Instron® TechNotes

Getting the most up-to-date information on materials testing

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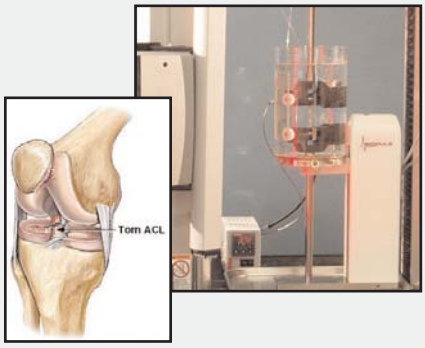
Application Story

Patient's Own Tissue Repairs Torn Ligaments



A torn Anterior Cruciate Ligament (ACL) is one of the most common knee injuries for recreational and professional athletes. The ACL is one of four ligaments that keep the knee joint in place during normal flexion and extension motions required for walking and running. Tissue Regeneration, Inc., Medford, MA, is an early stage company developing new technologies that may significantly address orthopaedic and other connective tissue clinical repair needs, such as ACL reconstruction.

ACL reconstruction involves total replacement of the torn or injured ligament. Current treatments include (1) an autograft implant, harvested from the patient's own body or (2) an allograft implant from cadaveric tissue. Allografts are available in limited supply and autografts result in pain in the area from which they were harvested. Patients with these treatments may never fully regain pre-injury activity levels. Tissue Regeneration, Inc., is designing a novel ligament replacement device to eliminate the need for current grafts options. These protein-based devices encourage growth of the patients own tissue around the graft, eventually replacing it completely. This allows the ligament to heal more effectively, thereby ultimately improving the clinical outcome for the patient.

To be sure that these devices will endure a patient's normal activity level, mechanical testing is required to measure failure load and fatigue life. A specially-equipped fatigue testing system was used, in combination with a bath, to rupture the devices through single pull to failure testing and cyclic loading designed to simulate performance during walking or running. A temperature-controlled bath was required to ensure that all tests were conducted under physiological conditions, as previous studies have shown that the testing environment can have a significant affect on mechanical properties.

Learn more about Tissue Regeneration Inc.'s unique technology.

Learn more about Instron's solutions for testing sutures and other medical products.

Tech Tip

Producing tensile strength values that are lower than normal?
Make sure the operator is not manually zeroing the load (balance load) and that the software is not auto-balancing the load after the specimen is loaded into its grip or fixture.

Ask the Expert

Have a question about materials testing?
Submit your question and you may see it featured in a future issue of TechNotes.

Ask Us >>

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Technologies

How do you move a 250,000 pound deadweight stack, while maintaining its integrity and accuracy?

Did you know that the load cell used to calibrate your testing machines was originally calibrated using a 3-story tall, 250,000 lbf deadweight stack; one of the largest deadweight force calibration systems in the world? Or that one nick on the deadweight could mean a lost gram; and a 5-mile change in location means a change in gravity of 0.0009%?

A deadweight calibration system applies a series of weights to a load cell and compares the electrical readout of the load cell to the force of the weights. It applies force with an accuracy of 0.0012%; its accuracy depends on knowing precisely the masses of the weights, local gravity and air density.

Instron faced many hurdles in moving the deadweight stack when the company relocated in April: the physical size of each weight, keeping the accuracy of the stack's physical properties, a change in gravity from neighboring towns and possible nicks and scratches that could affect the accuracy of the weights.

After six weeks of careful disassembly in Canton and re-assembly in Norwood; an additional 60 days of fine-tuning and tweaking the mechanisms; and having a local gravity measurement made by a consultant from the National Geodetic Survey to an accuracy of 0.000002%, Instron succeeded in moving the 250,000 pound deadweight stack!

Learn more about **Instron's calibration services.**

You Asked - We Answered

Q: How do I know when my hardness test block is no longer useful?

A: The useful life of a test block is determined by the population and proximity of the indentations. The distance between the center of any two adjacent indentations should be at least three times the diameter of the indentation. The distance from the center of any indentation to an edge of the test block or test piece should be at least two and a half times the diameter of the indentation. Tests are to be taken on the top side of the block only.

Learn more about **hardness testing.**

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