

Automated Probe Changer

Enabling Advances in Research Through Automation

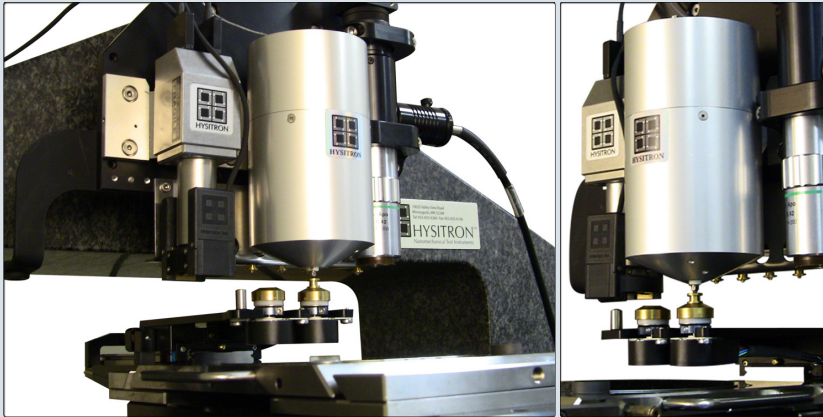


Figure 1. Automated Probe Changer exchanging a nanomechanical test probe on a TI 950 TribolDenter® equipped with Dual Head capability.

With the APC, probe interchange and calibration are accomplished with a few mouse clicks, making nanomechanical characterization faster, easier, safer, and more reliable than ever before.

The **Automated Probe Changer (APC)** for Hysitron's **TI 950 Series** nanomechanical test instruments brings the next level of automation to nanomechanical testing.

Hysitron's APC increases the ease, speed, and safety of nanomechanical testing by accommodating probes of various geometries and interfacing with multiple heads. Manual probe changes and re-calibration routines are among the most time-consuming and delicate tasks performed during nanomechanical characterization. By automating probe changes, calibration, and test procedures, the APC allows users to focus their time and effort on research rather than machine setup.

Full Characterization Suite

Years of nanomechanical testing research, have been established that certain probe geometries are best suited

for particular nanomechanical testing applications. Pyramidal probes are commonly used for nanoindentation, nanoscratch is usually performed with cono-spherical probes, and the best SPM image quality is obtained with sharper probes that can distinguish fine details.

Various research applications also require multiple probes to be employed. For example, the Poisson's ratio of an unknown material can be computed from indentation data using probes of various sizes. Until now, all of these operations would have required manual exchange and setup of individual probes, making them prohibitively time-consuming.

Automated Solution for Combinatorial Testing

The APC allows the nanomechanical instrument to quickly and easily perform multiple material characterization techniques, each with optimized probe

HIGHLIGHTS

- Automated installation of test probes minimizes user intervention
- Operator-free measurement routines
- Dual-head compatibility connects nano and microscale testing ranges
- Standardized and automated calibration routines improve confidence and reduce variability

APPLICATIONS

- Central laboratory facilities with multiple users
- Restricted access laboratory areas
- High throughput mechanical property screening
- Combinatorial testing techniques
- Fast and efficient data collection for large statistical data sets
- Facilitates automated stress strain evaluation at nano and micro-scale
- Advanced solution for the evaluation of thin film stress

geometry, without any need for user intervention. This leap forward in nanomechanical instrument automation represents the next step towards mechanical combinatorial testing at small scales. Using multiple probes, complex characterizations can be performed, each with optimized probe geometry. Combined with the high throughput and excellent precision of the TI 950 series instruments, the APC allows users to collect large amounts of nanoscale material property data with minimal time and effort.

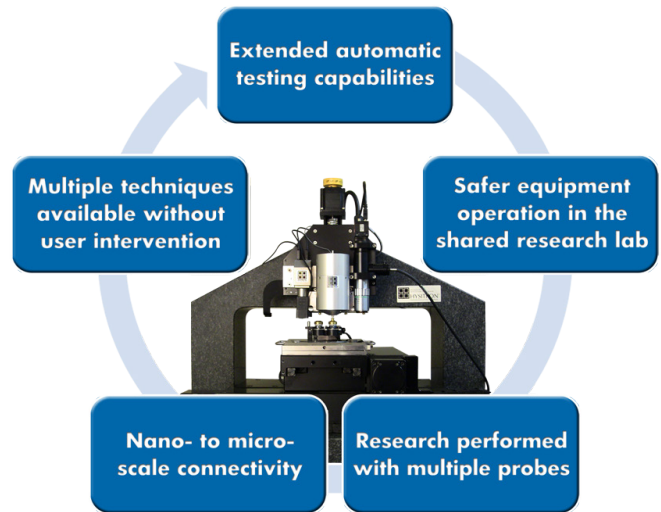
Nano- to Micro-Scale Connectivity

The APC is fully compatible with the TI 950 dual-head operation, allowing for automated combinations of mechanical tests that span many orders of scale from the nano to the micro. For composite structures or multiphase materials, this capability is particularly useful because the mechanical properties are highly scale dependent. Measurements at the nano-scale establish local properties of individual constituents while micro-scale experiments measure overall behavior of the material resulting from interaction of the nanoscale components.

Highly Automated Equipment Operation

Manual manipulation of hardware always presents some risk to the equipment, and probe changing is the most common and critical manual operation, especially for novice users. Together with the calibration routine, probe exchange procedures may significantly influence the quality of data.

Instrument downtime related to operator accidents also creates bottlenecks in research progress. Employing the APC minimizes downtime by reducing user intervention inside the enclosure and removing the subjectivity from the calibration procedures, which is extremely important when multiple inexperienced users are involved in experimental setup.



The Automated Probe Changer makes nanomechanical characterization faster, easier, safer, and more flexible than ever before.

