For a Total Solution to all of your Materials Testing Needs

Fullam enables materials testing in microscopes

Ernest F. Fullam, Inc. addresses the needs of a microscopic niche market. Specifically, it provides accessories for scanning electron and light microscopes. Its offerings are wide-ranging, yet certainly one of its most interesting offerings is a load frame that tests the tension and compression characteristics of materials while in the vacuum chamber of an electron microscope. Using the hand-sized load frame that exerts from a few grams up to a thousand pounds of force, Fullam enables researchers to examine materials at a microscopic level. To collect and analyze the test data, Fullam uses the MTESTWindows™ Materials Testing System from ADMET, Inc. With MTESTWindows, Fullam solved a long-standing problem of automatically controlling the test frame and efficiently collecting data for in-depth analysis. Now, using ADMET's turnkey system, Fullam can offer its customers a complete materials testing system.

Ernest F. Fullam, Inc. specializes in providing accessories for electron and light microscopes. Its products range from tweezers to imaging systems, turbo evaporators, substages, specimen holders, micromanipulators, darkroom and general lab supplies. One of its more unique offerings is a hand-sized materials tensile tester that fits inside a scanning electron microscope vacuum chamber. The tester, which exerts a force as small as a few grams or as much as 1,000 lbs., can be used to test virtually anything from a human hair or a single carbon fiber to recording tape, metals and ceramics.

The testers perform a range of tests including tension, compression, vertical and horizontal bending and cyclic loading for fatigue testing. Optional heating and cooling units enable testing of materials at different temperatures. The advantage of the tensile tester is that researchers can measure crack propagations or grain rotation while observing the specimen under high magnification – up to several thousand diameters of magnification under an electron microscope. This enables greater insight into early stage fatigue and failure, and a better overall understanding of how materials perform.

Fullam customers include automotive and electronics companies, as well as petroleum and engineering firms, universities, the military, testing labs and medical research. Fullam materials testers are being used throughout the world.

Started in the '60s

Fullam became aware of the need to stretch materials under a microscope in the 1960s. At that time, they introduced a rudimentary tensile tester that has been improved over the years with motor drives and other features. The company has never strayed from its original concept of a small unit designed to work with microscopes. "There are plenty of bench top tensile testers for larger specimens but, as far as we know, we're the only American producer that has specialized units for microscopy applications," commented Ernest F. Fullam, Inc. president, Peter Fullam.

SOLUTION OVERVIEW

Industry: Laboratory Research
ADMET Product: MTESTWindows
Application: Materials testing in microscopes
Partner: Ernest F. Fullam, Inc.

The challenge from the start has always been data acquisition – capturing readings and moving the findings from the tester to spreadsheets and databases for analysis. “We added a primitive data acquisition capability to our frame but could not find a software program that was designed for this type of work,” commented Fullam. “We tried using a standard laboratory information management system but it was patched together and it was very hard to integrate tensile test findings with data analysis tools.”

Data acquisition comes of age

Fullam finally found the solution to his data acquisition problems when he found ADMET. ADMET’s MTESTWindows is specifically designed to work with electrohydraulic and electromechanical testing machines. Said Fullam, “I contacted ADMET and found out that they’d be happy to work with me to create a packaged MTEST software system for use with my load frame.” ADMET developed a “Plug ‘n Play” level of integration for the Fullam system. “Now, when we receive an order, we send the frame to ADMET. They do all of the wiring connections and cabling – the whole package. When they return the full system to us, we test it using a laptop computer, add and test the other peripherals, and ship the whole package to our customer.”

Fullam offers a number of options from special clamps to heating and cooling units. It also provides the interfacing equipment for adapting the frame to the customer’s specific microscope. This normally includes a port cover for the vacuum chamber and mounting adapters. No machining or drilling is required on the microscope. “We send the unit with a few pages of instructions. Normal installation takes about one-half hour by the user,” he continued.

For data acquisition, the frame is connected via its vacuum port cover to ADMET’s machine interface box, which includes connections and signal conditioning for all transducers, a motor amplifier for powering the miniature motor under servo control and a serial port for connection to a personal computer or workstation running MTESTWindows software. The machine interface box employs a speedy 32-bit microprocessor to acquire data, accurately control the movement of the test frame and transmit the captured data to the computer.

MTESTWindows tracks and reports all tests

Since MTESTWindows is designed to work with load frames, it gathers and reports all test data for commonly used mechanical tests. It plots stress vs. strain curves as the tests are in process. Key test parameters, such as peak load/stress, offset yield, modulus of elasticity and other measures are also reported.

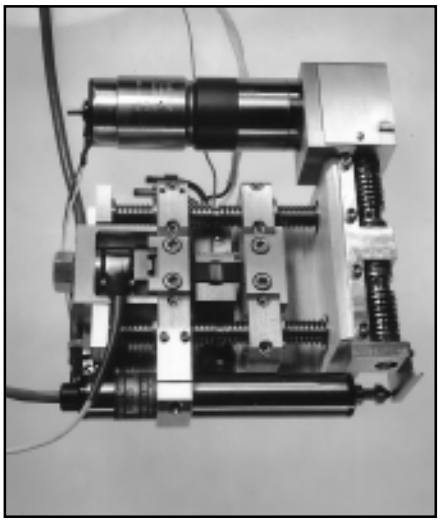
MTESTWindows saves raw test data and results so multiple tests can be easily compared. Its X-Y plot capabilities and ability to export data in standard formats make it easy to integrate with other data analysis and laboratory management systems. MTESTWindows includes inputs for load, crosshead position and axial strain with options for a transverse strain channel and servo control. Load accuracy exceeds ASTM E-4 standards.

The MTESTWindows software has minimal system requirements and works on all Microsoft Windows operating systems (Windows 95 and higher). A user manual for the software is included with the distribution CD.

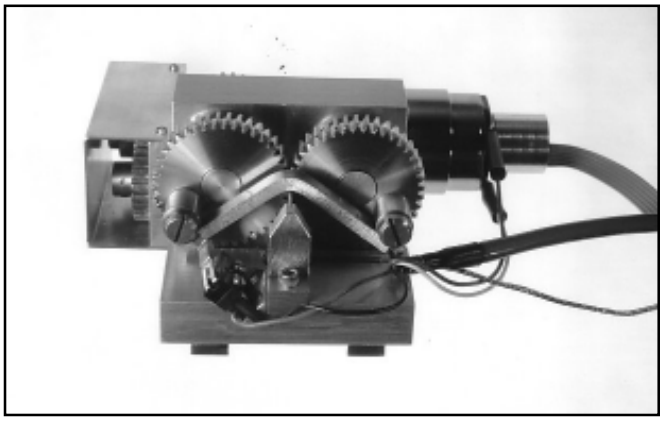
For More Information

For more information about ADMET products or services, please call us at 800-667-3220 in the US or Canada, email sales@admet.com or visit our Web site at http://www.admet.com.

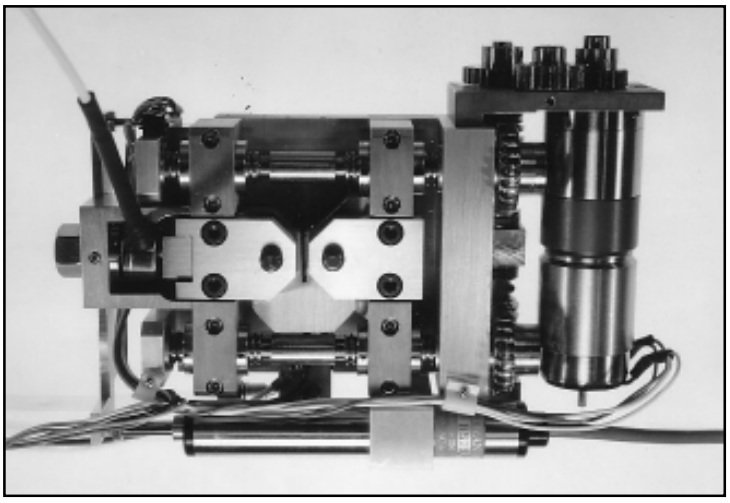
Ernest F. Fullam, Inc. can be reached at 800-833-4024, sales@fullam.com or http://www.fullam.com.



1,000 lb Tension/Compression Frame



3 Point Bend Frame



Compact Fatigue Frame