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## Positioning systems help tree-ring study

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Discovered by Andrew Douglass of the University of Arizona, dendrochronology is the science of using tree rings to date climate changes by studying tree-ring growth. In 1906, Douglass noticed that wide rings of certain species of trees were produced during wet years and narrow rings during dry seasons. Using this information, climatic changes of specific geographic areas can be traced by comparing trees of unknown age with samples from trees with known growth sequences.

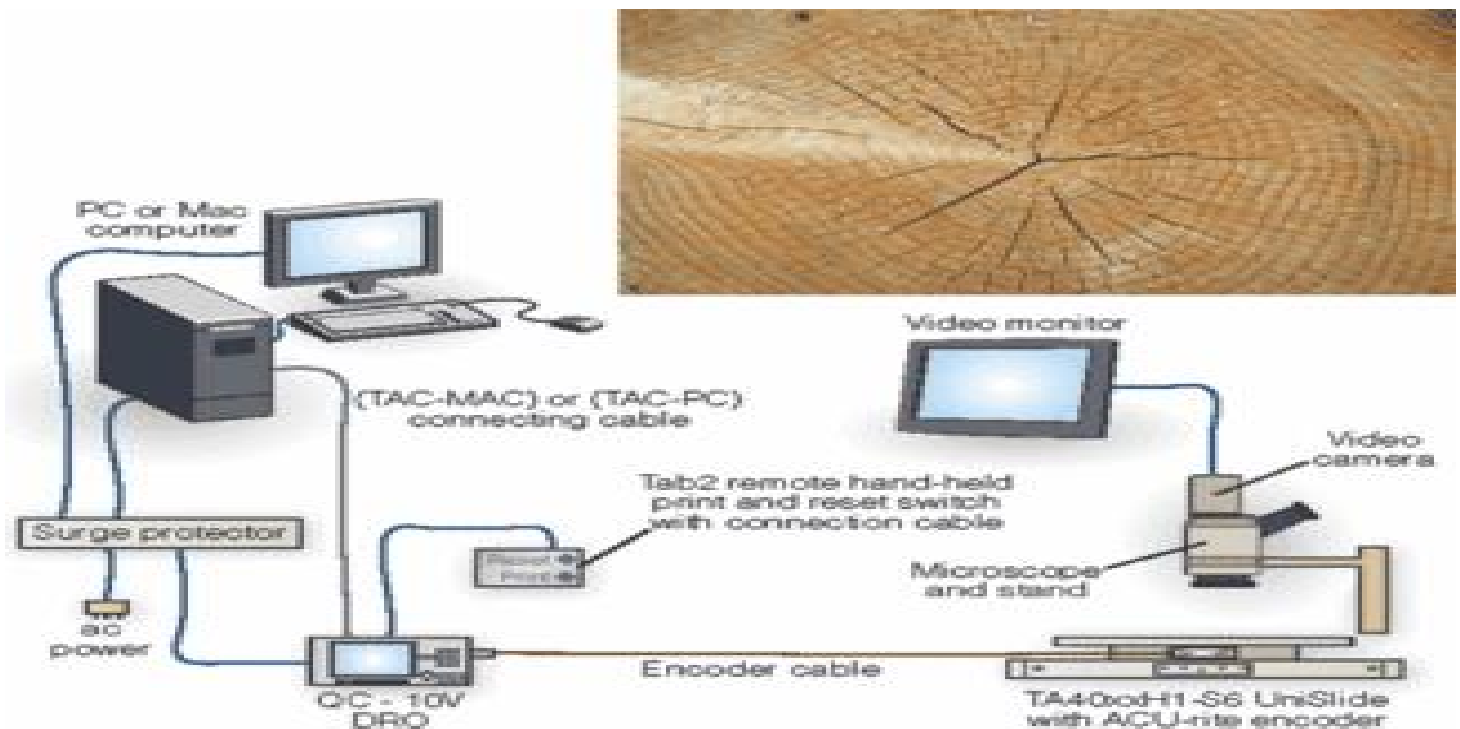
To address this market, Velmex (Bloomfield, NY, USA; [www.velmex.com](http://www.velmex.com)) has developed a PC-based micropositioning system based around an off-the-shelf microscope, video monitor, and third-party software. "While the company's TA measurement system allows dendrochronologists to precisely measure and catalog tree-ring measurements," says Richard Yurick, marketing communications manager at Velmex, "the system also has been used as the basis for probe positioning, bore inspection, and material stress analysis."

The TA system consists of an aluminum dovetail screw motion UniSlide Assembly from Velmex that incorporates a 10 × 1-mm lead screw connected to an ENC-150 linear encoder from Accurite (Jamestown, NY, USA; [www.acu-rite.com](http://www.acu-rite.com)). The linear encoder is available in resolutions from 0.005 to 0.001 mm. This linear encoder is interfaced to a QC-10V DRO digital readout from Metronics (Bedford, NH, USA; [www.metronics.com](http://www.metronics.com)) that displays the position of single-axis measurements.

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*In the development of a microscopy-based positioning system for scientists studying tree-ring growth, Velmex TA system uses its own UniSlide positioning system coupled to a linear encoder and digital readout.*

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Using the RS-232 interface of this digital readout, positional data can be transferred to a PC-based system, where data can be logged and displayed in database format. "Mounting a linear encoder directly to the platform gives a direct reading of platform movement, eliminating lead-screw and backlash errors," says Yurick. After a sample is placed on the UniSlide mount, manually turning the lead screw allows the operator to finely position the sample. Rapid traversing is achieved by disengaging the platform from the screw thread and manually repositioning the slider. "The operator saves time in gross repositioning the sample," Yurick says.

After the TA system is integrated with a conventional microscope system, samples are placed on the TA systems' manual stage and viewed through the microscope. By using the microscope's built-in display, crosshairs on the microscope's video monitor are used to calibrate the microscope with the PC-based micropositioning system. In this way, the operator can simultaneously view the sample being analyzed and use the PC to capture positional data.

Although Velmex does not provide any software for data collection, a measurement program specifically tailored for dendrochronology has been developed by VoorTech Consulting ([www.voortech.com/projectj2x/tringMainV2.html](http://www.voortech.com/projectj2x/tringMainV2.html)). Voortech's Measure J2X is a multiplatform, graphical tree-ring measuring program that allows researchers to capture and edit tree-ring measurements. Available for a \$180 subscription, the program runs on both PC and Macintosh computers.

Measure J2X enables capture of measurements from a variety of measuring stages, encoders, and digital readout units and allows users to creating new measurements or editing existing data. By reading and writing data in the "decadal" format, output from the program can be integrated with analysis programs from the Dendrochronology Program Library, a suite of more than 30 data-analysis tools written by the late Richard Holmes of The Laboratory of Tree Ring Research at the University of Arizona (Tucson, AZ, USA; [www.ltrr.arizona.edu/software.html](http://www.ltrr.arizona.edu/software.html)).

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