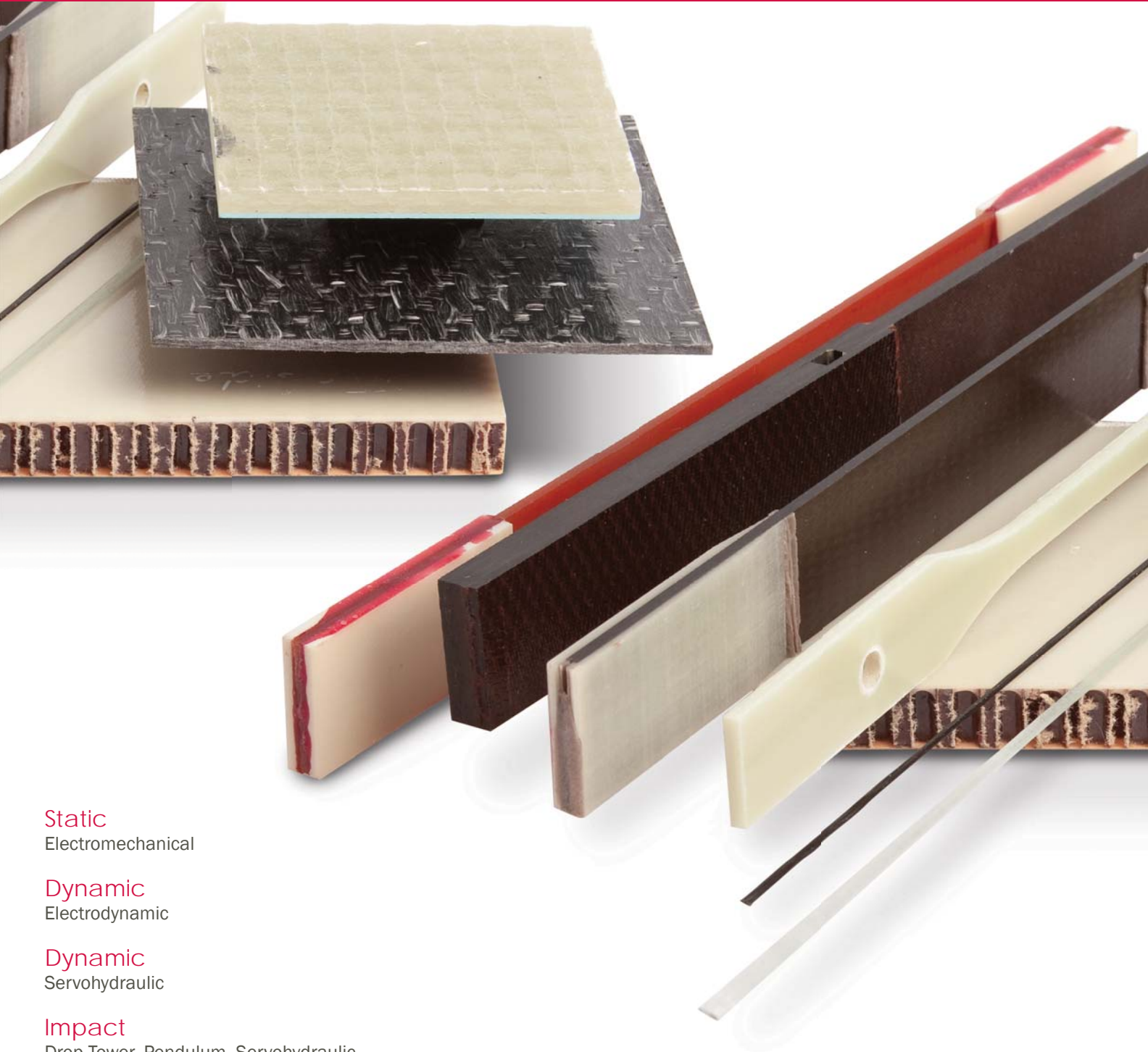


# Composites Solutions for Mechanical Testing



**Static**  
Electromechanical

**Dynamic**  
Electrodynamic

**Dynamic**  
Servohydraulic

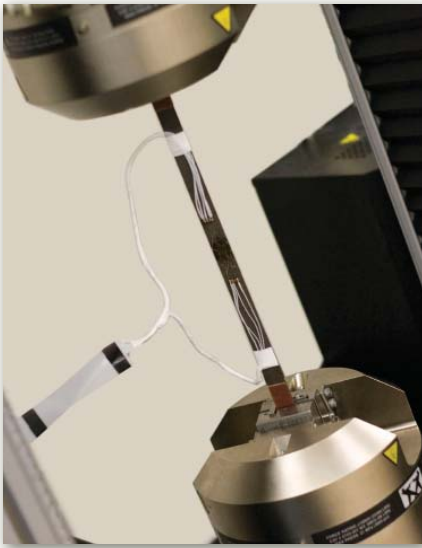
**Impact**  
Drop Tower, Pendulum, Servohydraulic

**Rheology and Thermo-Mechanical**  
Melt Flow Testers, Capillary Rheometers, HDT & Vicat

**Software**  
Static, Dynamic, Impact, Rheology, Thermal

**Services**  
Calibration, Verification, Force, Strain, Alignment (NADCAP)





## Laminates/Coupons

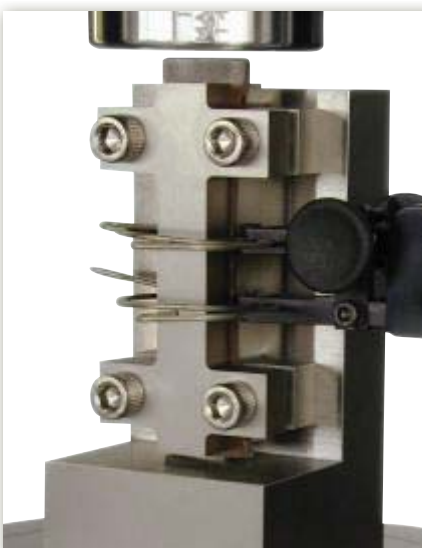
Composite materials show a wide range of behaviors and are, often, challenging to test. Tensile and compression test properties are sensitive to gripping and alignment. Efficient grip design and the use of the correct jaw surface is important to avoid slipping while avoiding jaw breaks. Accurate grip alignment and repeatable specimen location in the grips is required to minimize mis-alignment and may also be required to meet the requirements of NADCAP and other certification bodies. Instron® supplies high-precision, stiff and robust testing frames which are built to withstand repeated shock loads from composite specimen failures whilst maintaining excellent alignment.



## High/Low Temperature

The determination of the properties of composite materials over a range of temperatures demands accurate control of the specimen temperature along with grips and fixtures that perform reliably at various temperature settings and are easy to use. Instron provides temperature chambers, grips, test fixtures and extensometers for testing over a range of temperatures from -70 to +250 °C (-94 to +392 °F). The systems are designed to make switching from a test performed at room temperature to a test performed at a specific temperature as well as changing the test type a quick and simple operation.

Hydraulic grip solutions for non-ambient testing place the hydraulic components outside the temperature chamber for safety and reliability. Adapters are available to allow other accessories such as compression platens and bend fixtures to be attached while leaving the grips in place.



## Fixtures

Determining the full set of mechanical properties of a composite material requires a number of different test types like tension/compression, in-plane shear, interlaminar shear, and compression after impact. Furthermore, a given test type may require a different specimen size and fixture when testing to a specific international (ASTM, ISO, EN, JIS, SACMA) or manufacturer's (BSS, AITM) standard.

Instron has a comprehensive range of composites fixtures for both composite laminate and sandwich core materials (e.g. flatwise tensile, shear, climbing drum). These fixtures are constructed from high quality materials and finished to a high standard and can be used over a range of temperatures generally from -70 to +250 °C (-94 to +392 °F). The fixtures mount on standard mechanical interfaces in the testing frame. In addition, adapters are available to mount the fixtures on top of existing grips allowing heavy grips, which may have been precision aligned, to be left in place. This reduces the time spent re-configuring the system and eliminates the need to re-check grip alignment.



## Fatigue and Fracture

Instron® has an extensive range of electrodynamic and servohydraulic dynamic systems with load capacities loads from < 1 - 5000 kN, ideal for meeting the fatigue and fracture testing requirements of composite materials – especially in demanding applications such as aerospace and wind power.

For test loads up to 10 kN, ElectroPuls™ systems are the established materials testing machines using patented linear motor technology. With only a single-phase electrical connection to the wall, ElectroPuls systems are dynamic testing machines of the future that do not have the environmental impact of conventional servohydraulic technologies.



## Alignment

Alignment is critical when testing composites. Instron test 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.

The Instron alignment system improves the accuracy of test data by ensuring that the load string is correctly aligned under load and consists of the AlignPRO fixture, a strain gauged alignment specimen (fitted with 8 or 12 gauges) and dedicated AlignPRO software. The fixture allows the load cell and grip assembly to be aligned quickly and precisely while allowing both concentric and angular misalignment to be adjusted. The software monitors the output from the strain gauges mounted on either flat or round alignments cells and identifies which adjustments are required and displays in real time the effect of the adjustments, enabling accurate machine set-up in minutes.



## Fibers and Tows

Testing composite materials at the constituent level is important for both quality control and research. Tests on individual carbon and glass fibers requires the accurate measurement of low forces and gripping solutions which provide enough gripping force to prevent slipping without introducing stress concentrations which cause the fibers to break prematurely in the grip face.

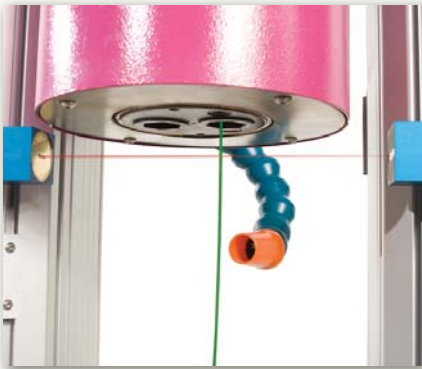
Instron offers more than a dozen models of electromechanical testing systems with industry-leading accuracy and force ranges for testing glass or carbon fibers and tows – from grams to hundreds of kilograms of force. Instron can also supply electrodynamic test systems which are ideal for both static and dynamic testing of fibers and tows.



## Impact

Measuring the effects of impacts on composites is an important area. The compression after impact test is widely used to quantify the impact resistance of composite panels. Instron can supply the impact system and fixtures needed to perform impact and compression tests to ASTM and AITM standards.

Instron® can supply a range of impact test systems from pendulum testers to simple drop towers to fully instrumented, spring assisted, drop towers to high-rate servohydraulic machines.



## Rheology and Thermo-Mechanical

From basic Melt Flow Testers for quality control to advanced Capillary Rheometers for research and development, Instron provides equipment to characterize the flow properties of thermoplastic polymer melts. In addition, Instron supplies systems to measure the Heat Deflection Temperature (HDT) and Vicat softening temperature of plastics.



## Services

Instron Professional Services is a global operation delivering quality customer services to you locally and in your language. Services include telephone support, technical and software support, application test method set-up, consultancy and training. Through Instron you have access to technical and applications teams that know your equipment and are experienced in your business environment. We have a full suite of calibration and verification services to meet ISO/ASTM, force, strain and NADCAP alignment standards. Instron laboratories have accreditation from the major accreditation bodies, including NVLAP and UKAS, and are widely accepted internationally through ILAC and EA.

[www.instron.com](http://www.instron.com)