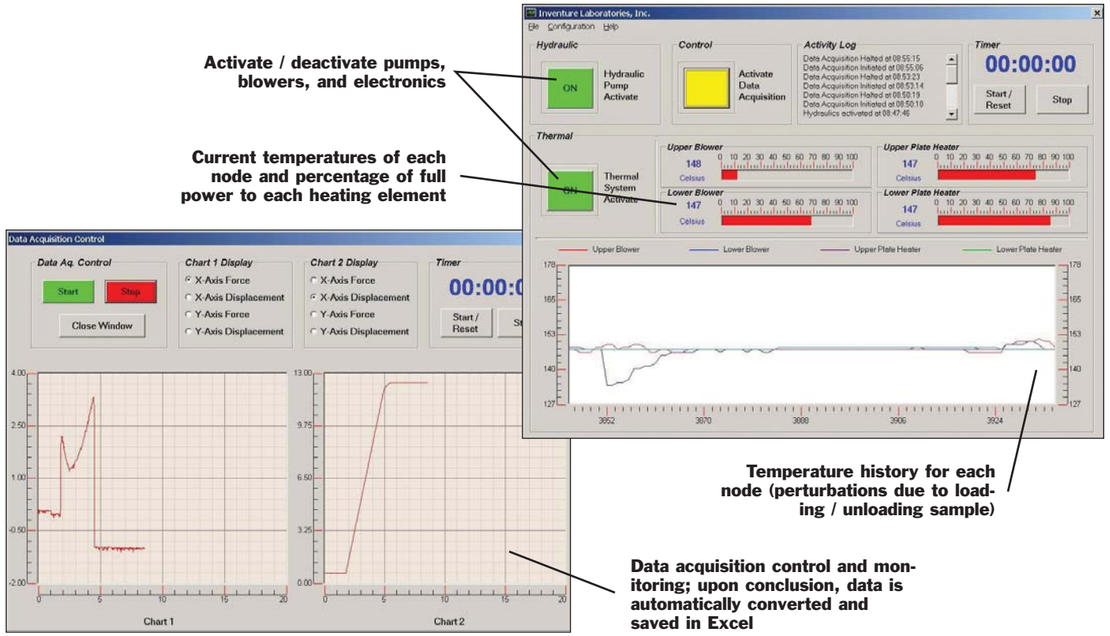
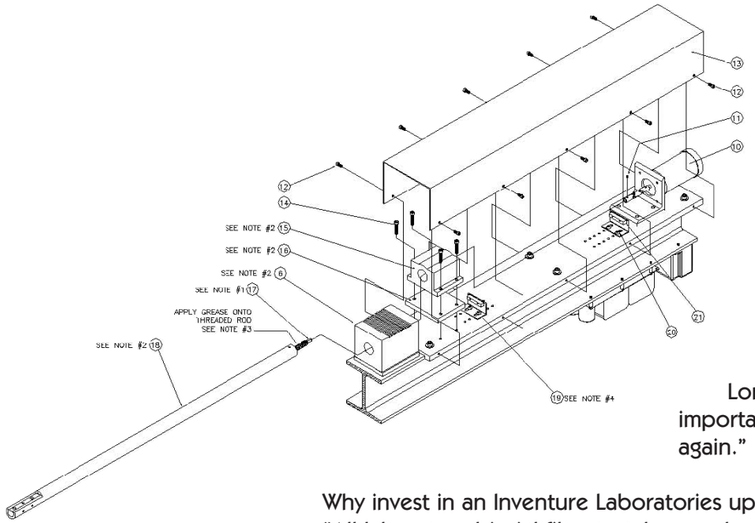



According to Vic DiNardo, Sunoco Inc. Research and Technology, “Inventure Laboratories took the time to understand our needs and goals and their solution is right on target.” Dick Mitchell, Lab Supervisor at AET Films agrees, “With Inventure’s upgrades, our Long machine has become an important part of our R&D effort again.”

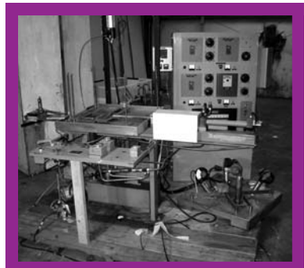
Why invest in an Inventure Laboratories upgrade T.M. Long machine? “All laboratory biaxial film stretchers today,” says Tom Shope, of Inventure Laboratories, “utilize mechanical components - clamps, pantograph mechanisms, etc. - that are similar to that used on the T.M. Long machine. Upgrading and, if necessary, repairing a good instrument is the best solution for value conscious researchers.”

**Contact Inventure Laboratories for more information, including pricing, and to discuss your specific questions.**

**865-531-8258**
Inventure Laboratories, Inc.
P.O. Box 30457
Knoxville, TN 37930-0457 USA

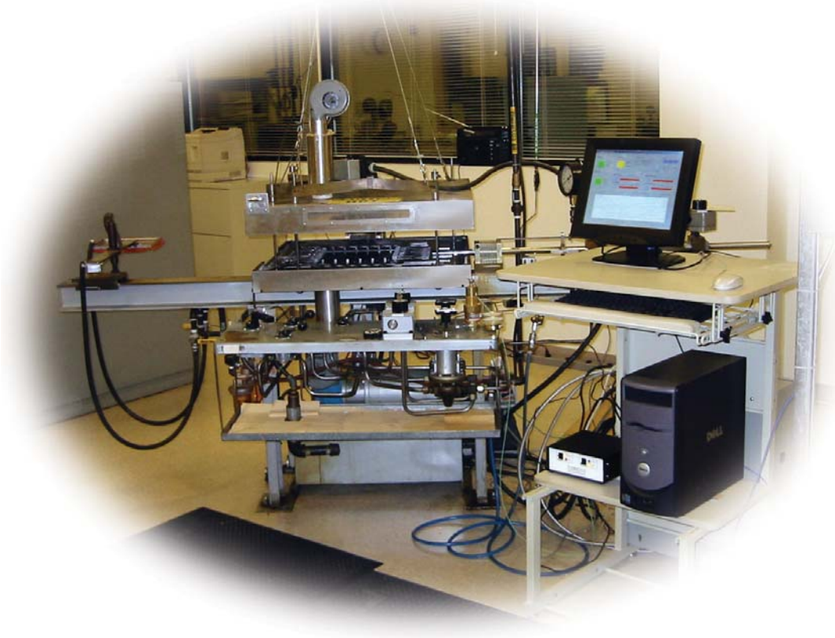
www.biaxialstretcher.com

INVENTURE! LABORATORIES inc



# Breathing New Life Into a Classic

## Upgrade and Replacement Parts and Systems for the T.M. Long Machine



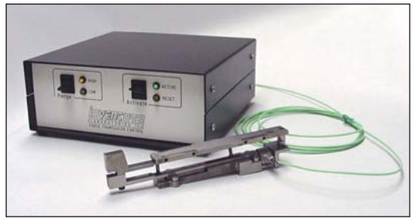
INVENTURE! LABORATORIES inc

**865-531-8258**
www.biaxialstretcher.com

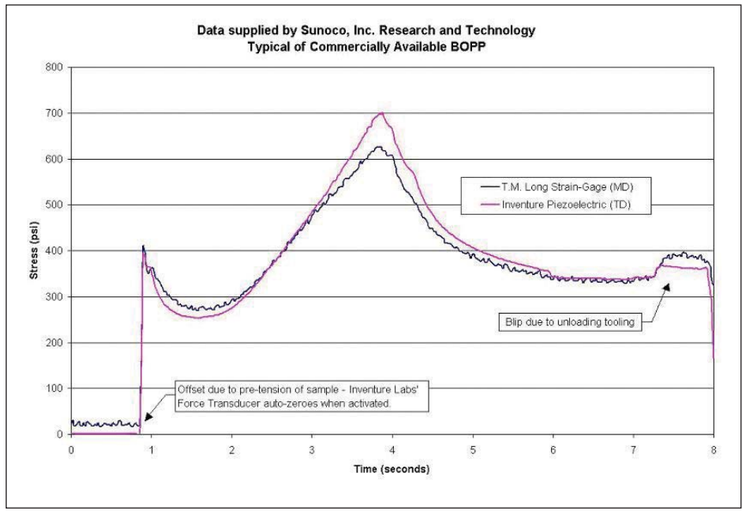
**For years, the T.M. Long Machine has been the de-facto standard in laboratory biaxial film stretching equipment.**

Sources indicate that there were approximately 115 of these machines made between the early 1960's and the late 2000's. Though features and capabilities evolved during this time, all of these instruments shared robust construction and excellent craftsmanship. Like all machines though, these instruments eventually begin to fail, and T.M. Long Co. is no longer offering support or manufacturing new units.

Inventure Laboratories, Inc. offers upgrade and replacement parts for the T.M. Long Machine based on the technology and software employed in their AccuPull Laboratory Biaxial Film Stretcher. Inventure Laboratories manufactures a modern Laboratory Film Stretcher that, according to Michael Carroll, CEO of Inventure Laboratories, "... continues the tradition of high-quality, robust, and dependable machinery that T.M. Long customers have come to appreciate, in a package incorporating the 21st-century technology that modern researchers have come to demand." Inventure Laboratories understands that, in the challenging economic climate of late, it is imperative for companies to keep their equipment in operation for as long as possible - laboratory instrumentation is no different.



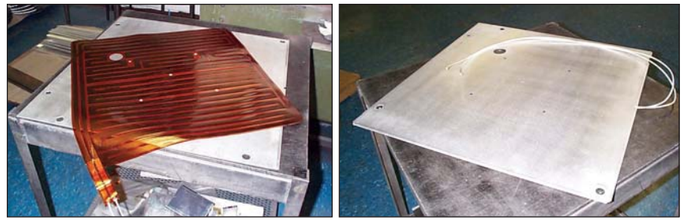
**Inventure Laboratories Force Transducer (above) provides a cleaner, more accurate signal than the original T.M. Long force transducer, compared below.**




Traditionally, one of the greatest utilities of a laboratory film stretcher is to generate stress vs. strain curves. Unfortunately, one of the first parts to fail on the T.M. Long Machine is often the force transducer clips. Inventure Laboratories supplies an upgrade clip that employs a two-range piezoelectric force transducer.

The piezoelectric force transducer allows a much higher sensitivity than the original strain-gage; while the two ranges allow the owner of the T.M. Long Machine to study a wider range of materials and maintain a high signal-to-noise ratio. The chart at left shows a direct comparison between the Inventure Laboratories and an original T.M. Long force transducer. Note that the piezoelectric unit allows a much cleaner, and hence more accurate, signal.

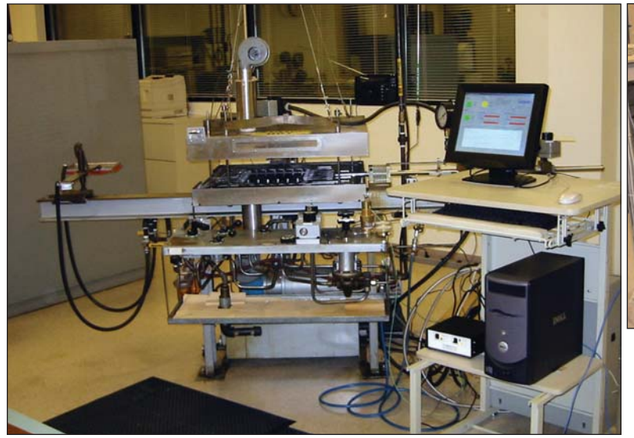
Ted Long built many of the components on his machinery himself. (In the 1960's there wasn't the wide and varied selection of purchasable components that there is today - another indication of the beauty of these instruments). The hand-wound heating elements were an example of this. As temperature is such a critical parameter in film research, the loss of a heating element may render the T.M. Long Machine ineffective. The blower heaters are relatively easy to replace from commercially available components; however, the plate heaters

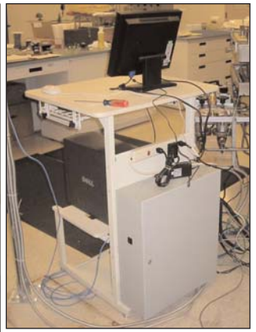


**Inventure Laboratories replacement plate heaters are more efficient and heat more uniformly than the original T.M. Long heaters. The heating element (left) is encased in the plate housing (right).**

are another story. Inventure Laboratories now produces replacement plate heaters that employ efficient carbon film heating elements that permit higher thermal response rates and lower EMI (electro-magnetic interference)* - for the same power input - compared to the original T.M. Long resistive heaters.

T.M. Long machines were originally equipped with human powered thermal control (via rheostats) and data acquisition via pen-plotters and/or oscilloscopes. In the computer age, this is no longer acceptable. Inventure Laboratories provides a machine control and data acquisition / analysis package comprised of Windows-based software requiring a Pentium-III computer or greater, 16-bit data acquisition, temperature control, and all ancillary power electronics necessary to control and operate that instrument.





**(left) Touchscreen LCD monitor streamlines and simplifies work with the T.M. Long Machine.**

**(right) Everything needed to control, take data, and power the instrument is housed in one cabinet.**

Machinery photos courtesy of Applied Extrusion Technologies, Inc. (AET Films)

**"With Inventure's upgrades, our Long machine has become an important part of our R&D effort again."**

- Dick Mitchell, AET Films

The machine control, data acquisition, and analysis software is built on the framework of the "instrument control software package" that comes standard on Inventure Laboratories' AccuPull Biaxial Film Stretcher. This control system greatly enhances the capabilities and throughput of the T.M. Long Machine and increases its repeatability through automating as much of the control as possible. Data taken during pulls is noise-filtered, analyzed, and saved in an Excel spreadsheet where charts are automatically generated and the data formatted. Temperature control is via PID proportional controllers - i.e. rather than the original hand control or typical on-off controllers, the power to each of the heating elements is independently "throttled" allowing for greater thermal accuracy and less fluctuation during sample loading.

The next step up the ladder is to include motion control in their data acquisition and analysis package. The solution is to remove the original hydraulics and replace them with software controlled linear actuators, custom designed and built by Inventure Laboratories. No more adjusting strain with a hex key and a 2x4; now the motion and data acquisition can be controlled, synchronized, and analyzed via a single Window's based software package and with touch-screen interface. The T.M. Long machine finally makes it to the 21st-century.

* Though resistive in nature, carbon film heating elements are more efficient, heat more uniformly, and exhibit lower EMI than traditional wound elements.