ELECTRIC VEHICLE BATTERY TESTING SOLUTIONS

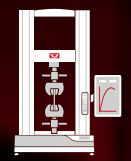
The Latest Materials Testing Systems, Accessories, and Software

INSTRON®

INSTRON®

A LEADER IN EV BATTERY TESTING SOLUTIONS

As the global automotive industry trends towards electrification, Instron is working closely with industry leading battery manufacturers to meet the evolving mechanical testing demands of materials, cells, modules, and packs. Our application experts are well versed in the unique demands of battery testing and can help identify solutions and best practices to optimize your test setups for increased throughput and efficiency.



Tension and Compression

Melt Flow and Rheology

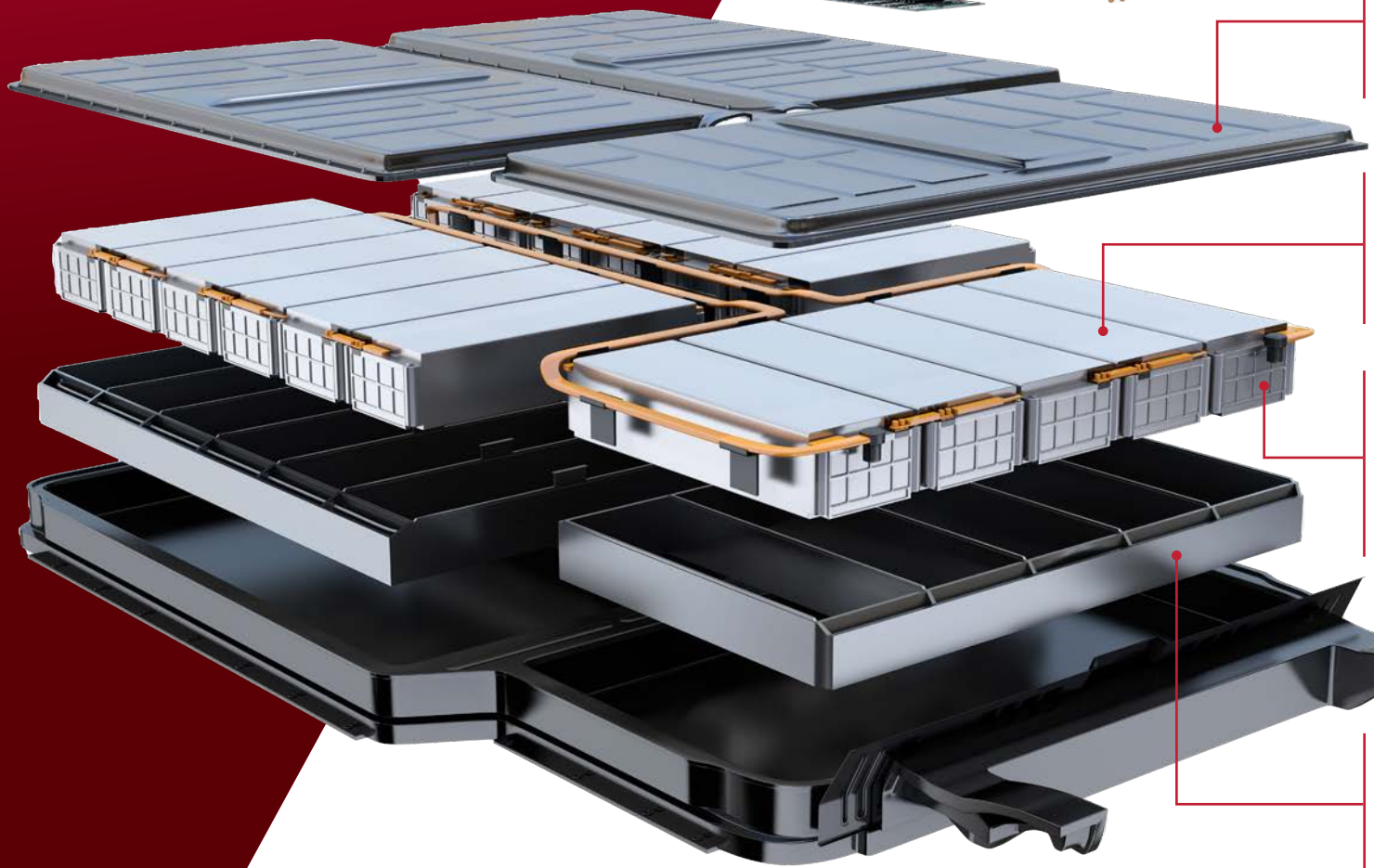
Fatigue and Fracture

Impact

OUR PRODUCTS

Instron offers a diverse product line spanning the entire spectrum of mechanical testing equipment, with an emphasis on developing advanced fixturing solutions to meet emerging battery testing demands. Our products are backed by a global infrastructure offering a broad range of local services, including installations, calibrations, performance verifications, preventative maintenance, technical support, and training.

TESTING SOLUTIONS FOR **EV BATTERY** CELLS, MODULES, & PACKS



Battery Management System (PCB Material)
- Solder Strength / Component Adhesion
- Fatigue Durability – Flexure (3-Point Bend)

Battery Pack Enclosure Top (Structural components & Foam)
- Energy Absorption – Impact
- Dynamic damping – Cyclic loading
- Compressive Strength

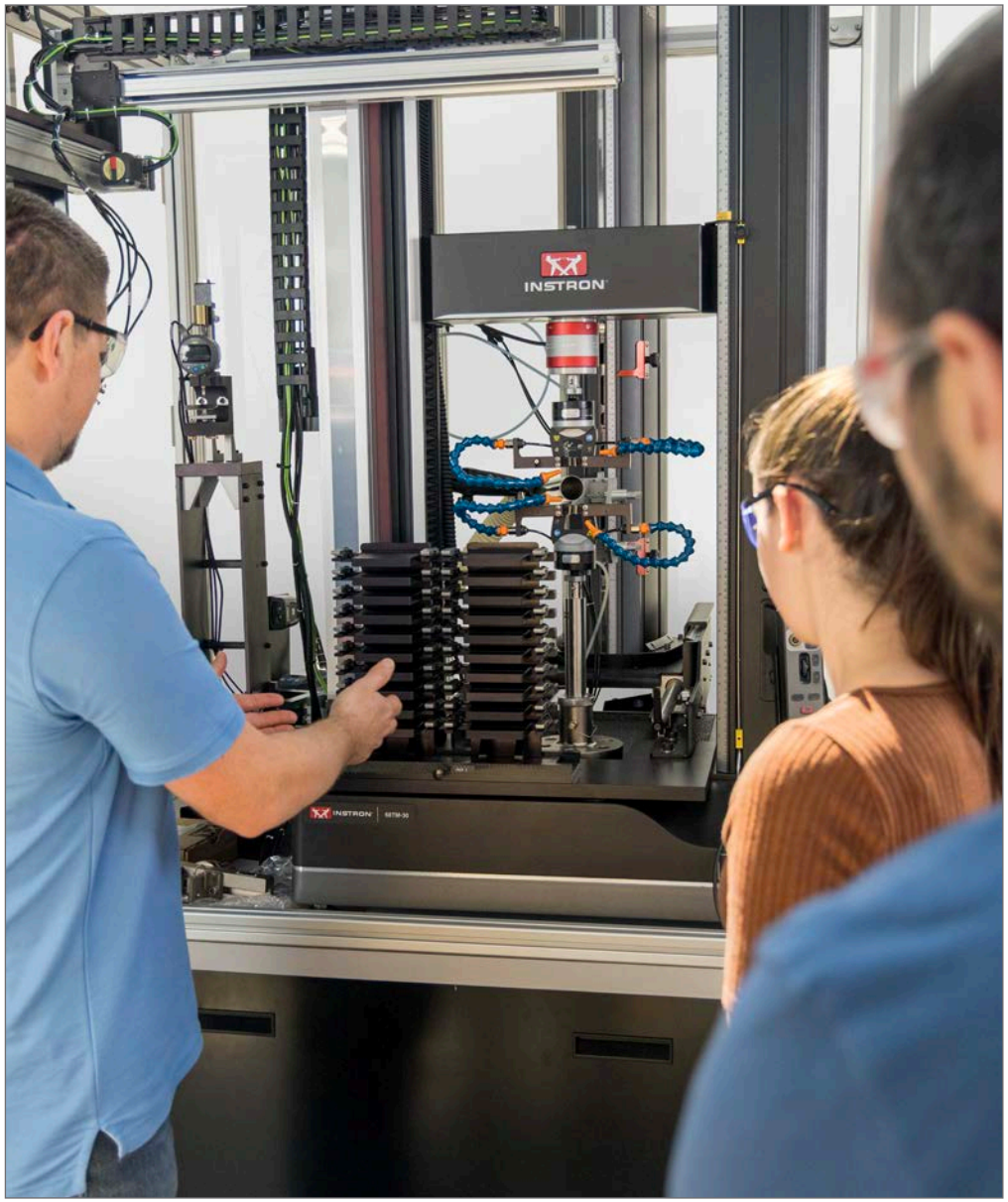
Battery Modules (Welds, Adhesives & Foam)
- Tensile strength
- Adhesion strength
- Static/Impact Crush Resistance

Battery Cells (Separator Film, Electrodes, & Busbars)
- Tensile strength
- Tensile-Impact strength
- Puncture
- Peel strength

Battery Pack Enclosure Base (Structural Components & Welds)
- Impact Indentation/puncture
- Vibrational loading
- Tensile strength

ADAPTING TO CHANGING **TESTING REQUIREMENTS**

Battery materials and component structures are constantly evolving, and businesses need a testing equipment partner ready to support their growth. In addition to our extensive range of standard grips and fixtures, Instron has a dedicated engineering group and production division focused on designing and manufacturing custom solutions tailored to fit specific application demands, including emerging battery testing requirements. This includes custom fixturing, environmental chambers, testing frames, and automation solutions to enhance throughput and repeatability. With the rapid advancements in battery technology, Instron's Engineered Solutions Group is ideally positioned to deliver custom products with quick turnarounds.



FOILS AND SEPARATOR FILMS

Application-Based Testing Solutions

Metal foils and separator films are tested in high volumes and have become increasingly thinner and more challenging to handle manually. Automated testing solutions and specimen loading devices for manual testing are ideal solutions for optimizing throughput and reducing material waste from mishandling.

01 Tensile Test of Seperator Film

02 Tensile Test of Copper Foil

03 Precision Specimen Loader for Thin Films and Foils

04 Puncture Test of Separator Film

05 Automated Specimen Thickness Measurements of Copper Foil

06 Pneumatic Puncture Fixture for Testing Separator Film

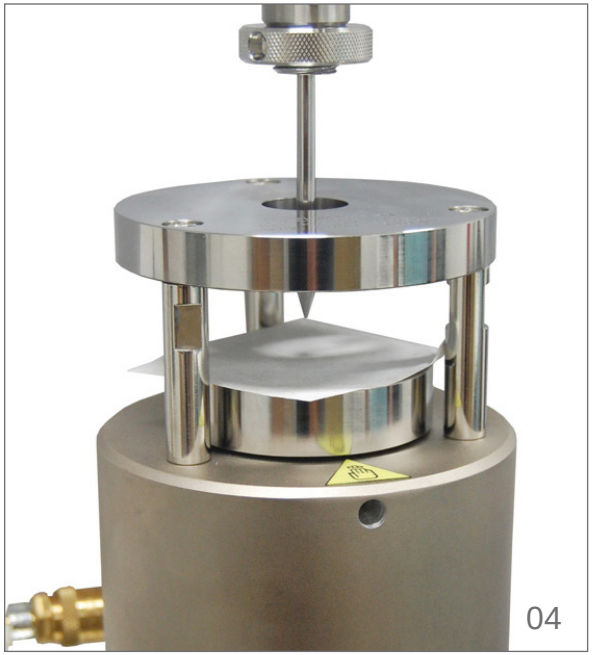
07 Coefficient of Friction Test of Separator Film

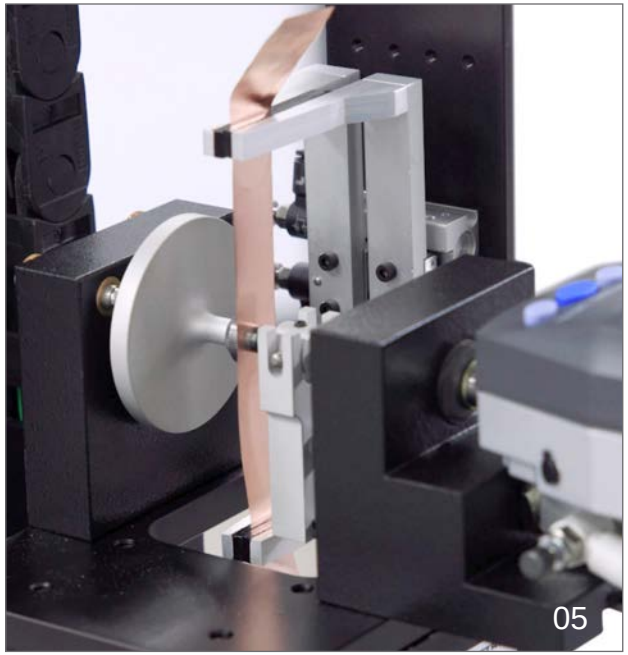
08 Automated Tensile Testing of Separator Film

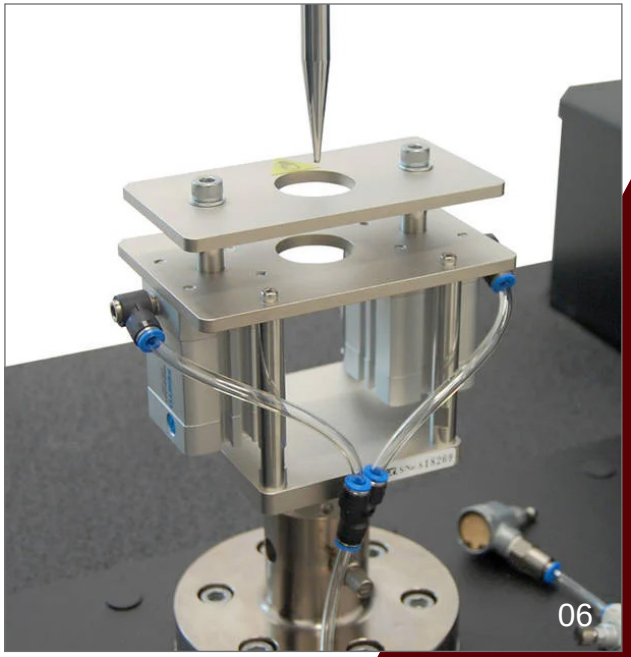
01

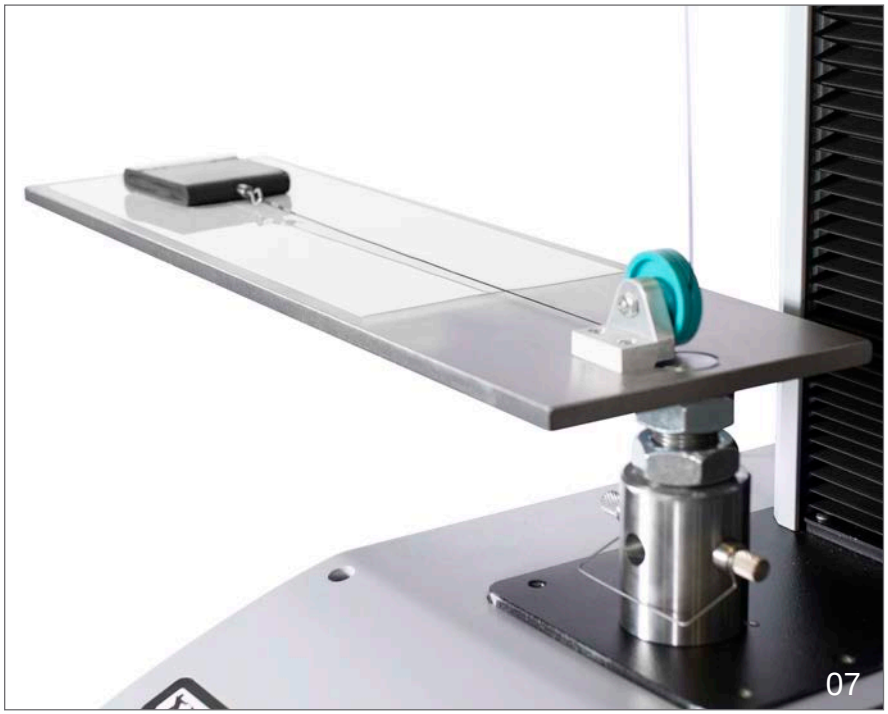
02


03


04


05


06


07

08

ELECTRODES

Application-Based Testing Solutions

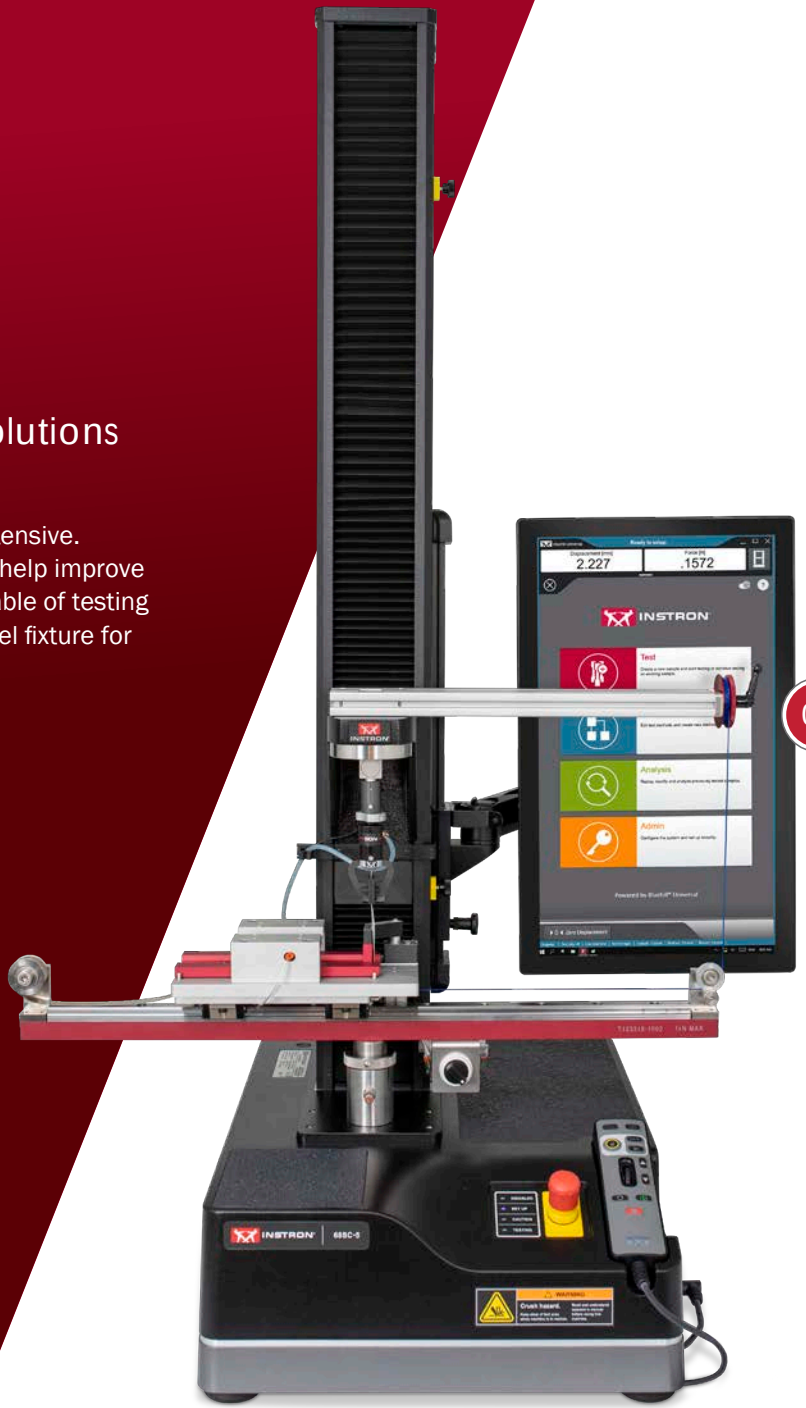
Adhesion testing of electrodes can be time intensive. Instron has developed specialized fixturing to help improve efficiency, including a tack testing fixture capable of testing five specimens per batch and a pneumatic peel fixture for increased consistency.

01 90° Peel Test with Pneumatic Fixture

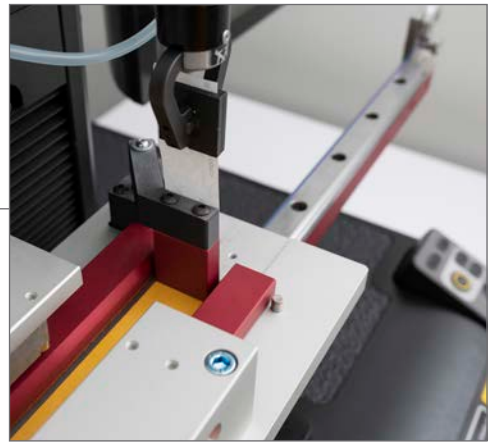
02 Tack Test

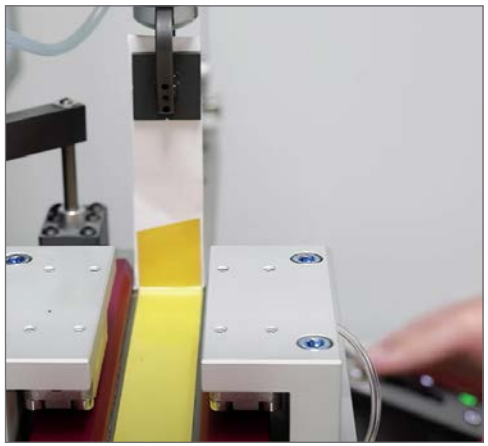
03 3-Point Bend Test

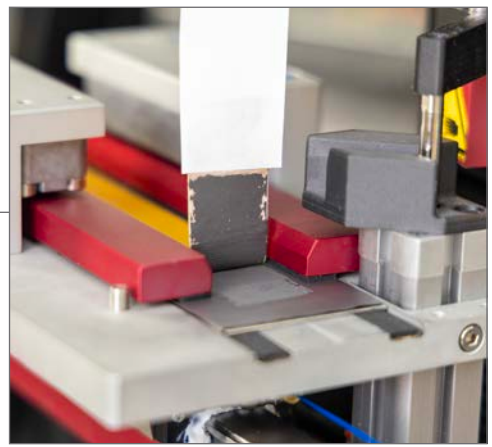
04 180° Peel Test

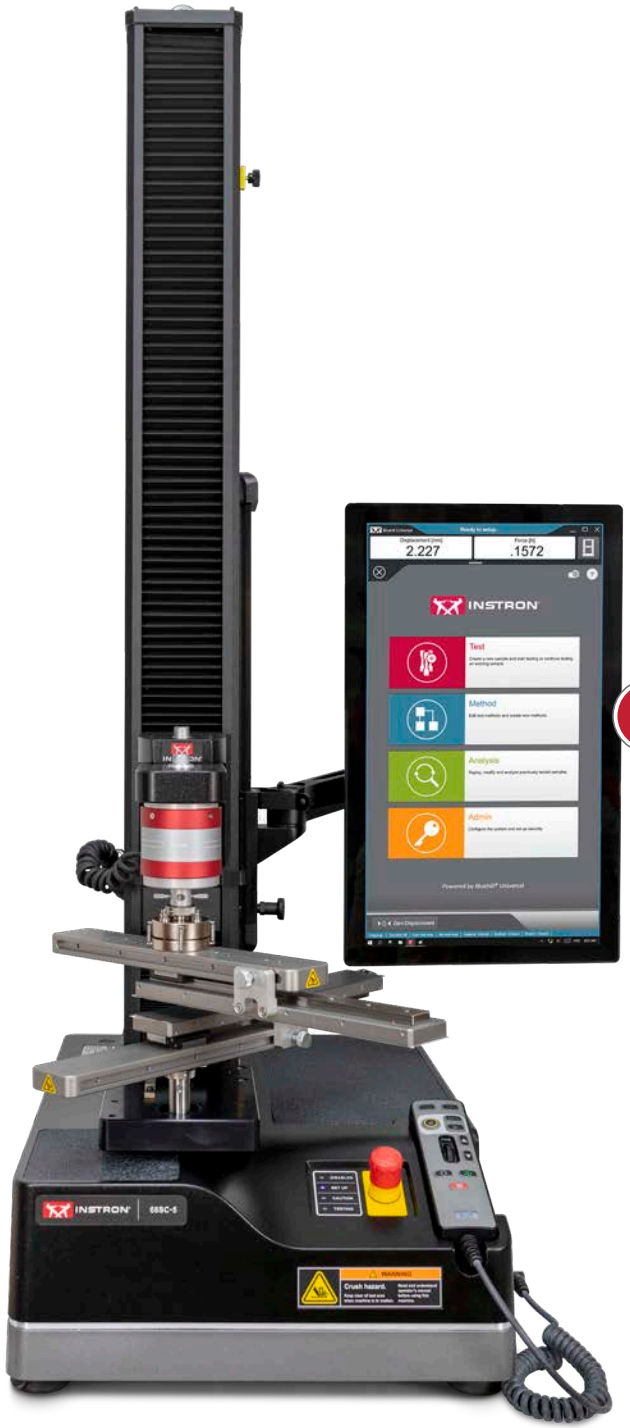


01



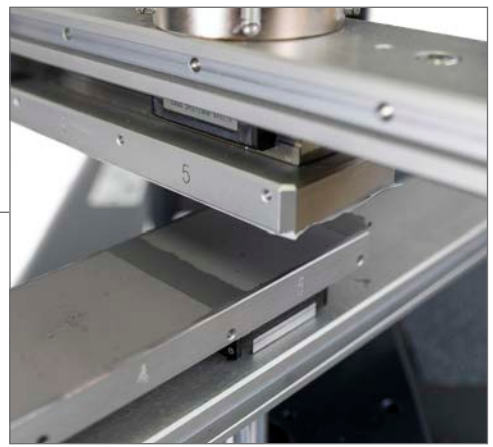




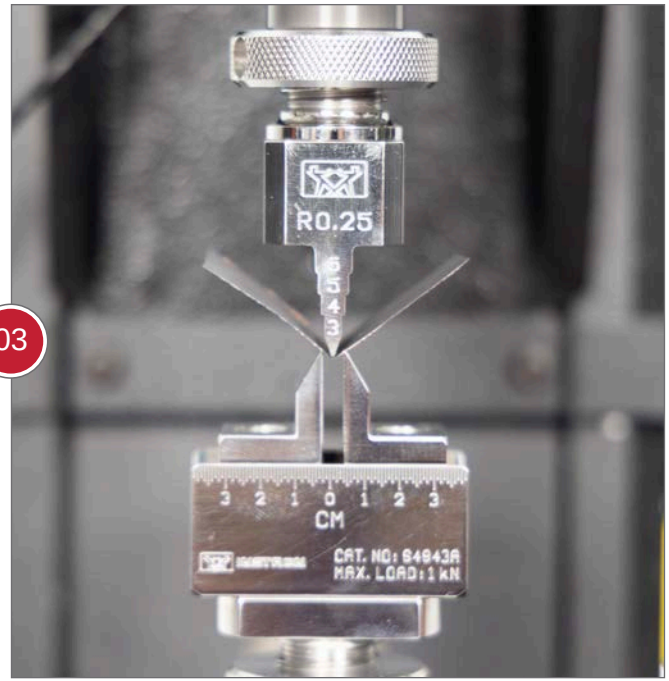

2.227
.1572
INSTRON
Test
Method
Analysis
Admin
INSTRON
Crush hazard.

02

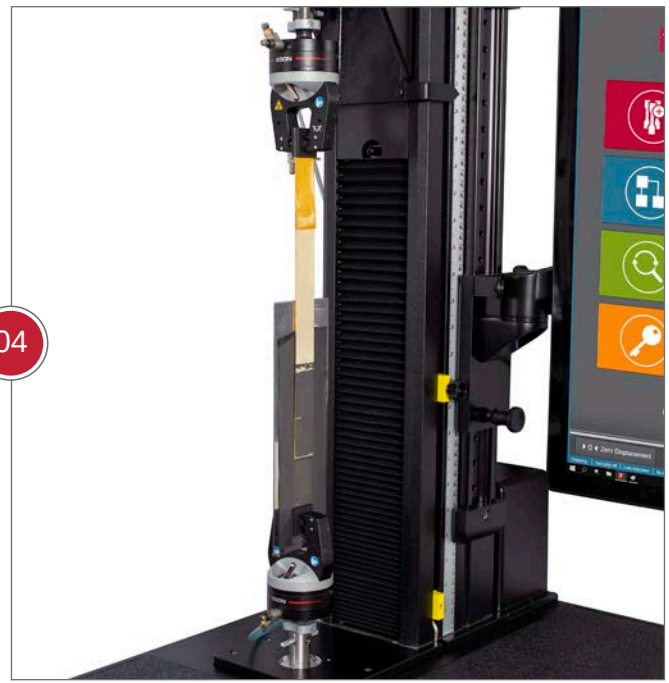

INSTRON



03


R0.25
3 2 1 0 1 2 3
CM
CAT. NO: 94943A
MAX. LOAD: 1 kN

04



WELDS

Application-Based Testing Solutions

Performing weld strength testing often requires specialized fixturing and grips with jaw faces that can be offset to properly secure, align, and test the materials and components.

01 Cap Weld Test

02 Prismatic Cell Weld Test

03 Busbar Weld Test

04 Lap Shear Test of Weld


01


02


03

04

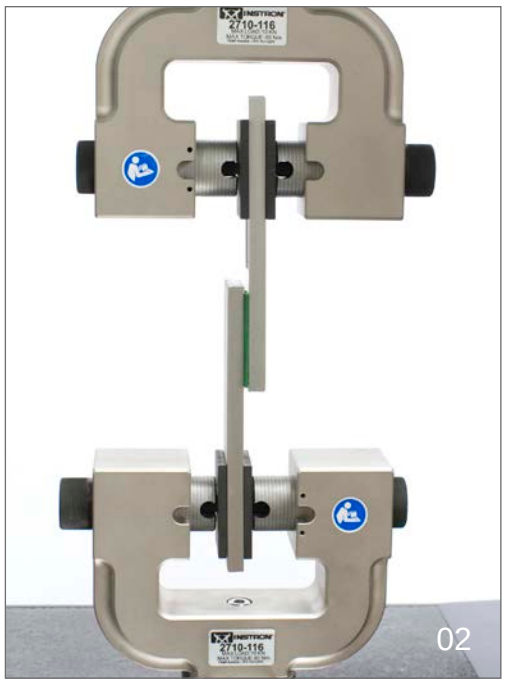
CELLS AND PACKS

Application-Based Testing Solutions

Beyond their electrical performance, cell behavior such as swelling can be measured to assist manufacturers with module and pack design. Various materials like foams, adhesives, and plastics are commonly used in modules and pack assemblies.

- Foam Compression Test 01
- Lap Shear Test 02
- Swell Test of Battery Cell 03
- 3-Point Bend Test 04


01


02

03

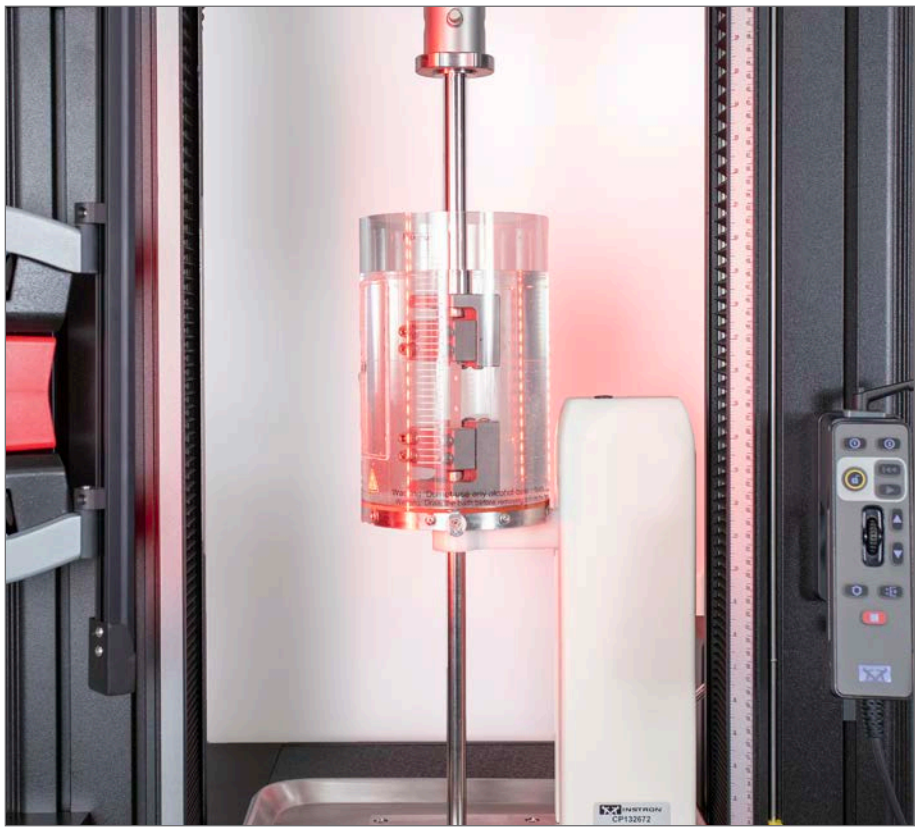

04

ADVANCED SOLUTIONS

Application-Based Testing Solutions

Environmental Chambers

Materials and structures used in EV batteries can perform differently under varying environmental conditions. A testing chamber integrated with the Instron test frame allows specimens to be tested under a variety of environmental conditions while under load.



Temperature Controlled Bath

A temperature-controlled bath allows you to simulate the environmental conditions of materials submersed in liquid solutions while under load. Paired with submersible tensile grips and a pneumatic lift for ease of use, the bath is compatible with video extensometers to allow for unparalleled accuracy in strain measurement.

Non-Contacting Strain

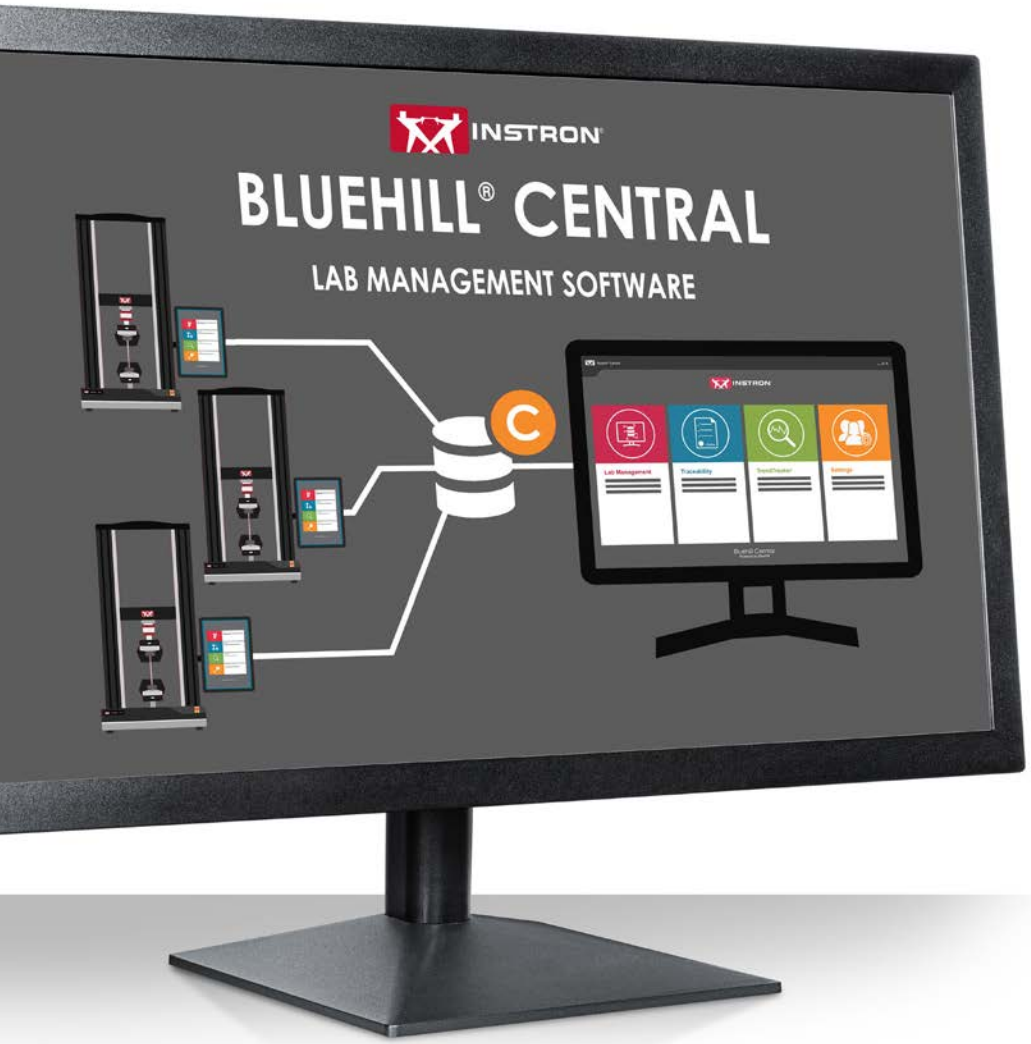
The AVE 2 video extensometer is fully integrated with Instron testing systems, providing a repeatable and highly accurate non-contacting method of strain measurement for ambient and non-ambient testing in temperature chambers and fluid baths.

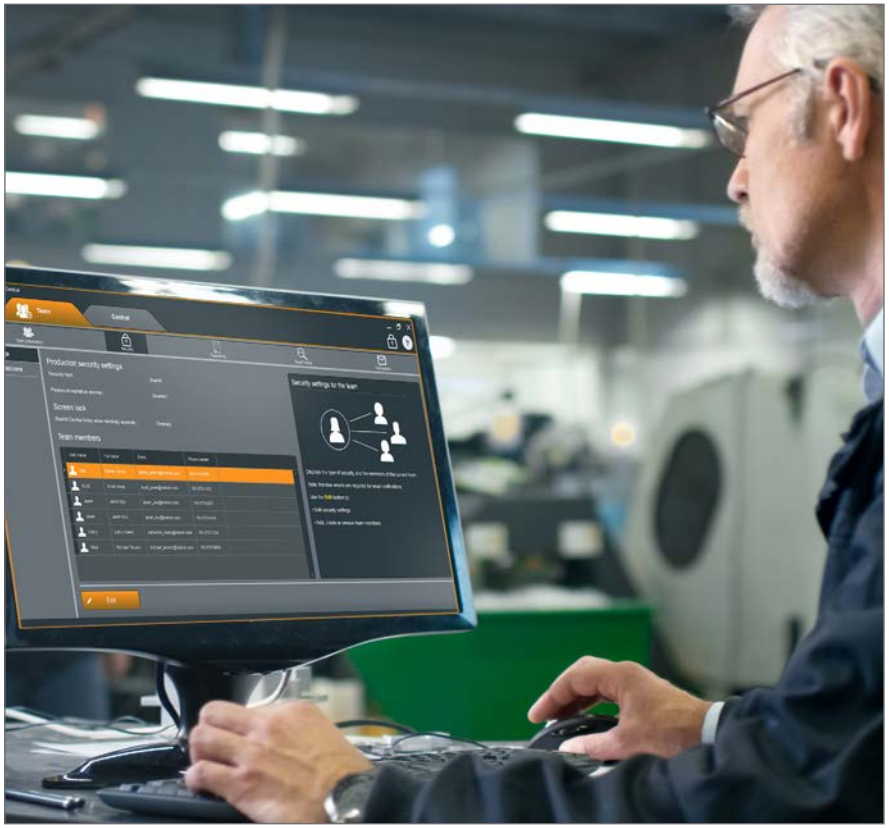
Speciment Alignment

Instron's Precision Specimen Loader is specifically designed to improve the process of testing thin films and foils. A detachable clip allows the operator to load and align the specimen away from the testing space before mating it to the linear rail that guides the specimen to the center of the jaw faces for consistent placement every test.

ADVANCED SOLUTIONS

Application-Based Testing Solutions





Bluehill® Central

Bluehill Central software is a laboratory management tool that enables centralized, remote management of Bluehill Universal software applications associated with multiple Instron test frames. The software allows you to remotely manage all Bluehill Universal users, test templates, results, file revision approvals, and audit trail data from multiple Instron systems.

Automation

As battery manufacturing scales up, automated testing systems are an ideal way to optimize throughput, repeatability, and safety. Available as either a complete turnkey solution or as modules that can be fitted to existing frames, Instron automation products can be tailored to your specific requirements. Capable of testing up to 160 specimens per batch without operator interaction, automation empowers labs to run tests all day and all night.

TESTING SYSTEMS

For Testing Battery Materials, Cells, Modules, and Packs

TENSILE, COMPRESSION, & FLEX TESTING

Universal testing systems can be used to perform a wide range of static tests, including tensile, compression, bend, peel, tear, shear, friction, puncture, and more. These systems are compatible with thousands of accessories and can easily accommodate custom fixturing to adapt for unique testing requirements.

IMPACT

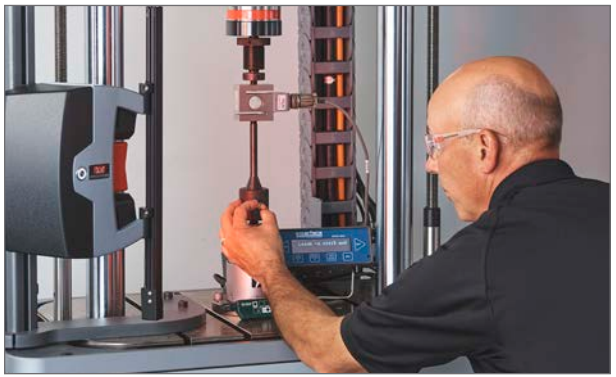
Drop tower systems are used to apply and measure impact loading at moderate to high speed (typically puncture or point indentation). Single-strike tests are controlled in terms of incident velocity and energy (1-24m/s and up to 1800J).

DYNAMIC AND FATIGUE

Used for tests that require low to moderate force capacity, these machines are capable of fatigue and cyclic loading at up to 100 Hz (transient movements at over 1m/s or 40G acceleration) but can also be deployed for static tests.

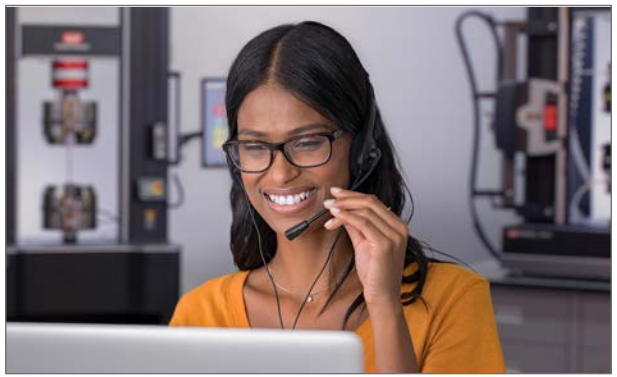
OUR PROMISE: WITH YOU EVERY STEP OF THE WAY

With over 300 field service engineers spread across every major market, Instron has all the tools, services, and staff needed to offer you exceptional personalized support. Our global team is on hand to help you achieve your objectives, from regular preventative maintenance and calibration of testing instruments to application support and training. Partnering with Instron will extend the life of your investment, minimize downtime, and reduce the cost of equipment ownership while streamlining your testing processes and helping to future-proof your testing.



CALIBRATION

PREVENTATIVE MAINTENANCE



TECH SUPPORT AND TRAINING

CONNECTED SERVICES

REPAIR AND REFURBISHMENT

SYSTEM UPGRADES AND RETROFITS

GLOBAL COVERAGE, LOCAL EXPERTISE

We are regionally close to our customers with **1,500+ worldwide employees**

We speak **40+ languages** with documentation in 20+ languages

Sales in **120** countries with **300+ field service engineers** globally

○ Manufacturing + Sales & Service Office ● Operations + Sales & Service ■ Office Sales & Service Office

FIELD SERVICE ENGINEERS AROUND THE WORLD

130 AMERICAS

80 EUROPE & UK

100 ASIA

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

ElectricVehicleBatteryTestingSolutions__BrochureV1