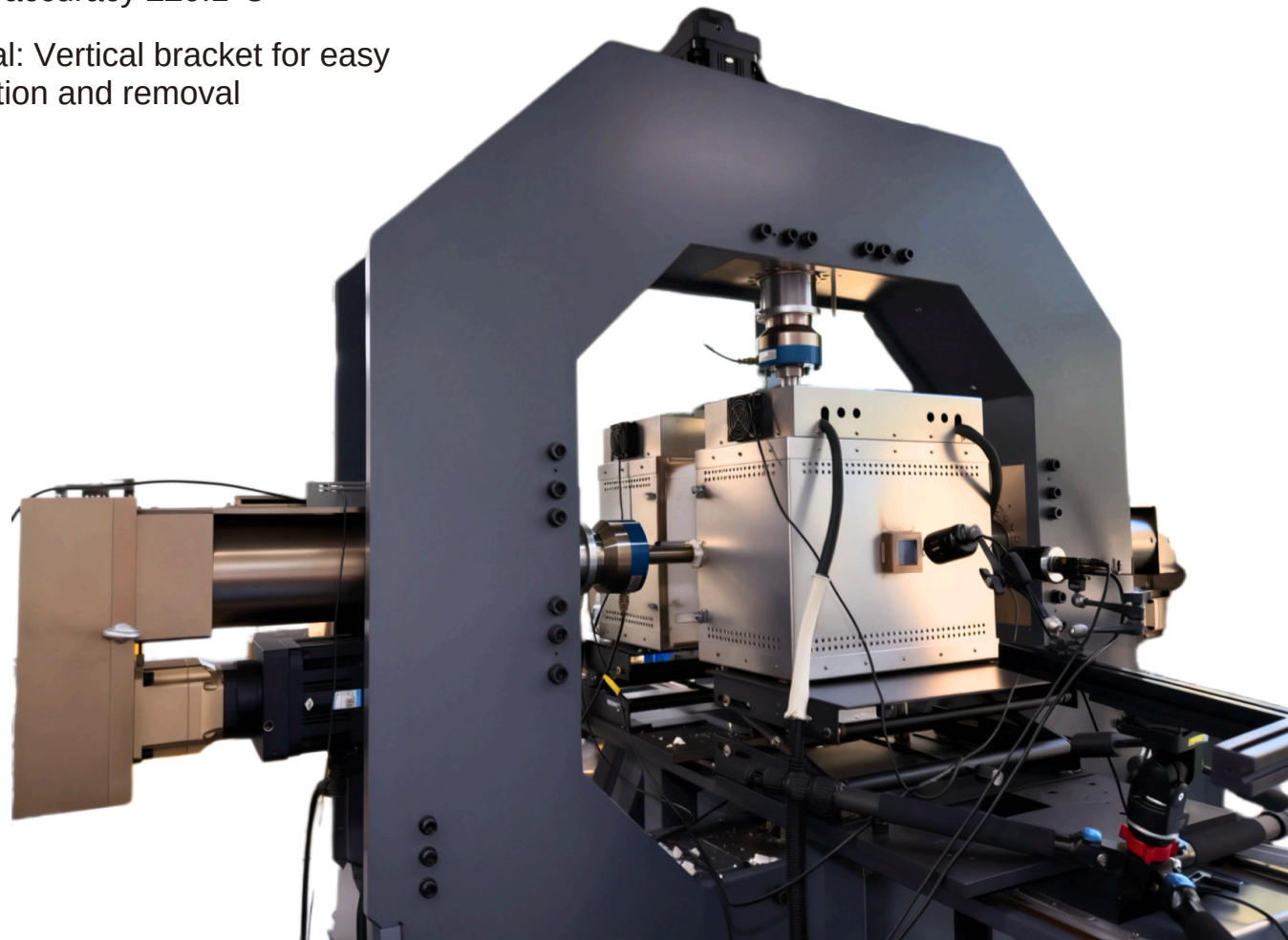
THALIA
Biaxial Fatigue Testing Machine

Environmental Chamber

▶▶ High / low temperature environmental chamber

| Performance Features

- Temperature range: -70°C to 1200°C ; internal dimensions customizable
- Observation: Transparent window for full-field optical strain measurement
- Control: Integrated with the testing machine interface for automatic and manual temperature control; real-time temperature curve display
- Accuracy: Temperature uniformity $\pm 1.5^{\circ}\text{C}$ (within ± 120 mm from chamber center); display accuracy $\leq \pm 0.1^{\circ}\text{C}$
- Optional: Vertical bracket for easy installation and removal

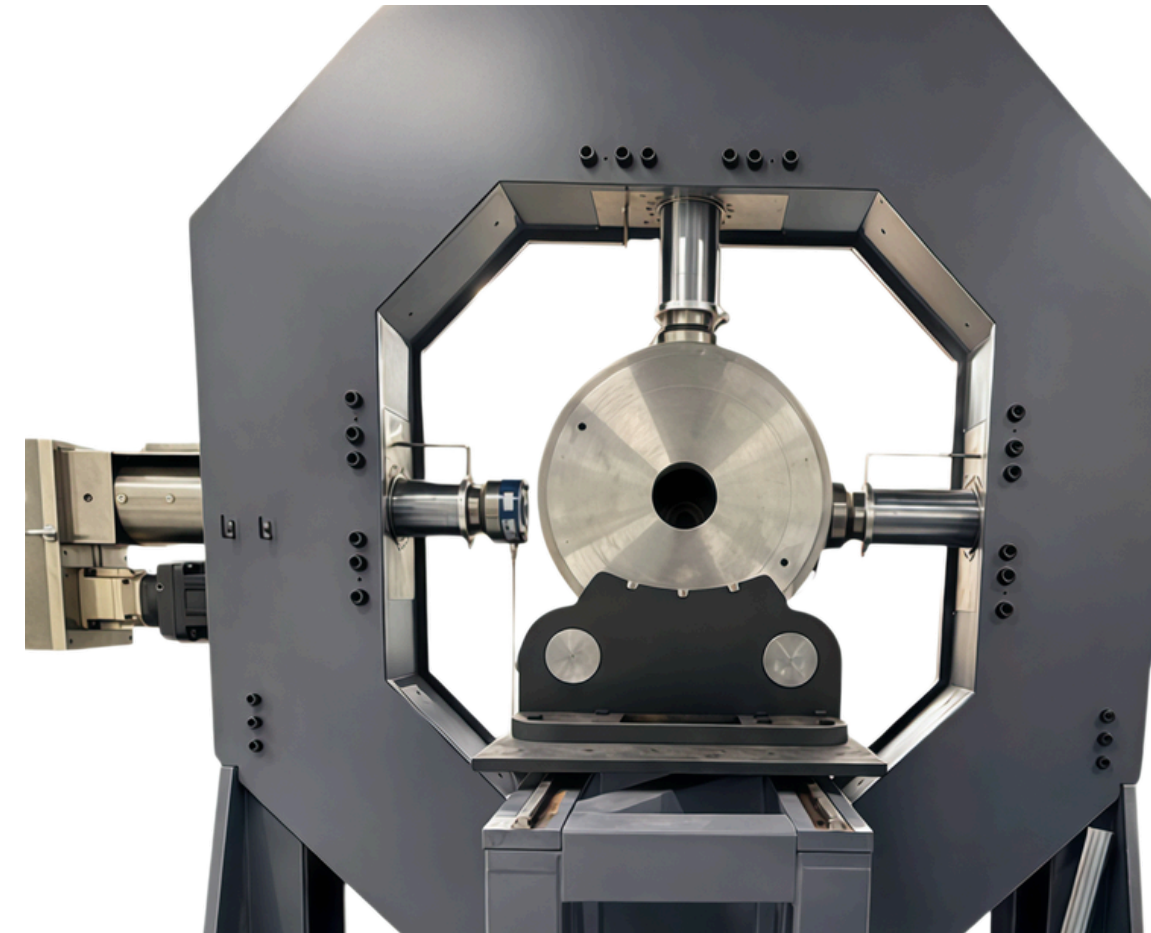


High / low Temperature
Environmental Chamber

▶▶ Deep-sea environmental chamber

| Performance Features

- Simulated depth range: 0–12,000 m; pressure range: 0–120 MPa; internal dimensions customizable
- Observation: Transparent window compatible with full-field DIC strain measurement.
- Biaxial four-direction planar creep, quasi-static, and low-cycle fatigue with non-proportional coordinated biaxial/hydrostatic loading.
- Optional: Vertical bracket for easy installation and removal

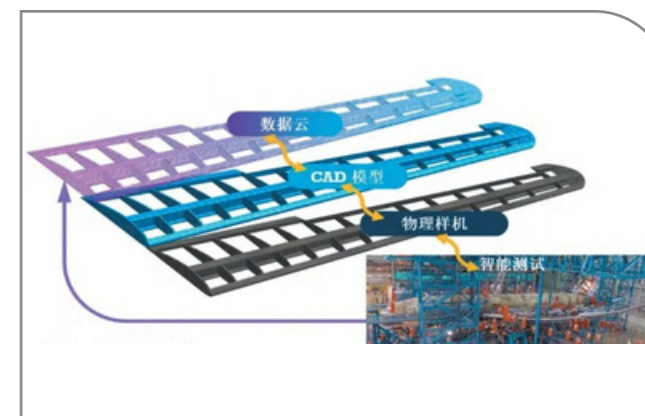
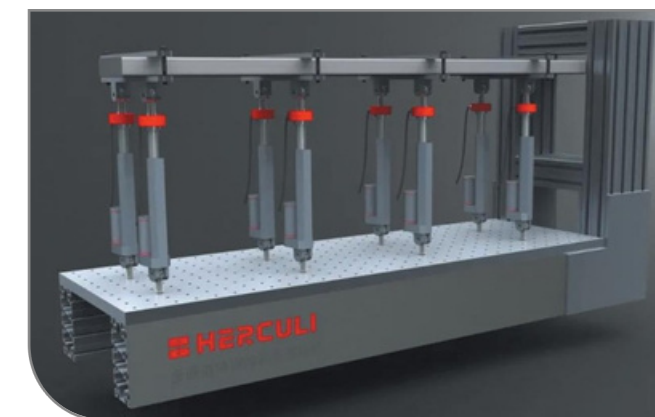
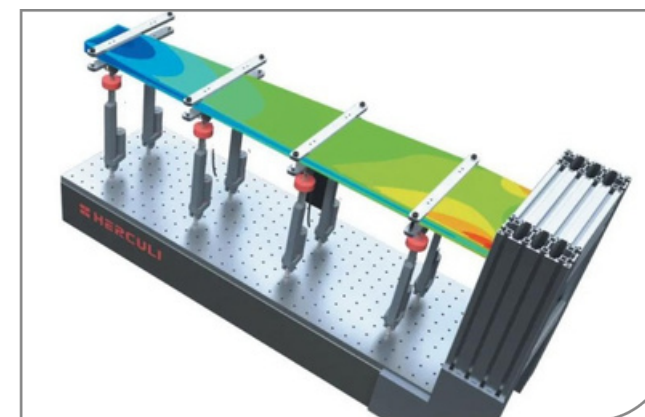


Deep-sea
Environmental Chamber



Custom Loading Systems

Custom Loading Systems |



Multichannel Coordinated Loading Principle Prototype

Performance Features

- Multichannel coordinated loading: Multiple actuators synchronously load small-scale wings at multiple points, simulating real stress conditions for complex structures
- High-precision closed-loop control: Displacement-sensor feedback ensures precise loading and synchronization, providing reliable static data for strength validation
- Multi-source data acquisition & analysis: DIC strain acquisition plus FE simulation enables bidirectional validation and multi-dimensional performance assessment
- Simulation model validation: Experiment-simulation comparison validates FE model fidelity, supporting full-aircraft virtual static testing platforms

Custom Loading Systems

Four-Channel Uniaxial Creep Testing Machine

Performance Features

- Multi-channel integration: Four independent channels for synchronized testing
- High-precision control: Ball-screw electric actuators with servo motors and grating scales deliver closed-loop force/displacement control with low noise
- Flexible loading: Multi-axis algorithm supports proportional biaxial load/displacement for creep and non-proportional loading for quasi-static tests.
- Intelligent processing: Real-time creep monitoring and automated analysis meet rigorous research/industrial needs with minimal intervention.

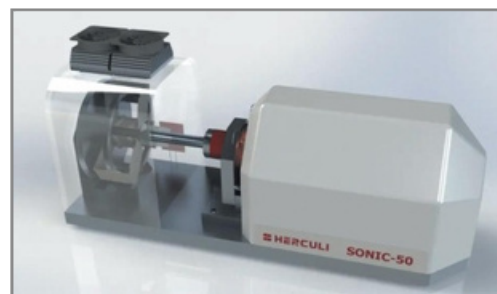


CRT-100KN

Electromagnetic High-Frequency Uniaxial Fatigue Testing Machine

Performance Features

- All-electric closed-loop electromagnetic drive; $\pm 0.2\%$ force accuracy @5 Hz, 0.1 ms sync.
- Sine/triangle/trapezoidal/Custom CSV waveforms; ASTM fatigue algorithms + auto-reports.
- Overload/thermal protection, auto stiffness matching; software with workflow, alerts, remote monitoring & power-loss protection.
- 20 kHz DAQ with real-time force-disp-time curves & phase-lag display.

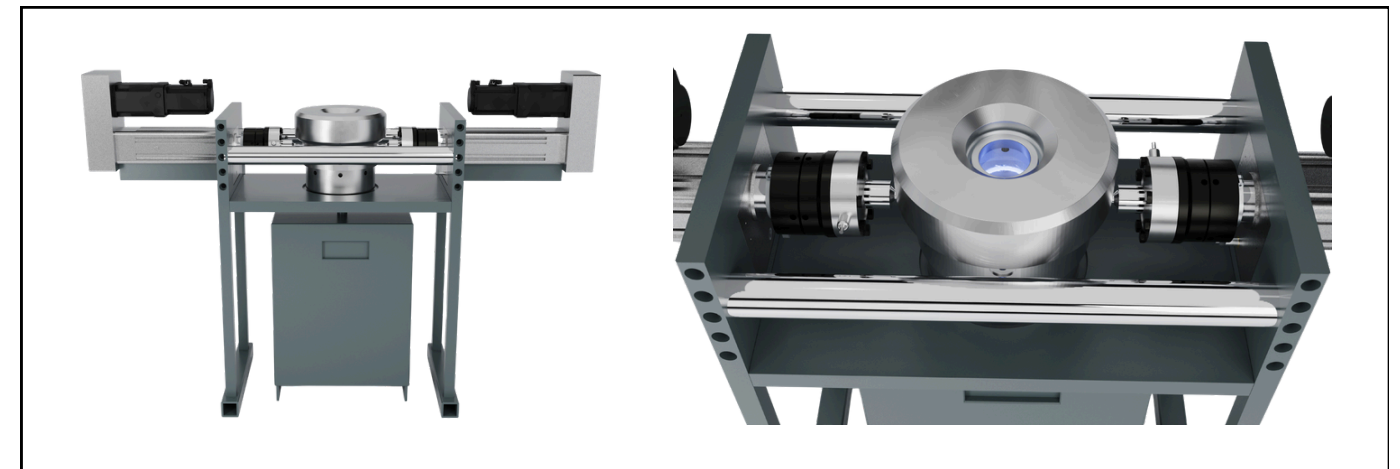


SONIC-50

Uniaxial Bidirectional Testing System with Coupled High-Pressure Seawater Environment

Performance Features

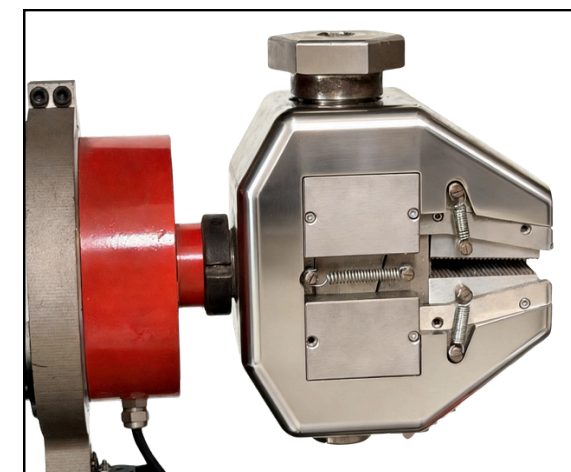
- Maximum seawater pressure: 120 MPa
- Maximum load capacity: 10 tonnes
- Testing capability: Supports low-cycle fatigue loading under coupled seawater pressure, with loading frequency up to 1 Hz.



Biaxial Testing Machine Grips

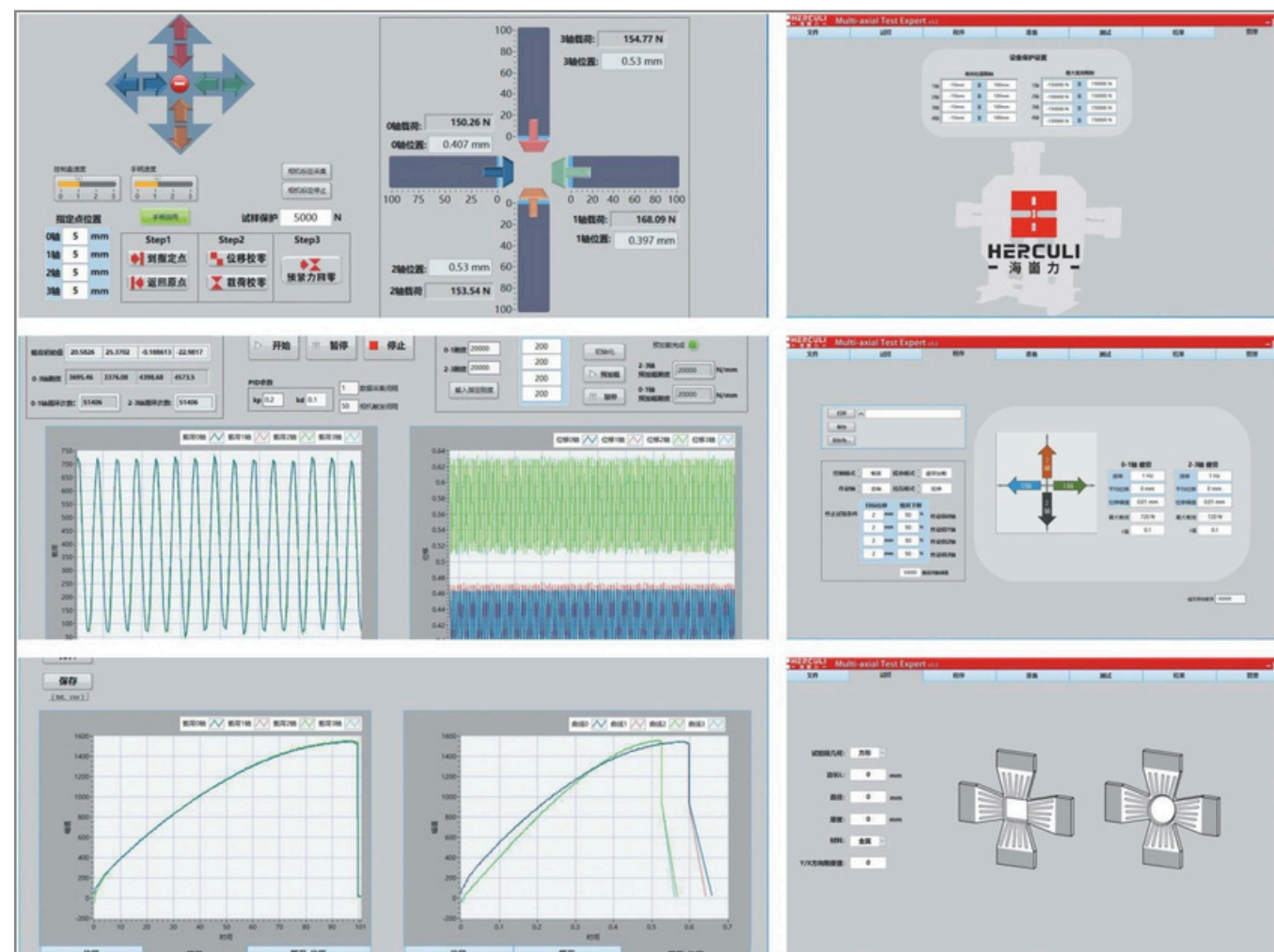
Performance Features

- Designed for large-tonnage specimens.
- Tool-free operation; static friction self-locking prevents slippage.
- High-strength alloy steel, carburized and quenched – high stiffness and wear resistance.



Biaxial Tension Grips

Multi-channel coordinated loading system



Control System Interface

Performance Features

- Visualized testing machine operating system
- User-friendly interface with simple operation
- Customizable test programming, parameter settings, and data processing
- Proprietary algorithms; 4-axis software control (jog/continuous, speed-adjustable)
- Handwheel control can be enabled or disabled via software
- Software-controlled DIC acquisition frequency
- Regular updates and maintenance with free post-delivery software upgrades

3D - DIC

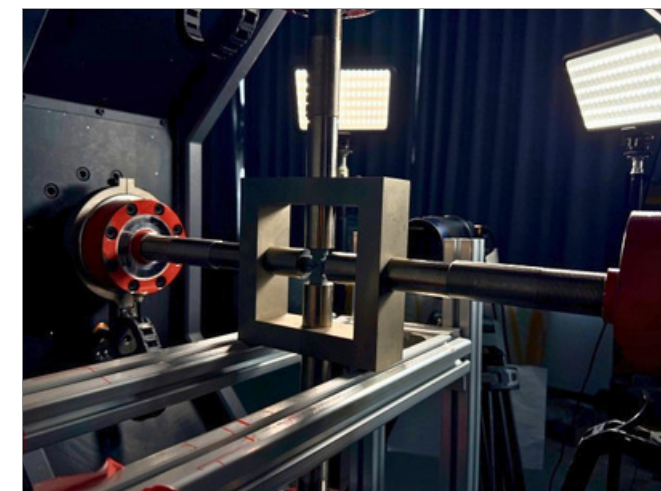


Image Acquisition

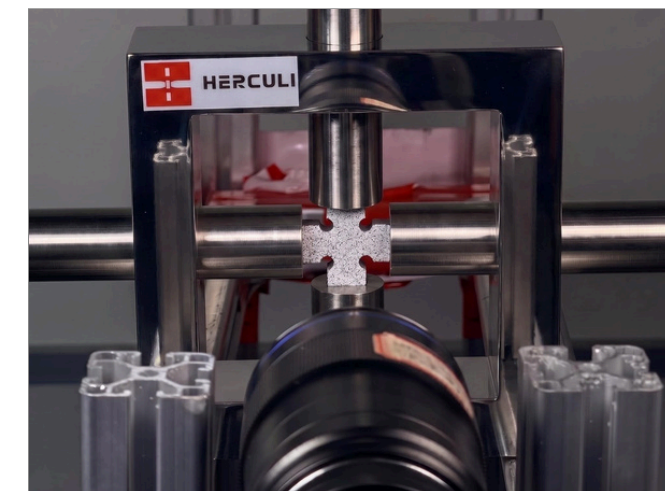


Image Acquisition

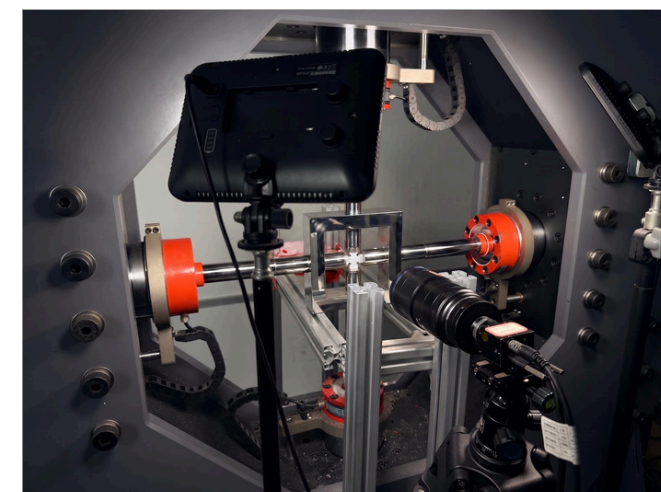
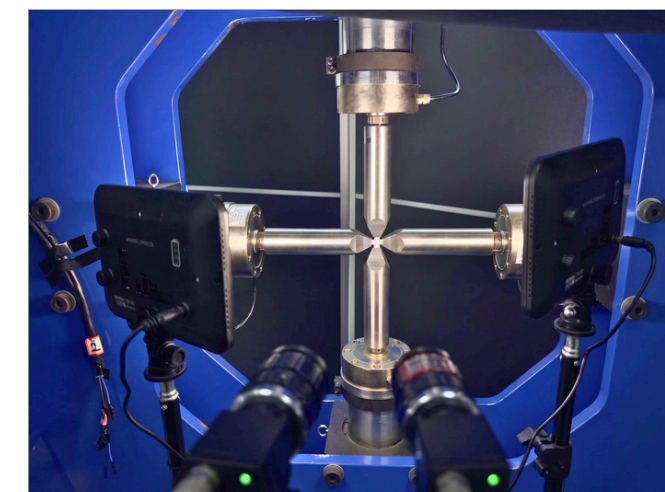


Image Acquisition



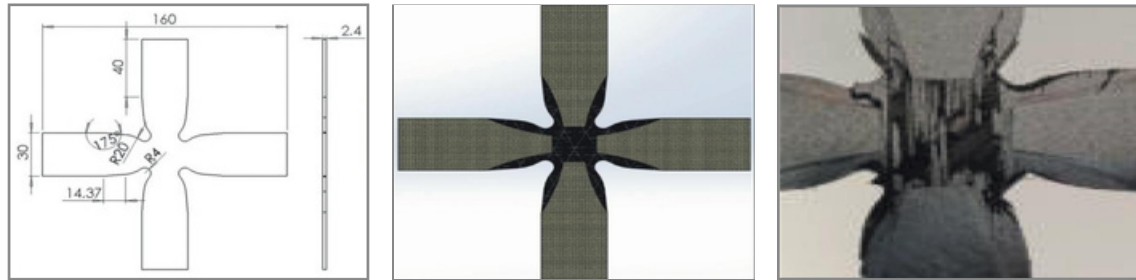
3D-DIC Analysis System

Performance Features

- Frame rate: software-set via tester control
- Sync: camera & load data on same timeline, deviation ≤ 0.1 ms
- Camera: ≥ 2 MP
- Continuous run: ≥ 1500 hrs @ 1 fps
- Measurement area: 10–200 mm²

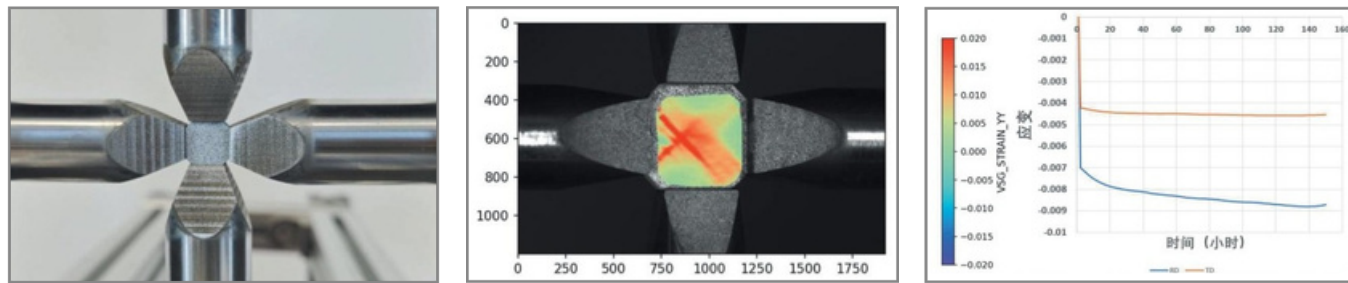
Test Cases

Composite Biaxial Tension Specimen Design and Tabbed Specimen

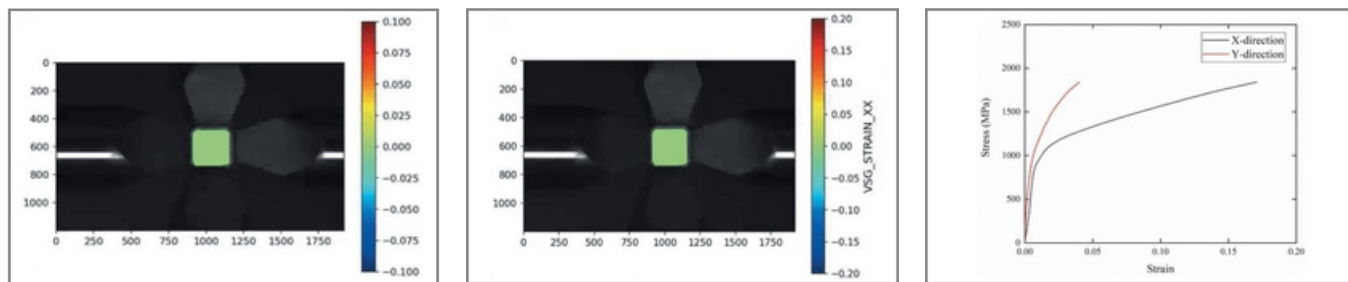


双轴准各向同性铺层拉伸，试样发生纤维破坏、分层、面内剪切等，导致试样破坏

Composite Biaxial Tension Specimen: Design and Tabbed Preparation



Composite Biaxial Tension Specimen Design and Preparation

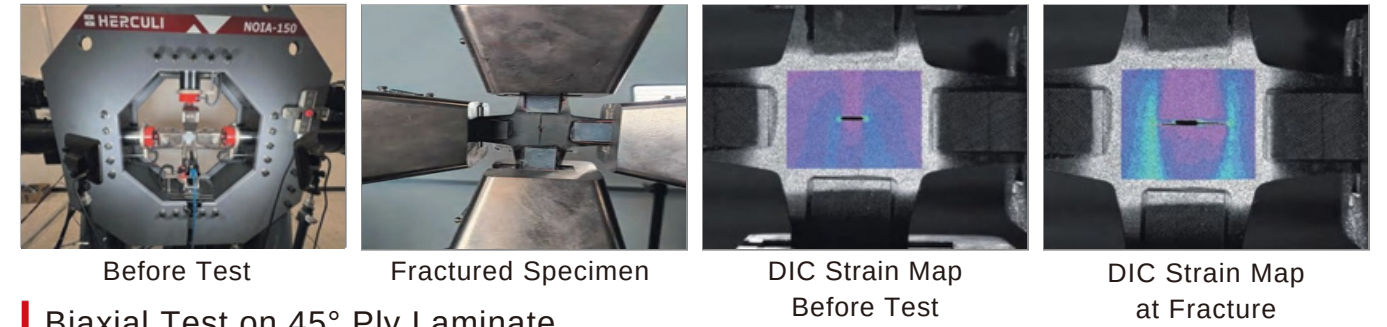


Composite biaxial tension specimen: design and tabbed specimen

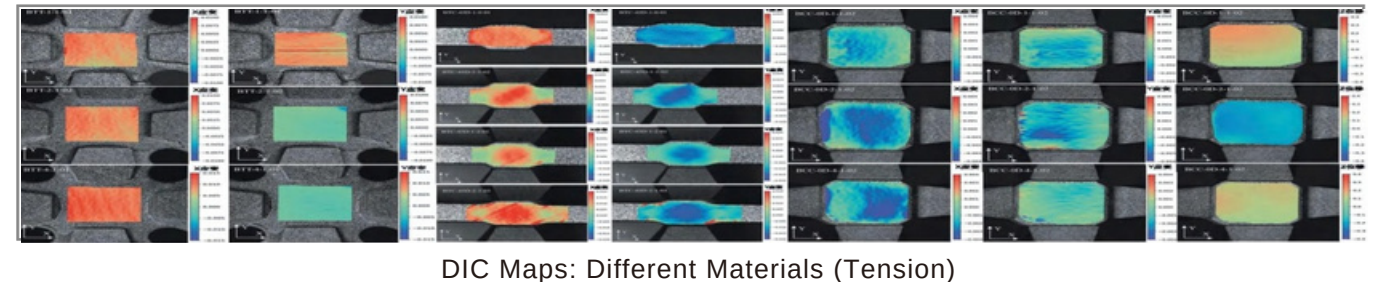
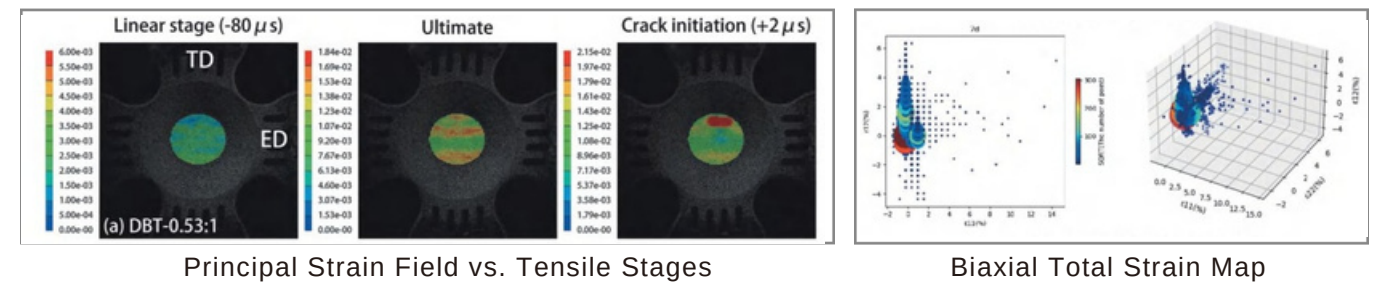
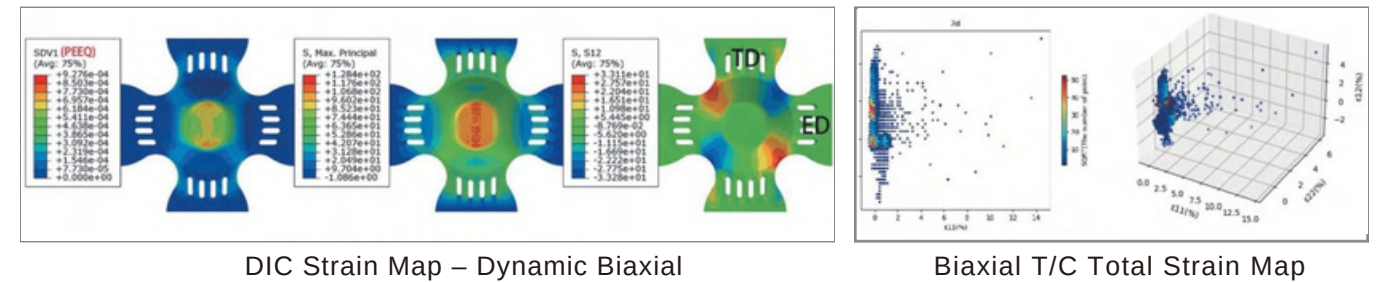
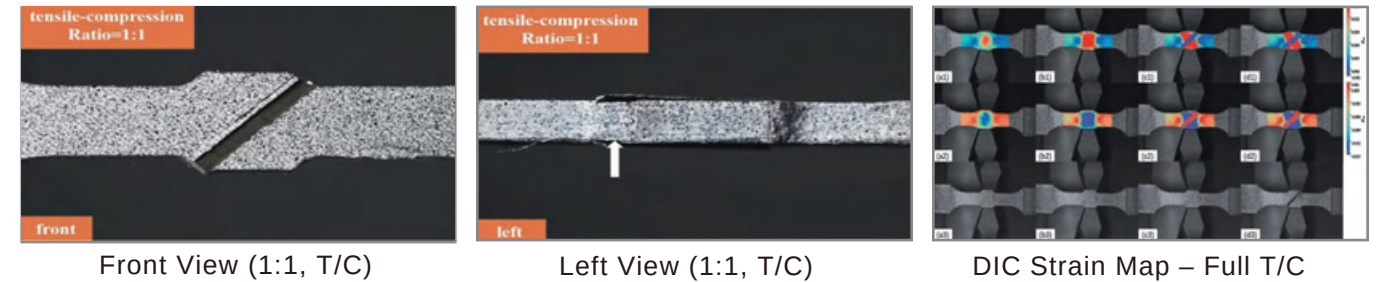


Test Cases

Biaxial Tension Fracture Test



Biaxial Test on 45° Ply Laminate



DIC Maps: Different Materials (Tension)