

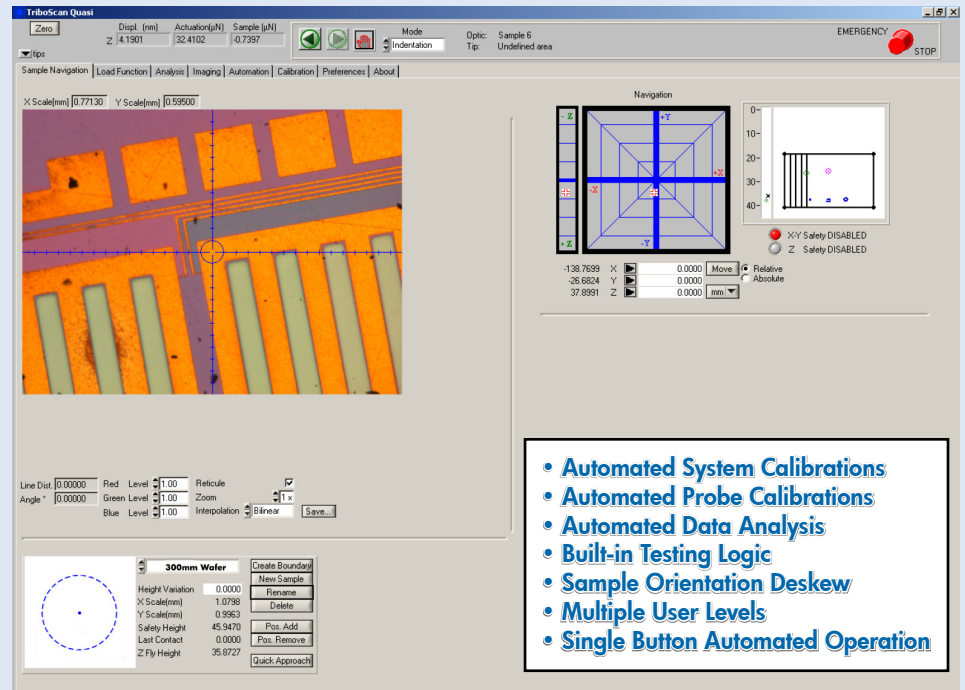
TriboScan™ Professional

Automated Nanomechanical Metrology Software

Hysitron's **TriboScan Professional** is a highly automated instrument operating and data analysis software package—specifically developed for industrial applications. Streamlined system operation combined with a multi-user level software architecture and automated test routines, calibration, data analysis, and data reporting capabilities greatly reduces the cost of ownership for nanomechanical test instrumentation. Built-in testing logic along with push button operation and automated analysis routines assures accurate data with greatly enhanced throughput. While traditional nanomechanical test instrumentation requires a dedicated and relatively skilled operator, Hysitron systems equipped with **TriboScan Professional** virtually run themselves with minimal operator involvement.

ENHANCED AUTOMATION ROUTINES

TriboScan Professional sets the industry standard for highly automated nanomechanical characterization. Thousands of measurements can be performed within a single automated run for high throughput testing of materials and increased statistical sampling rates. The automated testing routines incorporate periodic transducer calibration procedures to assure the nanomechanical test instrument is always operating at the peak of its performance. Built-in logic determines when the test probe geometry needs to be recalibrated and automatically performs a tip area function calibration to assure the instrument is continuously providing measurements



Screenshot of the **TriboScan Professional** navigation tab showing the staging controls, optical image of the sample surface, and real-time force and displacement measurements.

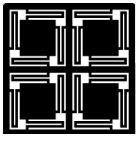
with the highest degree of accuracy. Once the automated testing routine has been initially defined, subsequent testing can be rapidly performed with the push of a button. **TriboScan Professional's** automation routines incorporate two decades of nanomechanical testing expertise to provide accurate and reliable data – the first time, every time.

AUTOMATED DATA ANALYSIS & REPORTING

During the course of an automated run, **TriboScan Professional** automatically analyzes the data after each measurement has been performed. By continuously updating the test results in real-time, unexpected material and process variations can be quickly identified. Nanoindentation

results are analyzed using standard analysis techniques to output quantitative hardness and modulus values after each test. Proprietary, tunable data analysis algorithms allow automated data analysis of nanoscratch results for critical load of interfacial adhesion determination and for assessing fracture thresholds of materials during nanoindentation measurements. The automated standard data analysis routines along with material-specific tunable data analysis algorithms require zero operator involvement after test initiation, greatly speeding time to results, decreasing operating costs, and removing operator variability.

- Automated System Calibrations
- Automated Probe Calibrations
- Automated Data Analysis
- Built-in Testing Logic
- Sample Orientation Deskw
- Multiple User Levels
- Single Button Automated Operation

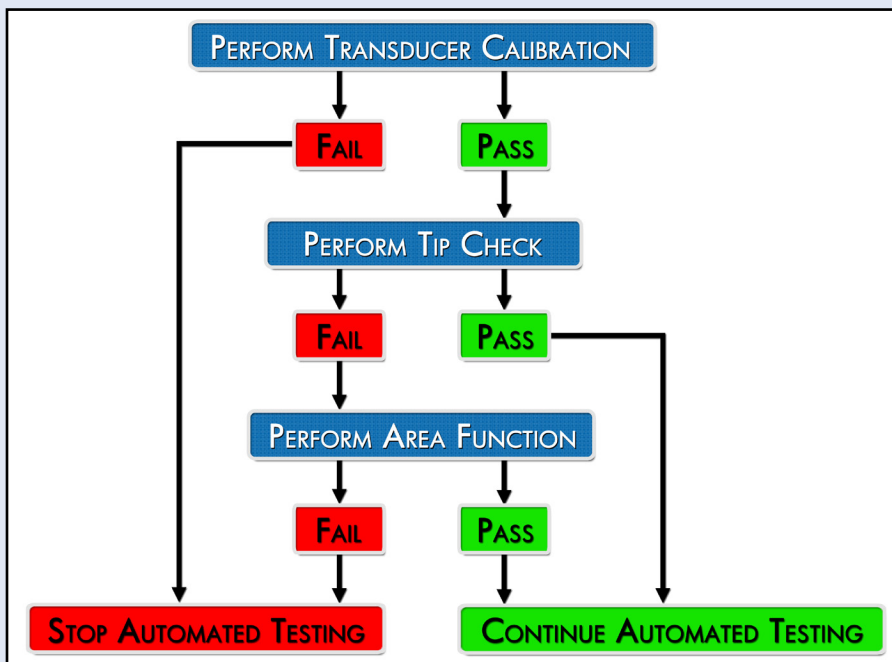


MULTI-USER LEVEL PRIVILEGES

TriboScan Professional incorporates five user access levels to accommodate a wide array of testing requirements. User levels are segmented to provide various levels of system operability, from full software functionality and maximum testing flexibility to simple push button operation. The various user levels provide only the system functionality required to perform the testing, which significantly streamlines the testing process, minimizes the possibility of operator error, and simplifies instrument operation.

RAPID TEST PLACEMENT & EXECUTION

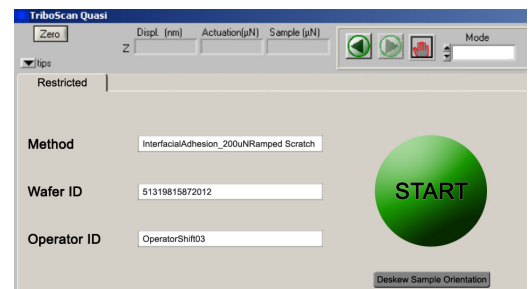
It is extremely important to repeatably, accurately, and reliably test highly specific sample coordinates when identifying intra-batch and batch-to-batch material and process variability. Hysitron's **TriboScan Professional** incorporates sample orientation de-skew capabilities to rapidly test highly localized regions of materials. Instead of optically defining each test location on every similar sample, **TriboScan Professional** utilizes two reference coordinates fixed relative to the testing coordinates. Subsequent testing only requires identification of these two reference coordinates and the software automatically determines the X-Y offset and rotation of the sample. The testing coordinates are automatically de-skewed based on this information and tests can be placed to within $\pm 100\text{nm}$ of the desired test location. **TriboScan Professional's** sample orientation de-skew capability greatly speeds testing throughput while minimizing operator involvement.



TriboScan Professional incorporates built in testing logic to assure the system is consistently operating at the peak of performance and providing accurate results.

HIGHLIGHTS

- Greatly minimizes cost of ownership of nanomechanical test instrumentation by streamlining the testing process and minimizing operator interaction
- Fully automated indentation and scratch testing routines
- Automated transducer calibrations (indentation and scratch axis)
- Automated probe calibration and validation
- One-click auto-calibration initialization
- Advanced routines for tunable critical load detection (indentation and scratch)
- Real-time data analysis (hardness, modulus, and critical load)
- Multiple user level privileges
- De-skew feature for sample orientation correction
- Integrated outlier detection and removal
- User-definable auto-calibration frequency and tolerance limits



Simple push button operation to calibrate the instrument, take measurements, and analyze the data in a single automated run.