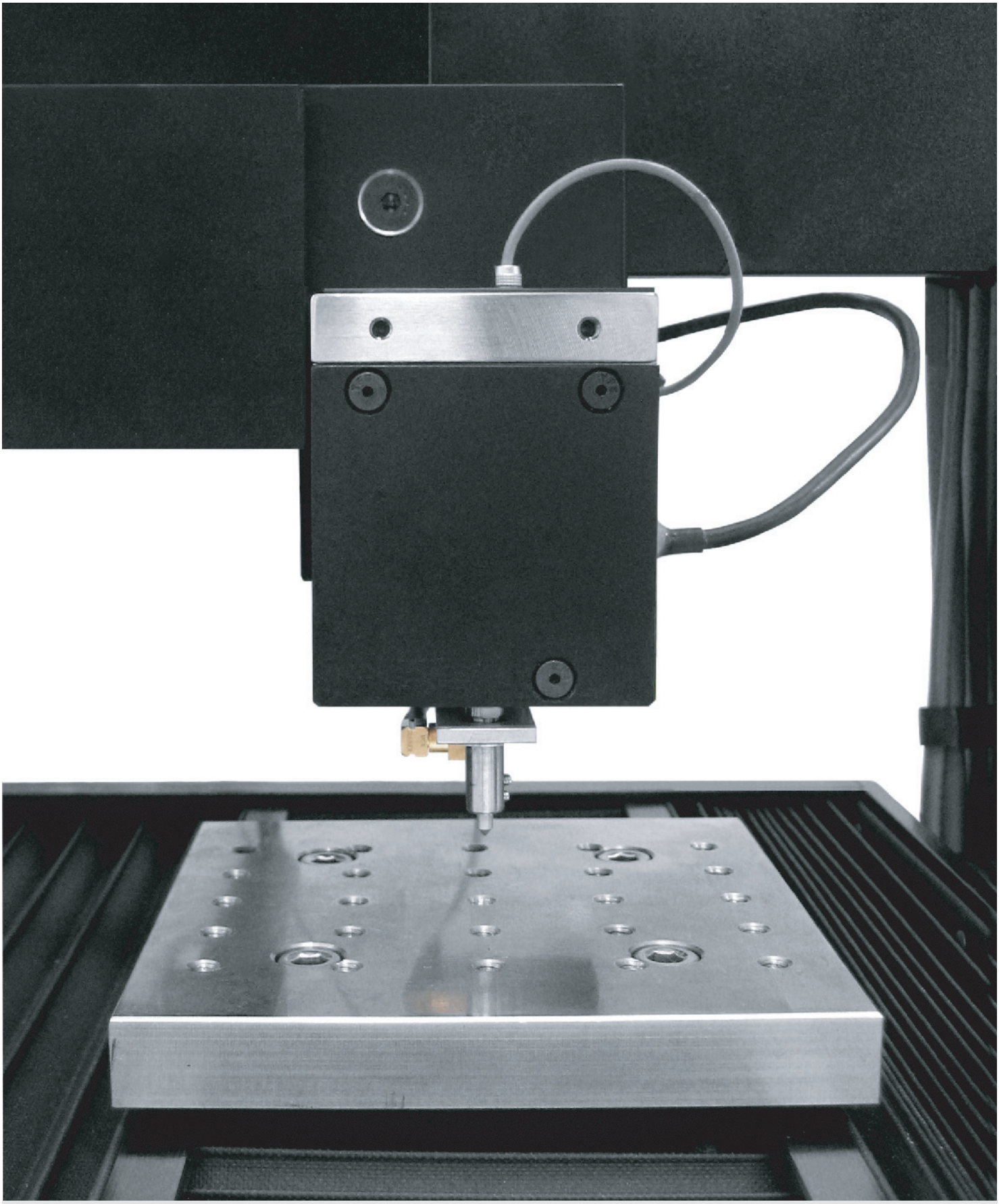
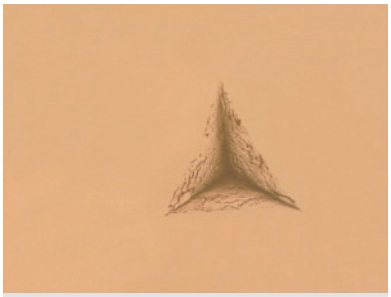




MECHANICAL TESTER INTRO

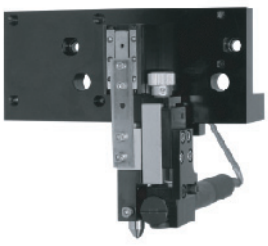
Nanovea Mechanical Testers provide unmatched multi-function Nano and Micro/Macro modules on a single platform. Both the Nano and Micro/Macro modules include scratch tester, hardness tester and wear tester modes providing the widest range of testing in the industry on a single module. Nanovea's unmatched range is an ideal solution for determining the full range of mechanical properties of thin/thick coatings and substrates. Applications range from low loads to measure hardness and elastic modulus of biomaterials to high loads required to test the fracture toughness of hard coatings in the tooling industry. Nanovea scratch, hardness and wear tester modes use independent force & depth sensors to obtain plastic and elastic deformation during scratch testing, depth versus load curves during instrumented indentation and friction coefficient and wear rate during pin-on-disk or linear wear testing. Additionally, force feedback controlled loops insure high precision load control during hardness, scratch and wear tester modes. Several optical imaging options including 3D non-contact profiler and AFM Module are available for high resolution 3D imaging of scratch, indentation and wear track in addition to other optical measurements such as roughness and general metrology.





MECHANICAL TESTER MODULE

Nano Module | Retrofitted on Platform or Compact Base, the Nano Module provides nanometer-scale during nano scratch, nanoindentation and nano wear tester modes; ideal for industrial coatings and those who demand ultrahigh resolution to accurately characterize thin layers of material. Examples include thin polymer coatings for the medical device industry and various thin coatings for the solar and optical lens industries. Another major application of the nano module is the marring of top surfaces such as varnish clearcoats used in the automobile industry and other protective coatings used on portable devices such as mobile electronics. The Nano Module uses independent force and depth sensors which are separately calibrated using equipment traceable to mass and length standards. Equipped with a load cell that continuously measures the real applied load. This combined with a piezo-electric controller allows quick force feedback control which is essential for nano scratch testing and nano wear testing. Unlike competitors, the Nano module applies the load vertically and directly from the piezo instead of using remote horizontal cantilever system. The result is a control of applied load far exceeding what is achievable with cantilever technologies. The stiffness and verticality of the applied load leads to unmatched nanoindentation, scratch and wear testing modes with the same module. Depth is measured with high precision capacitive ring.

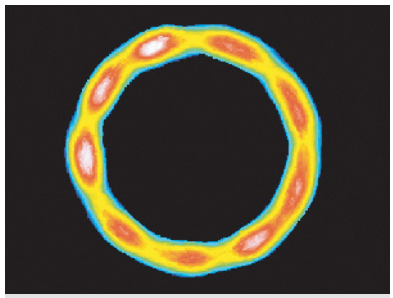


Micro/Macro Module | Retrofitted on Platform or Compact Base, the Micro/Macro Module provides loads from the mN range to 200N during micro/macro scratch tester, indentation tester and wear tester modes for thicker coatings and substrate materials. The higher loads are ideal for testing hard coatings (DLC, TiN, TiC) such as the one used in the tooling industry. However the more sensitive loads of the micro range are ideal for the characterization of industrial coatings; ranging from plasma processed layers used in semiconductor and optical technology, to decorative and protective coatings used for automobile parts and consumer goods. The Micro/Macro Module uses independent force and depth sensors to obtain depth-versus-load curves used in instrumented indentation. True load feedback control ensures stable scratch, indentation and wear testing. Contrary to competitors who use capacitor sensors attached to a mechanical arm that must touch the surface to obtain useful data, Nanovea micro technology uses an optical white light sensor (Patented Technology) directly connected to the diamond mounting which directly measures the depth of the diamond. This technique allows quicker tests and eliminates depth errors caused by surface roughness or sinking of the reference on soft materials when a physical reference is used to determine the height of the surface. The Micro Module also provides true depth measurements during scratch or wear testing. On other instruments, a ring or skate reference cannot be used when the sample is moved. For these instruments, the depth given during scratch is masked by the instrument compliance. Only scanning of the scratch track at low enough loads after the test provides accurate information but solely on plastic and not on the combined elastic/plastic deformation that actually occurred during the scratch. The Optical Profiler sensor performs as a full 3D Non-Contact Profiling tool which provides a 3D measurement of scratches, indents or wear tracks. Additionally, the tool can be used for all other types of profiling including surface roughness or height of steps.

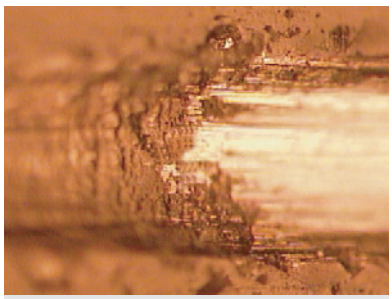


MECHANICAL TESTER OPTICS

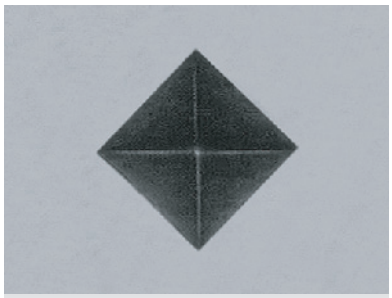
AFM | The AFM system provides three-dimensional data at higher lateral and vertical resolution than what Optical Profiler white light technology can provide. AFM measurements are non-destructive and require no sample preparation. The AFM has been designed with ease of use in mind with the easiest probe exchange on the market. The AFM is mounted separately from the microscope on a rigid base which allows for better stability and a more user-friendly setup avoiding cable tangling that is an issue on microscope mounted AFM's.



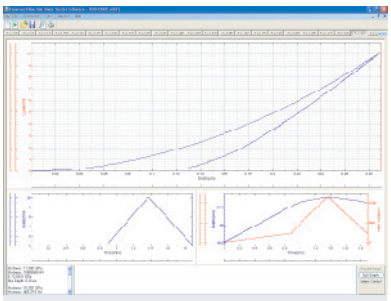
3D Optical Profiler | To precisely measure scratch, indentation and wear results with 2D and 3D, a full non-contact optical profiler can be integrated on the Mechanical Tester. This advanced feature provides measurement of volume while software uses the information and the test parameters to calculate a precise wear rate for the specific test. The profiler can also be used for roughness, dimensions and many other surface topography studies. The optical profiler has zero influence from sample reflectivity, variations require no sample preparation and has advanced ability to measure high surface angles. Measure any material: transparent, opaque, specular, diffusive, polished or rough. Ideal solution when combined mechanical and non contact surface measurements is needed.



Video Zoom Imaging | The Video Microscope is available for the compact base. The system is offset to the indenter with a calibrated distance for precise repositioning from one to the other. 12X Ultra zoom Lens with coax lighting & detent. Color Video Camera (PAL 752x582). 5X objective for total video magnification of 1X to 100X. Objectives up to 100x available for maximum magnification of 2000X.

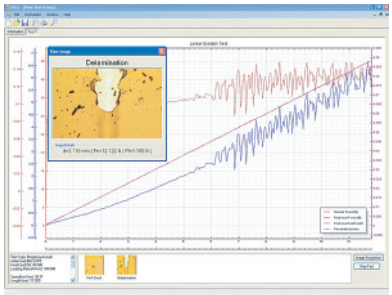


Microscope Imaging | Available on the Platform base with similar functions to the Video Zoom Camera. The Microscope Turret allows the full capability of a microscope with options such as polarizer and analyzer slides. The Microscope Turret can be equipped with up to 5 microscope objectives ranging from 5x to 100x, and provides an overall total video magnification of up to 4000x. The Microscope Turret provides high level detail needed to resolve small features on any surface. Available Objectives = 5x, 10x, 20x, 50x, 100x.



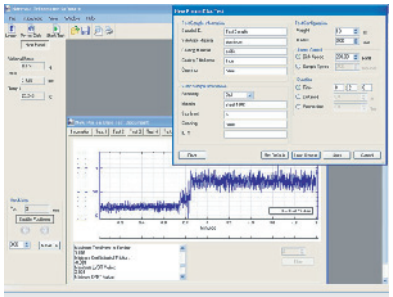
MECHANICAL TESTER SOFTWARE

Indentation Software | The powerful indentation software offers ASTM E2546 and also Martens method of analysis. User-friendly software with real-time display of depth versus load curves and calculation of hardness & elastic modulus. Automatic data averaging. Holding the maximum load or depth constant over time for Creep data. Easily save Images from color camera (save as part of file or separate JPEG for export). Full range of calculation including indentation, plastic work, flow stress, plastic & elastic energy. Automated multi-sample handling. Mapping and positioning of each indent with microscope. Precise relocation of each indent. Data export in ASCII format. Latest Windows OS software and User-friendly w/ free software updates. Sinus mode analysis (DMA) for viscoelastic properties. Creep data plotted separately on depth versus time graph. Multi cycle with increasing depth for hardness and elastic modulus versus depth. Multi-cycle constant load for fatigue test. Automatic report for easy printing User Channel (optional).

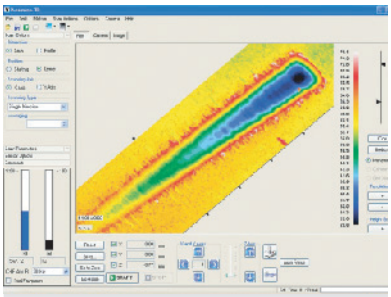


Scratch Software | A complete software package for controlling test parameters such as: speed, loading rate and scratch length, as well as analyzing test results. Full panoramic view with easy determination of critical loads with associated photo of failures. Real time display of Acoustic Emission, Depth, Frictional Force versus Load/Displacement. Images incorporated directly into the scratch file for easy reference. On-line correlation between measured data and optical observation. Pre and post profile scan for the study of plastic and elastic deformation. ---*Continued next page*

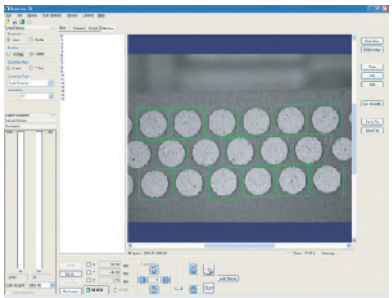
Advanced Panoramic view of the full scratch with direct visual correlation to depth, load, friction and acoustic emission data versus displacement curve. Associated load automatically indicated on the picture for easy identification. Multi-pass scratch testing for the characterization of the wear properties of the coating. Constant and progressive loads. Control of all the parameters: Speed, loading rate, and scratch length. Zoom Functions. Data export in ASCII format Latest Windows OS software and user-friendly with free software updates. Automatic report for easy printing User Channel (optional)



Wear/Friction Software | The Wear & Friction Software includes a complete set of features for installation of analyzing wear and friction data. Real-time display of Coefficient of friction and depth. Wear rate calculation of ball and disk. Data export in CSV format for Excel. Data filtering. Graph manipulations. Test parameters & information editing. Note saving.



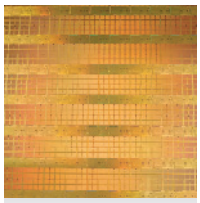
3D Mechanical Software | The 3D Mechanical Software is a complete software package for scanning using the integrated non-contact profiling sensor. User friendly ability to scan specified areas of interest or a single profile. Creates 3D representation of the scan. Quick analysis of roughness, critical dimensions, topography and full pre and post test area profile. Zoom Functions. Data export in ASCII format & Mountain analysis software. Analyze surface distance and height. Allows user to compare scan with optical microscope observation.

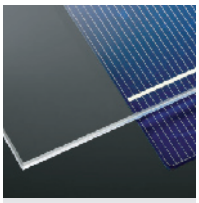


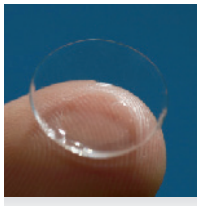
***PRVision* Software** | PRVision can be included in Mechanical Software when an optional camera is included. PRVision was designed to automatically recognize features from a user-trained image file. The surface is scanned while automatically recognizing all features of interest; then either automatically indents every feature found or a selectively chosen by the user. PRVision can also be used to reference sample orientation during a Macro measurement, which will automatically correct for rotations or displacement created when samples are loaded and unloaded from their holder. This option will significantly reduce setup time when a surface pattern or if several samples will be measured. Ideal for using hardness as a quality control measure.

MECHANICAL TESTER APPLICATIONS

Nanovea Mechanical Testers provide unmatched indentation, scratch and wear testing capability, at Nano through Macro range, for coating and bulk material study in industries including: Semiconductor, Automotive, Coatings, Solar, Fiber Optics, Metallurgy, Microelectronics, Pharmaceutical, Biomedical Aerospace and many others.






MECHANICAL TESTER SPECS

BASE	PLATFORM	COMPACT
X & Y Motorized Stages	150 mm x150mm	100 mm x 50 mm
X, Y Lateral Resolution with encoder	10 nm	10 nm
X,Y Lateral Accuracy	0.25 µm	0.25 µm
Z Maximum Clearance	140 mm	40mm (custom possible)
Z Motorized Approach (maximum)	0-240 mm/min	0-240 mm/min
Scratch Speed	50mm	25mm
Scratch Length w/Visual Inspection	90mm	25mm
Scratch Length w/o Visual Inspection	150mm	50mm
Extended Depth Range (Platform/Compact)	50mm / 25mm	50mm / 25mm
Base Dimensions	52 x 56 x 86 cm	30 x 30 x 45 cm
Sample Size	Up to 300mm	Up to 100mm
Microscope Imaging	N/A	Optional
Zoom Video Imaging	Optional	N/A
Optical Profiler	Optional	Optional
AFM	Optional	Optional

MODULE	NANO	MICRO	MACRO
Load Range	400mN (800mN & 1,600mN optional)	0.05 - 40 N	0.3 - 200 N
Load Resolution (Theoretical)	0.03µN	N/A	N/A
Load Resolution (Noise Floor)	1.5µN	0.75 mN (0.5mN if limit to 30N)	3.5 mN
Depth Range	250µm	300µm	300µm
Depth Resolution (Theoretical)	0.003nm	0.2nm	0.2nm
Depth Resolution (Noise Floor)	0.1nm	2nm	2nm
Extended Depth Range	50mm / 25mm	50mm / 25mm	50mm / 25mm
Extended Depth Resolution	2.5nm	2.5nm	2.5nm
Thermal Drift	< 0.05 nm/sec	N/A	N/A
Friction Force Max	400mN	40N	200N
Friction Resolution (Theoretical)	10µN	N/A	N/A
Friction Resolution (Noise Floor)	0.1mN	3mN	15mN
Sinus Mode Analysis (DMA)	Up to 10Hz	N/A	N/A

*At Nanovea, we believe that listing only theoretical resolution is deceiving and often leads to resolution that are physically impossible (we have seen depth resolution listed as low as 0.001nm which is 1/100 of the size of an atom!). For sake of clarity, Nanovea has decided to list both the "theoretical" and "noise floor" resolutions. Noise floor is the actual noise on the signal measured which is directly related to the quality of the data. Ask for this when comparing instruments.

*Specifications may change, please contact Nanovea for clarification.

Today's Standard For Tomorrow's Materials

Nanovea is the result of over 20 years experience providing professional solutions and experienced service throughout the fields of nano/micro/macro profilometry, mechanical, tribology, imaging and other related fields of materials research & development industries. After years of client feedback and the dedication to providing superior instrumental solutions, Nanovea was launched in 2004 as a privately held California corporation.

From the Irvine, CA office Nanovea designs and manufactures Profilometers, Mechanical Testers & Tribometers to combine the most advanced testing capabilities in the industry: Scratch Adhesion, Indentation Hardness, Wear Friction & 3D Non-Contact Metrology at Nano, Micro & Macro range. Unlike other manufactures Nanovea also provides Laboratory Services, offering clients availability to the latest technology and optimal results through improvements in material testing standards.

nanovea.com