

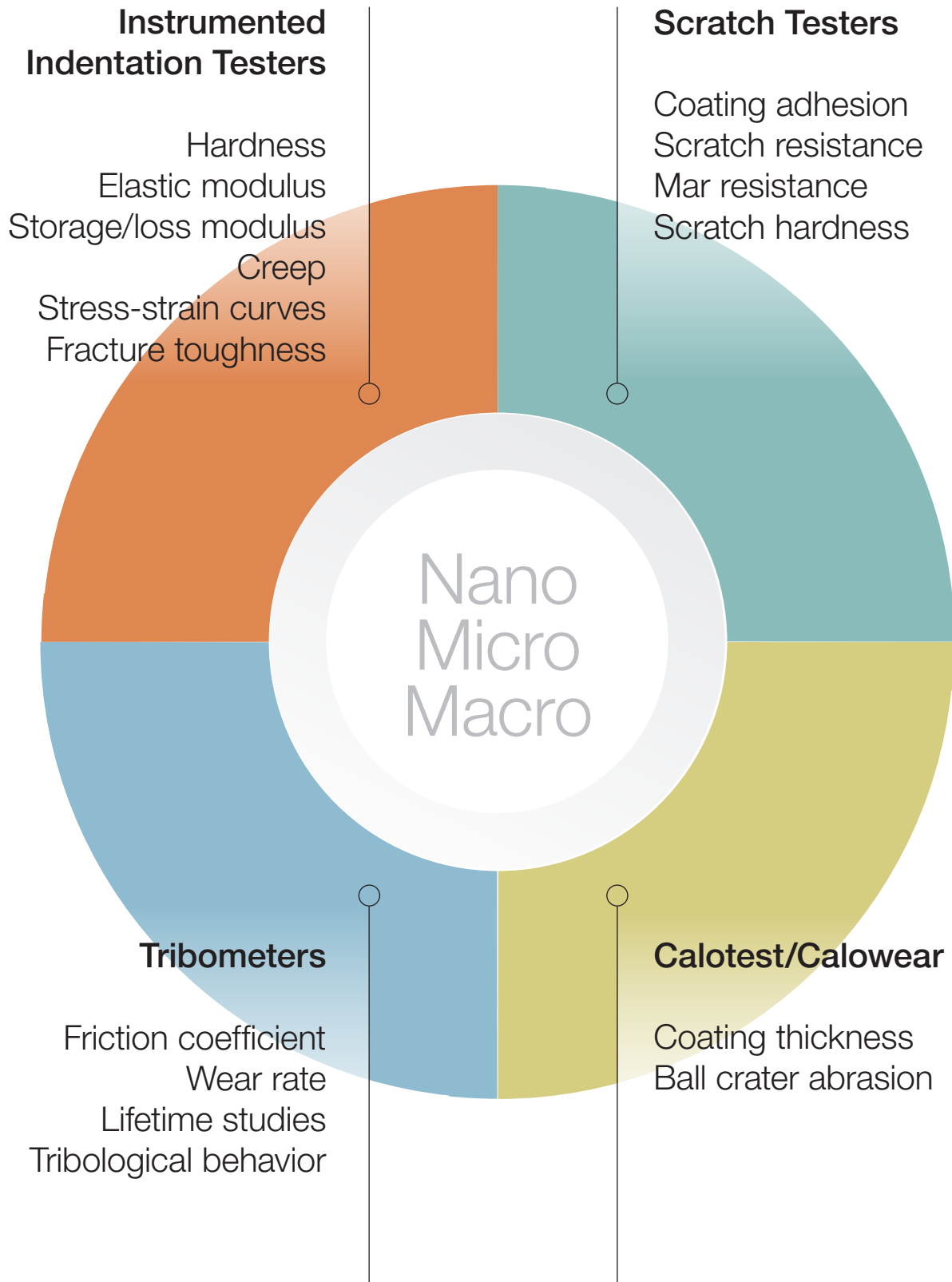


Anton Paar

Product Catalog
Mechanical Surface Testing

Your Solutions for Mechanical Surface Characterization

Anton Paar provides a variety of measurement options as either multi-module platforms or as dedicated stand-alone instruments. This gives you the most complete surface mechanical testing solution without compromise.



Applications

Hard Coatings

TiN, TiC, DLC
Cutting tools
Forming tools
Plasma spray coatings
PVD and CVD coatings

Semiconductor Technology

Passivation layers
Metallization
MEMS and NEMS
Hard disks
Low-K

Biomaterials

Arterial implants (stents)
Bone and cartilage
Prosthetics
Corneas
Tablets and pills

Optical Components

Eye glass lenses
Optical coatings
Contact lenses
Anti-reflective coating
Fiber optics

Decorative

Kitchen and bathroom appliances
Bathroom equipment
Indoor and outdoor trim
Switch panels
Eyewear

Automotive

Paints and polymers
Varnishes and finishes
Engine valves, ejector pins
Brake pads
Tires

Ceramics

Tiles
Knives
Concrete
Zirconia or alumina parts

General Engineering

Rubber
Touchscreens
Lubricants and oil additives
Sliding bearings



Instrumented Indentation Testers

Ultra Nanoindentation Tester UNHT

The UNHT, ultra high resolution nanoindenter, is used to examine the mechanical properties of a material at the nanoscale.

The UNHT virtually eliminates the effect of thermal drift and compliance due to its unique patented active surface referencing system. Therefore, it is perfectly suited for long-term measurements on all types of materials, including polymers, very thin layers and soft tissues.

Specifications

Force:

Resolution: 3 nN
Max. force: 100 mN

Depth:

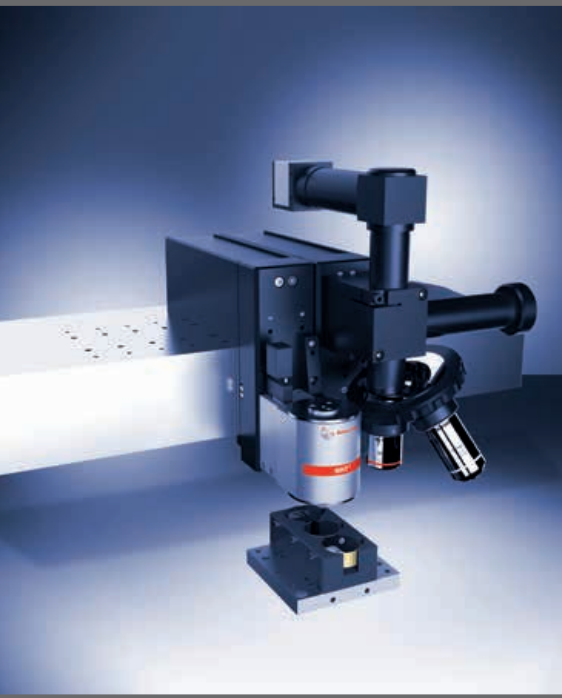
Resolution: 0.003 nm
Max. depth: 100 μm

Load frame stiffness:

$\gg 10^9$ N/m

International standards:

ISO 14577, ASTM E2546, etc.



Nanoindentation Tester NHT²

Force:

Resolution: 0.01 μN
Max. force: 500 mN

Depth:

Resolution: 0.01 nm
Max. depth: 200 μm

Load frame stiffness:

$\gg 10^7$ N/m

International standards:

ISO 14577, ASTM E2546, etc.

The NHT² is designed to provide low loads with depth measurements in the nanometer scale for the measurement of hardness, elastic modulus, creep, etc. The system can be used to characterize organic, inorganic, hard and soft materials.

With the unique top surface referencing technique, an indentation measurement can be made in less than 3 minutes without waiting for thermal stabilization.

Micro Indentation Tester MHT

The MHT is ideally suited to the measurement of mechanical properties such as the hardness and elastic modulus of thin hard coatings, thick soft coatings and bulk materials, such as PVD and CVD hard coatings and ceramic surface layers. It provides accurate and reproducible values.

Force:

Resolution: 6 μN
Max. force: 30 N

Depth:

Resolution: 0.03 nm
Max. depth: 1000 μm

Load frame stiffness:

$\gg 10^7$ N/m

International standards:

ISO 14577, ASTM E2546, ISO 6507, ASTM E384, etc.



Instrumented Indentation Testers



Specifications

Force:

Resolution: 0.4 nN
Max. force: 20 mN

Depth:

Resolution: 0.003 nm
Max. depth: 100 μ m

Bioindenter BHT

The Bioindenter, BHT, is optimized to respond to the requirements of testing soft materials with non-planar surfaces. (soft materials down to 1 kPa)

The BHT is a modified UNHT with a biochamber for easy mounting and observation of biological samples.

High Temperature Nanoindentation Tester HT-UNHT

The HT-UNHT is a low-load nano-mechanical test system for measuring the hardness and elastic modulus of thin films and coatings up to 700 °C. Patented UNHT technology combined with unique heating provides a high stability solution at any temperature.

3 options are currently available:

- up to 200 °C (with liquid cooling)
- up to 450 °C (with liquid cooling)
- up to 700 °C (under vacuum)

Force:

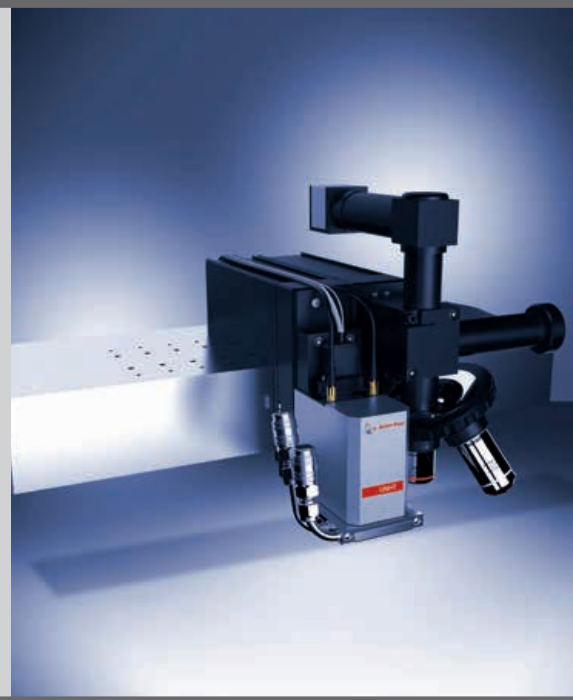
Resolution: 3 nN
Max. force: 100 mN

Depth:

Resolution: 0.003 nm
Max. depth: 100 μ m

Temperature:

Max.: 700 °C
Heating rate: 0.1 °C/min to
90 °C/min
Stability: \leq 0.1 °C
Sample size: disk of 25 mm



Special Projects Instrumented Indentation Tester

Add any of the instrumented indentation modules inside an environmental chamber (vacuum, humidity, SEM, ...)

For more information, please contact info.tritec@anton-paar.com

Anton Paar develops and produces integrated environmental platforms, such as platforms in a glove box, in a humidity chamber, or under vacuum; all upon request.

These automated solutions provide a dedicated environmental control without compromising the accuracy of the measurement technique.

Scratch Testers

Nano Scratch Tester NST

The Nano Scratch Tester is particularly suited for the characterization of adhesion failure and the mar (scratch) resistance of thin films and coatings with a typical thickness below 1000 nm.

The NST can be used in the analysis of organic and inorganic coatings, as well as soft and hard coatings.

Specifications

Applied load:

Resolution: 0.15 μ N
Max. load: 1000 mN

Friction force:

Resolution: 0.6 nm
Max. friction force: 1000 mN

Depth:

Resolution: 0.06 nm
Max. depth: 2000 μ m

Speed:

From 0.1 mm/min to 600 mm/min



Micro Scratch Tester MST

The Micro Scratch Tester is widely used to characterize the practical adhesion failure of thin films and coatings with a typical thickness below 5 μ m. The Micro Scratch Tester is also used in the analysis of organic and inorganic soft and hard coatings.

Applied load:

Resolution: 0.1 mN
Max. load: 30 N

Friction force:

Resolution: 0.1 mN
Max. friction force: 30 N

Depth:

Resolution: 0.3 nm
Max. depth: 1000 μ m

Speed:

From 0.1 to 600 mm/min

International standards:

ISO 20502, ISO 1071-3,
ASTM C1624, ASTM G171, etc.

Revetest® Macro Scratch Tester RST

The Revetest® macro scratch tester is widely used for characterizing hard-coated materials with a typical coating thickness exceeding 1 μ m.

Anton Paar is the world leader in scratch testing, having sold more than 1500 Revetests worldwide.

Applied load:

Resolution: 3 mN
Max. load: 200 N

Friction force:

Resolution: 3 mN
Max. friction force: 200 N

Depth:

Resolution: 1.5 nm
Max. depth: 1000 μ m

Speed:

From 0.4 mm/min to 600 mm/min

International standards:

ISO 20502, ISO 1071-3,
ASTM C1624, ASTM G171, etc.



Scratch Testers



Specifications

Applied load:

Resolution: 3 mN
Max. load: 200 N

Friction force:

Resolution: 3 mN
Max. friction force: 200 N

Depth:

Resolution: 1.5 nm
Max. depth: 1000 μ m

International standards:

ISO 20502, ISO 1071-3,
ASTM C1624, ASTM G171, etc.

Revetest Xpress Macro Scratch Tester RSX

For adhesion and scratch resistance, the RSX instrument is delivered with software that allows the user to predefine the measurement protocol on a separate computer. After the protocol has been defined, it is exported via a USB memory stick which is then inserted into the RSX. A simple press of the "start" button on the touchscreen will then initiate the test procedure.

Revetest Xpress Plus Macro Scratch Tester RSX+

The RSX+ is widely used for coating adhesion and scratch resistance of thin coatings. This instrument is delivered with software that allows the user to predefine the test protocol. A simple press of the "start" button initiates the test procedure.

At the conclusion of the test, the user has the choice to study the sample either directly on the RSX+ or on an optical microscope.

Applied load:

Resolution: 3 mN
Max. load: 200 N

Friction force:

Resolution: 3 mN
Max. friction force: 200 N

Depth:

Resolution: 1.5 nm
Max. depth: 1000 μ m

Speed:

From 0.4 mm/min to 600 mm/min

International standards:

ISO 20502, ISO 1071-3,
ASTM C1624, ASTM G171, etc.



Micro Combi Tester MCT

The Micro Combi Tester combines all the capabilities of Anton Paar's Micro Indentation Tester with those of its Micro Scratch Tester. This allows the investigation of adhesion, instrumented indentation and the scratch resistance of surface all with one instrument.

Applied load:

Resolution: 0.1 mN
Max. load: 30 N

Friction force:

Resolution: 0.1 mN
Max. friction force: 30 N

Depth:

Resolution: 0.3 nm
Max. depth: 1000 μ m

Speed:

From 0.1 mm/min to 600 mm/min



Pin-on-Disk Tribometers

Nano Tribometer NTR²

The NTR² is designed specifically to investigate surface interactions at low contact pressures, especially where soft layers or lubricants are of interest. The NTR² combines the resolution of an Atomic Force Microscope (AFM) with the stability, robustness and ease-of-use of a standard pin-on-disk tribometer.

Specifications

Load:

Max.: 1000 mN
Min.: 5 μ N

Rotative module:

Speed: 1 rpm to 200 rpm
Recipro. angle: $\pm 10^\circ$ to $\pm 150^\circ$

Linear reciprocating module:

Frequency: 0.01 Hz to 10 Hz
Stroke length: up to 2 mm



Pin-on-Disk Tribometer TRB

The TRB is the industry standard for measurement of friction and wear in sliding contacts. A wide range of test parameters, contact geometries and environmental conditions allows the user to simulate real in-service conditions.

Anton Paar tribometers have proven their reliability worldwide in over 1000 laboratories, studying all classes of mating materials.

Load:

Max.: 60 N
Min.: 0.25 N

Friction force: up to 20 N

Rotative configuration:

Rotation speed: 1 rpm to 1500 rpm
Radius: up to 40 mm

Linear configuration:

Frequency: 0.005 Hz to 10 Hz
Linear speed: 0.3 to 100 mm/sec
Stroke length: up to 60 mm

International standards:

ISO 20808, ISO 1071, ASTM G99,
ASTM G133, etc.

High Temperature Tribometer THT 800 °C

The analysis of the friction and wear properties of materials at elevated temperatures is becoming increasingly important, especially for the development and quality control of combustion engines and power plants. To meet this demand for instrumentation, Anton Paar has extended its range of pin-on-disk tribometers by adding a powerful high-temperature version which can accurately simulate in-service conditions.

Load:

Max.: 60 N
Min.: 0.25 N
Friction force: up to 20 N

Rotative configuration:

Rotation speed: 1 rpm to 1500 rpm
Radius: up to 40 mm

Temperature:

Max.: up to 800 °C
Min.: room temperature

International standards:

ISO 20808, ISO 1071, ASTM G99,
ASTM G133, etc.



Pin-on-Disk Tribometers



Specifications

Load:

Max.: 60 N

Min.: 0.25 N

Friction force: up to 20 N

Rotative configuration:

Rotation speed: 1 rpm to 1500 rpm

Radius: up to 40 mm

Temperature:

Max.: up to 1000 °C

Min.: room temperature

High Temperature Tribometer THT 1000 °C

For friction coefficient and wear rate measurement, the THT 1000 °C provides an ideal test configuration for simulating contact between two materials at their operating temperature. This allows a complete study of a material system using real contact conditions.

The unique top-heating design combined with direct measurement of sample temperature gives a highly stable and reliable solution.

Vacuum Tribometer VTRB - VTHT

Anton Paar's vacuum tribometer has been designed to provide controlled vacuum conditions (down to 10^{-7} mbar) or gaseous environments for friction and wear studies.

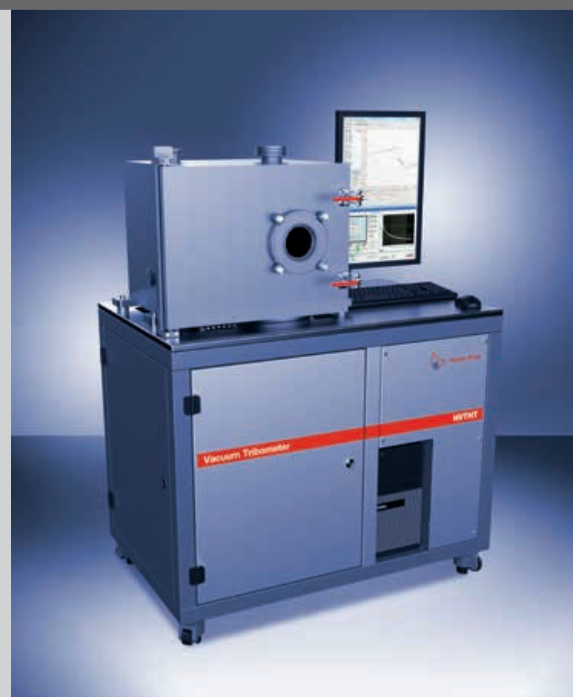
The highly efficient vacuum control system allows the user to reach the required atmospheric condition very quickly and in a controlled manner.

Primary Vacuum Chamber:

10^{-2} mbar

Secondary Vacuum Chamber:

10^{-7} mbar



Relative Humidity Tribometers RH-TRB

Accurate control of relative humidity (RH) in a high-quality chamber provides a unique tribological solution for simulating friction and wear at different humidities and temperatures.

Application examples include cosmetics, biomaterials and materials used in the automotive and aerospace industries.



Humidity chamber:

Relative humidity

from 15 % to 95 %

Coating Thickness CATc

The Compact Calotest is designed to quickly characterize coating thickness. The CATc is widely used for analyzing coatings with thicknesses between 0.1 μm and 50 μm . The simple ball-cratering method offers a fast and accurate means of checking the thickness of any kind of coating, whether a single or multilayered stack.

Typical examples include CVD, PVD, plasma spray coatings, anodic oxidation layers, chemical and galvanic deposits, polymers, paints and lacquers.

Specifications

Shaft speed:
10 rpm to 3000 rpm

Abrasion time ranges:
1 sec to 10000 sec

Standard ball diameters:
10, 15, 20, 25.4, 30 mm

International standards:
ISO 1071, VDI 3198 and
ISO 26423:2009



Coating Thickness CATi

Shaft speed:
10 rpm to 3000 rpm

Abrasion time ranges:
1 sec to 10000 sec

Standard ball diameters:
10, 15, 20, 25.4, 30 mm

International standards:
ISO 1071, VDI 3198 and
ISO 26423:2009

The Industrial Calotest measures the thickness of coatings in a typical time of 2 to 5 minutes.

In this industrial version the motor is fixed on a hydraulic arm, allowing the user to target samples of unlimited size.

It is the ideal instrument for a quick and precise determination of coating thickness on common industrial coated components.

Ball Crater Abrasion CAW

The Calowear is an easy and straightforward instrument to characterize the resistance to abrasion of a surface. Abrasive slurry is inserted into the contact between a coated sample and a rotating ball. Testing with these conditions results in a spherically shaped wear scar on the surface of the sample. The diameter of this wear scar gives a measurement of the amount of the worn material.

Shaft speed:
10 rpm to 1000 rpm

Abrasion time ranges:
2 sec to 15 min

Standard ball diameters:
20, 25.4, 30 mm

International standard:
VDI 3198





Specifications

System dimensions:
510 mm x 430 mm x 450 mm

Displacement tables:
X: 70 mm
Y: 70 mm
Z: 12 mm (only for UNHT)

Weight:
50 kg

Table Top Platform TTX

The TTX is specifically designed for mechanical surface testing and has the added advantage of being extremely compact.

It can be configured with different motorized tables. For the budget conscious, manual tables are available.

This table-top instrument provides all the precise technical features of Anton Paar measurement modules in a space-saving solution.

Compact Platform CPX

The modular system of the Compact Platform allows a maximum of 3 measuring heads/modules on the same instrument.

This allows you to build on applications in the future if the original purchase does not include 3 modules.

A full video microscope comes as standard on the platform.

System dimensions:
635 mm x 620 mm, 1300 mm height

Displacement tables:
X: 145 mm
Y: 70 mm
Z: 30 mm

Weight:
145 kg



Open Platform OPX

System dimensions:
900 mm x 625 mm, 1300 mm height

Displacement tables:
X: 245 mm
Y: 120 mm
Z: 30 mm

Weight:
275 kg

The OPX is the most advanced modular system for mechanical surface testing, allowing for 4 different measuring heads/modules.

The OPX can accommodate samples with a diameter of up to 300 mm (12").

A full video microscope comes as standard on the platform.

