COMPOSITES TESTING SOLUTIONS

Technology You Can Trust

INSTRON®

Accurate,
Trusted, Reliable
COMPOSITES
Testing Systems

For over 75 YEARS, the Instron® brand has been widely recognized for producing the most advanced mechanical testing systems in the world. Our systems are designed by industry experts, vetted by active members of major standards organizations, and supported by a global network of skilled and experienced service technicians. This comprehensive approach allows us to back each Instron system with an unmatched level of industry and application expertise designed to support it throughout its lifetime.

1,500+ employees
A highly-educated, experienced, and diverse workforce

Representing **160 countries**, speaking **40+ languages**

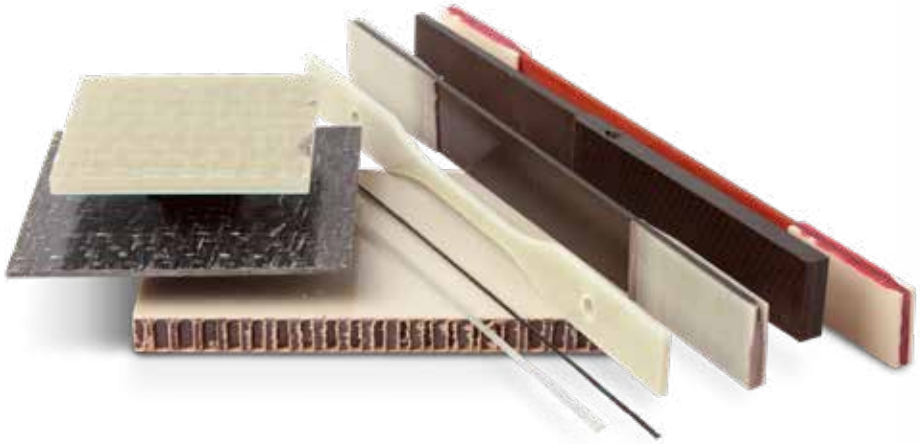
50,000+ systems
installed worldwide

75+ years of engineering and manufacturing testing systems

Diverse product range
for nearly all global markets and industries

COMPOSITES TESTING SOLUTIONS

Application-Based Testing Solutions



Composites present a unique set of challenges for product developers and engineers who need to measure the material's mechanical properties. As the popularity of composites continues to grow, so does the need for testing equipment that can safely, accurately, and efficiently characterize these complex materials.

Instron's universal testing machines are designed to perform the most common types of testing used in the composites industry, including but not limited to **in-plane tensile, through thickness tensile, interlaminar shear, compression in end, shear or combined loading, and compression after impact.** Instron systems provide highly accurate and precise results, and are robust enough to withstand the very high forces experienced at failure.

SCAN THE QR CODE
to learn more about Instron's
composites testing solutions

Instron® test systems are designed to withstand decades of high force testing while also making it easy to change the system configuration in order to perform different test types. Our industry leading software makes system operation simple and intuitive for both new and experienced users.

Maximize Uptime: Pre-loaded bearings, precision ball screws, a thick crosshead and base beam, and low-stretch drive belts increase performance and help reduce shock damage during specimen failure.

Ensure Audit Compliance: Frames are solidly designed to ensure minimal compliance and bending. Nadcap alignment can be achieved without an alignment cell depending on system configuration.

Easy to Configure: Easily switch between test types with a wide range of interchangeable grips and fixtures designed to meet the most popular ASTM/ISO/EN standards.

Simple to Use: Bluehill® Universal software comes equipped with a comprehensive library of common composites test methods.

Accurate Strain Measurement: We offer a wide range of contacting and non-contacting strain measurement solutions.

COMPOSITES TESTING SOLUTIONS

Systems at a Glance

For over 75 years, Instron® has supplied more than 50,000 testing systems to the world's leading manufacturing, educational, scientific, and research institutions. We offer a wide range of systems for static, dynamic, and impact testing of composite materials.

TENSION, COMPRESSION, AND BEND

Universal Testing Systems

Instron's universal testing machines can perform tensile, compression, shear, flexure, torsion, peel, and other mechanical tests on composite materials and structures to meet ASTM, ISO, and other industry standards. Our high-capacity frames are capable of meeting Nadcap alignment requirements and are available in a range of heights and widths to accommodate various application requirements and environmental chambers for non-ambient testing.

SCAN THE QR CODE
to learn more about our
materials testing systems

FATIGUE AND FRACTURE

Servohydraulic and Electrodynamic Systems

Instron offers servohydraulic and electrodynamic systems with force ranges from 1 kN to 5,000 kN (200 lbs to 1,000,000 lbs), for dynamic testing of composite materials and components.

IMPACT

Drop Weight Impact Systems

Our drop tower systems are designed to qualify the impact resistance of composites and other materials. These machines range from basic un-instrumented to fully instrumented systems with ultra high-speed data acquisition.

TENSILE GRIPS

Instron® offers both manual and hydraulic grip types capable of operating over a wide range of temperatures. Moving body manual and hydraulic wedge grips are recommended for testing composite materials as they provide reliable gripping of test specimens while maintaining accurate and repeatable alignment that meets Nadcap requirements for aerospace testing. When it is necessary to change the test setup, Instron offers piggyback adapters that allow composite test fixtures to be attached directly to the grips. Through piggybacking, the grips can stay on the testing system to maintain any valid Nadcap verifications – minimizing disruption and increasing productivity.

MANUAL WEDGE ACTION GRIPS

Grip Type	Moving body wedge
Static Capacity	100 kN, 150 kN
Operation	Manual
Temperature Range	-73°C to 315°C
Nadcap Alignment	No
Catalog Numbers	2716-002, 2716-003, 2716-008, 2736-004, 2736-005

PRECISION MANUAL WEDGE GRIPS

Grip Type	Moving body wedge
Static Capacity	100 kN, 250 kN
Operation	Manual
Temperature Range	-80°C to 250°C
Nadcap Alignment	Yes
Catalog Numbers	2716-028, 2716-030

HYDRAULIC WEDGE ACTION GRIPS

Grip Type	Moving body wedge
Static Capacity	30 kN, 50 kN, 130 kN, 312 kN, 600 kN
Operation	Hydraulic
Temperature Range	Ambient only
Nadcap Alignment	Yes
Catalog Numbers	2742-301, 2742-450, 2742-501, 2742-601, 2743-401

EXTENDED HYDRAULIC WEDGE GRIPS

Grip Type	Extended moving body wedge
Static Capacity	130 kN, 312 kN
Operation	Hydraulic
Temperature Range	-70°C to 350°C
Nadcap Alignment	Yes
Catalog Numbers	CP104947, CP109120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COMPOSITES FIXTURES

Solutions for Composites Testing

Supported Gauge Section Compression Test Fixture

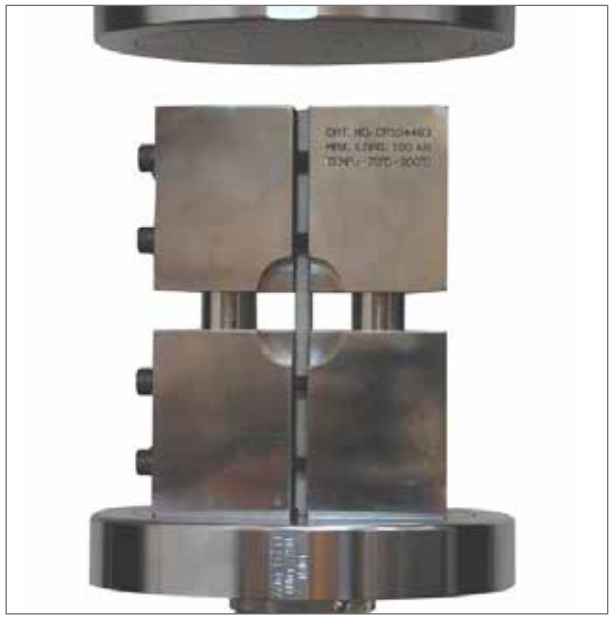
ASTM D695, ASTM D3846, Boeing BSS 7260, SACMA SRM-1, prEN 2850

The anti-buckling fixture was originally designed for the compression testing of rigid plastics per ASTM D695 and the shear testing of reinforced plastics per ASTM D3846. Boeing then adapted the fixture for use with high strength composites, introducing an L-shaped base support to ensure accurate and consistent alignment of the fixture and specimen. The SACMA standard followed the Boeing design with an added alternative support fixture with a cutout, allowing bonded strain gauges to be used at the center of the specimen for precise strain measurement.

Unsupported Gauge Section with Shear Loading Compression Test Fixture

ASTM D3410, ISO 14126

Compression testing of composites without anti-buckling guide plates is often preferred, as the free unsupported length is more representative of true compression behavior. This method relies on the accuracy of the alignment between the upper fixture and the lower fixture while introducing the compression load. In addition, the natural failure process of the specimen will induce high lateral forces that must be resisted to ensure that forces remain in true compression.



Combined Loading Compression Test Fixture

ASTM D6641, ISO 14126

The combined loading compression fixture was designed to use both shear transfer of axial load to the specimen as well as end loading the specimen. Shear force is introduced by tightening four clamping screws, while the specimens are positioned so that the specimen ends are exposed flush with the top and bottom blocks of the fixture. The upper and lower parts of the fixture are maintained in alignment by guidance columns and linear bearings to ensure minimal friction. This fixture design is therefore significantly different to IITRI and Modified Celanese suggesting less damage to the specimen at the jaw face.

SCAN THE QR CODE
to learn more about our
composites fixture offerings

Compression After Impact - "Boeing CAI" Fixture

ASTM D7137 / 7137M, Boeing BSS 7260

The "Boeing CAI" fixture is used to test the impact resistance of carbon and other fiber-reinforced polymer composite laminates. These materials are prone to great reduction in compressive strength even when the impact load is insufficient to cause visible damage. The post-impact compression test is used to assess the relative performance of different composite laminates with different fiber matrix combinations. Laminates are subjected to low-velocity impact loading simulating tool drops and flying debris, or may be subjected to an out-of-plane static indentation (ASTM D6264 / D6264M). Specimens then undergo a compression after impact (CAI) test on an electromechanical or servohydraulic testing machine.

Compression After Impact - Airbus AITM 1-0010

AITM 1-0010

The "Airbus CAI" fixture is used to test the impact resistance of carbon and other fiber-reinforced plastic (CFRP) composite laminates. These materials are prone to great reduction in compressive strength even when the impact load is insufficient to cause visible damage. The post-impact compression test is used widely to assess the relative performance of different composite laminates with different fiber matrix combinations. In the first part of the test, the laminates are subjected to low-velocity impact loading simulating tool drops and flying debris. Specimens then undergo a compression after impact (CAI) test on an electromechanical or servohydraulic testing machine.

COMPOSITES FIXTURES

Solutions for Composites Testing

Flatwise Tension Test Fixtures

ASTM C297

This fixture is designed for ASTM C297 testing to determine the bond strength between the facing and core of a sandwich core panel, or the strength of the core itself. The specimen is bonded to thick loading blocks and then subjected to tensile loading applied via the blocks. The fixture can be used to test a variety of different sandwich core materials including honeycomb core structures and continuous core structures such as foam or balsa wood.

Climbing Drum Peel Fixture

ASTM D1781, EN 2243-3

The climbing drum peel fixture consists of a flanged drum assembly, flexible loading straps mounted in a lower adapter, an upper clamp to grip the specimen, and a drum clamp to hold the outer skin against the face of the drum. Two different fixtures are available, one with a drum clamp suitable for use with flexible facings (e.g. thin gauge aluminum) and one with a drum clamp suitable for use with rigid facings (e.g. CRFP sheet).

Boeing Open Hole Compression Fixture

ASTM D6484, ASTM D6484M, Boeing BSS 7260

The open-hole compression fixture was originally developed by Boeing and is outlined in Boeing specification BSS 7260. This compression fixture is used to perform open-hole compressive tests on multi-directional polymer matrix composite laminates reinforced with high modulus fibers in compliance with ASTM D6484 / D6484M.

V-Notch Shear Test Fixtures

ASTM D5379, ASTM D7078

Instron® shear test fixtures are designed for in-plane or interlaminar shear testing of composite materials. The V-Notched Rail Shear Method was introduced in 2005 under ASTM D7078 and includes the distinctive V-notches in the specimen design, which serve to create a localized and approximate uniform shear stress zone between the notches.

Composites Rail Shear

ASTM D4255

This fixture is used to determine the in-plane shear strength of a composite laminate panel in accordance with ASTM D4255. ASTM D4255 describes both 2 rail and 3 rail methods for determining the in-plane shear strength of a composite laminate panel. In the 2 rail test (Method A), a laminate panel specimen is clamped between loading plates and yokes and then subject to shear loading. Measurement of shear strain requires the use of strain gauges on the specimen.

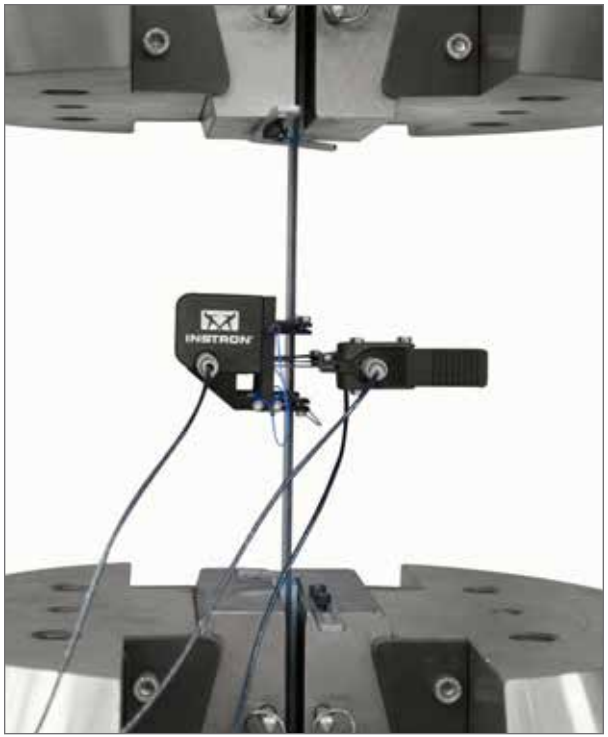
Flexural and Interlaminar Shear Bend

ASTM D2344, ASTM D2344M, ASTM D790, ASTM D7264, EN 2377, EN 2562, EN 2563, ISO 14125, ISO 14130

The precision flexural and interlaminar shear strength (ILSS) bend fixture system comes with a range of interchangeable anvils and is suitable for testing to a number of international standards, including ASTM D2344, ASTM D790, EN 2562, EN 2563, ISO 14125, and ISO 14130. This fixture incorporates very low friction precision guidance as well as precision centering of the anvils.

STRAIN AND ENVIRONMENTAL SOLUTIONS

Advanced Solutions for Composites Testing



Averaging Axial & Biaxial Extensometers

Average axial strain is determined from independent strain measurements on opposite sides of the specimen. The use of average strain eliminates errors due to specimen bending and allows the determination of precise modulus values. By integrating a transverse strain transducer, this extensometer can simultaneously measure average axial and transverse strain.

Bonded Strain Gauge Adapters

Bonded strain gauges are attached to the surface of a specimen with the help of an adhesive. Instron strain gauge adapters allow a single strain gauge to be used with any standard Instron strain channel. Our Expansion Channel Module allows you to connect up to 8 additional strain gauges for a total of 11 strain gauges at one time on your Instron test frame.

Advanced Video Extensometer

Video extensometers are non-contacting strain measurement solutions that use high-resolution digital camera technology to measure deformation by tracking the movement of two markers on the specimen. Video extensometers do not exert any influence on the specimen, eliminating concerns about knife-edge slippage and errors due to moving parts or operators. Instron's AVE2 is capable of Digital Image Correlation (DIC).

Environmental Chambers

Environmental chambers facilitate testing of composite materials and components over a wide range of temperatures from -150°C up to +600°C. Instron chambers are equipped with multipaned windows that allow viewing during testing including the use of non-contacting video extensometry. Rapid heat-up and cool-down times improve productivity and throughput.

AlignPRO™

Alignment is critical when testing composites. Instron testing machines use precision guidance columns along with adjustable AlignPRO™ alignment fixtures to meet and maintain the highest levels of alignment demanded by the aerospace industry, and help you achieve Nadcap compliance. The fixture allows both concentric and angular misalignment to be adjusted, while the load string is still preloaded.

BLUEHILL® UNIVERSAL

Simpler. Smarter. Safer.

Bluehill Universal is the testing industry's most powerful and advanced testing software and is compatible with all Instron high force systems. Its intuitive workflows are designed to simplify operator training, increase testing efficiency, and minimize safety hazards.

Effortless Workflows

Bluehill Universal's easy-to-use touch interface optimizes your testing workflow and is designed with ergonomics in mind.

TestProfiler

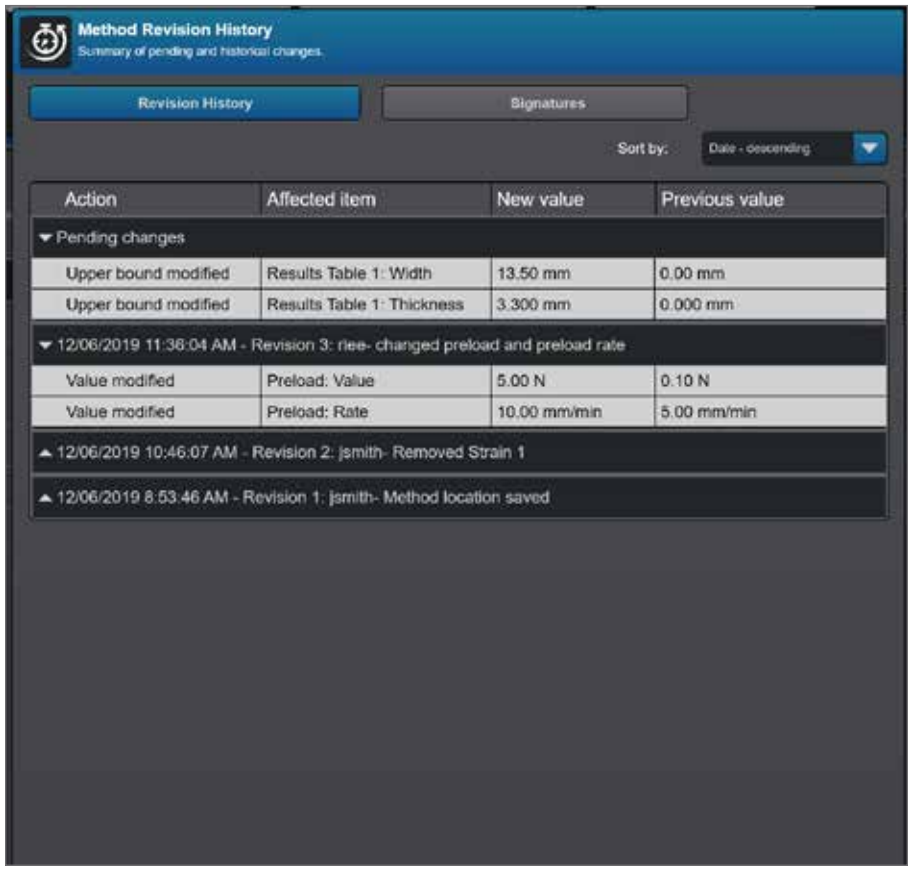
Build tests with multiple loading and unloading steps for fracture toughness applications on carbon fiber-reinforced polymer (CFRP) coupons, while capturing relevant data points in your test curve.

Prompted Tests

Users can be guided through the entire testing process with step-by-step instructions, ensuring that your tests remain repeatable, simple, and error-free. The prompts are customizable with your own text and images — for example, tables of failure modes.

Built-In Test Methods

The Bluehill Universal Composites Module includes many composites testing standards to make testing simple and more consistent across many different systems and labs. It includes testing standards commonly used by aerospace suppliers and manufacturers such as ISO 527-4/5, ISO 14126, ISO 14130, ASTM D3039, and ASTM D6641.



Revision History

Revision history allows users to view the full version history of Bluehill methods, tested samples, and report templates. Each revision contains the details of the affected item, including a time stamp, both the previous and new values, and the name of the user who made the change.

SUPPORT FOR THE LIFE OF YOUR EQUIPMENT

Protecting Your Investment

Instron® is among the largest suppliers of materials testing systems in the world. Our reliable testing systems are designed to run critical tests 24 hours per day. However, if an issue arises or if you have a question, we offer a variety of resources to ensure you receive the assistance you need as soon as you need it.

Instron Connect

Instron Connect allows you to securely share your screen with Instron service professionals and submit service requests directly through your test system. You can also use this portal to easily send test methods and sample data files for review.

Training

Instron offers a wide variety of training opportunities designed to meet the needs of machine operators and test method developers of all skill levels. Training courses are available online, in-person at regional training events, in our factory classrooms, or at your facility.

Calibration

Our state-of-the-art Calibration Laboratory offers a comprehensive range of accredited calibration and verification services complying with ASTM, ISO, and Nadcap standards for force, speed, impact, strain (extensometers), displacement, temperature, torque, creep, strain gauge channel, and alignment.

SCAN THE QR CODE
to learn more about how Instron®
can help protect your investment

On-Site Services

When on-site assistance is needed, our team of 300+ global Field Service Engineers can help get you back up and running. Our factory-trained technicians are strategically located around the world to provide fast on-site service.

Remote Support

Instron offers access to a troubleshooting tool that can help you self-diagnose issues with easy-to-follow steps created by our technical experts.

Accurate, Trusted, Reliable **COMPOSITES** Testing Systems

THE WORLD STANDARD

We stake our reputation on the integrity of data. From the measurement of primary test data to result generation, we design and manufacture the full data integrity chain (e.g. load cells, sensor conditioning, and software). Additionally, we calibrate more than 90,000 of these sensors annually with the lowest accumulated uncertainty.

30,000+

We service and calibrate more than 30,000 Instron systems in active use worldwide every year.

96%

96% of the Fortune 100 list of the world's largest manufacturing companies use Instron test systems.

18,000+

Instron systems have been cited in more than 18,000 patents since 1975.

www.instron.com

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