

Nanoindentation tester

Hit 300



Hit 300: Simple. Powerful.

Inspired by decades of experience, drawing from a high-class portfolio of instrumented indentation testers, Anton Paar brings you Hit 300: a premium yet highly affordable nanoindentation instrument. The simplified interface is self-explanatory. Automation lets you run 600 measurements per hour, while you're away. Active anti-vibration damping and a unique 2-laser targeting system make it accurate to <1 mm in all environments. Starting it up for first use takes 15 minutes, and you go from training to results in an hour. Hit 300 – a delightful fusion of simplicity and power.

INDENTATION TESTING FOR EVERYONE

Easily determine:

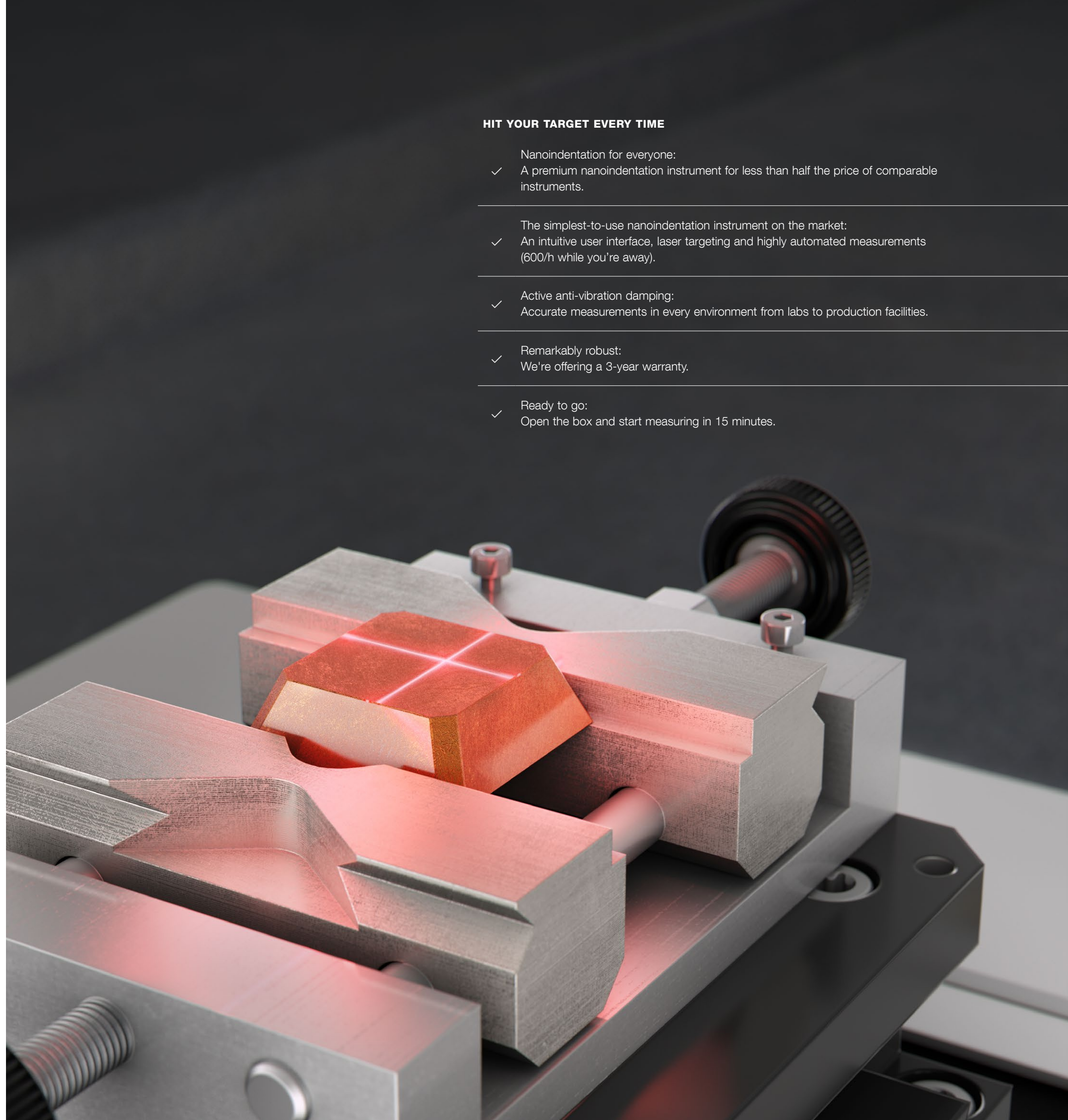
- hardness
- elastic modulus
- viscoelastic properties
- depth profiling of thin films, coatings, or bulk materials

THE APPROVED METHOD IS STRAIGHTFORWARD:

- An indenter tip is driven into a specific area of a material via application of an increasing normal load.
- The indentation depth is monitored with a displacement sensor.
- The resulting load vs. indentation depth curves provide data specific to the mechanical nature of the material under examination.
- The results are 100 % compliant with industry standards (e.g. ISO 14577, ASTM E2546)

HIT YOUR TARGET EVERY TIME

- ✓ Nanoindentation for everyone:
A premium nanoindentation instrument for less than half the price of comparable instruments.
- ✓ The simplest-to-use nanoindentation instrument on the market:
An intuitive user interface, laser targeting and highly automated measurements (600/h while you're away).
- ✓ Active anti-vibration damping:
Accurate measurements in every environment from labs to production facilities.
- ✓ Remarkably robust:
We're offering a 3-year warranty.
- ✓ Ready to go:
Open the box and start measuring in 15 minutes.

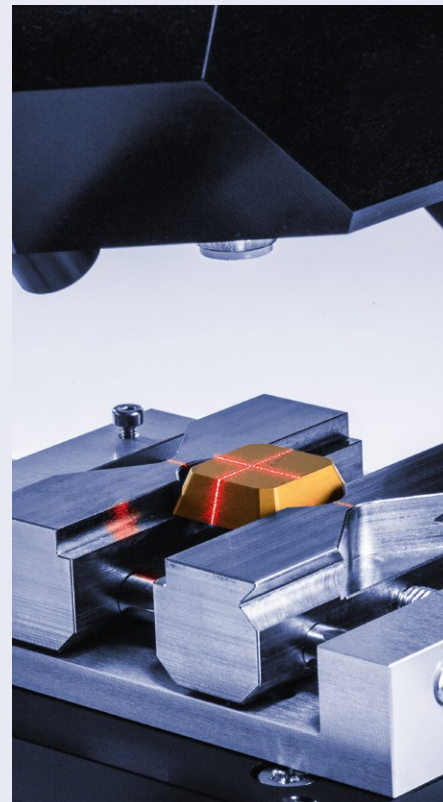


The simplest- to-use, most robust nanoindentation instrument on the market



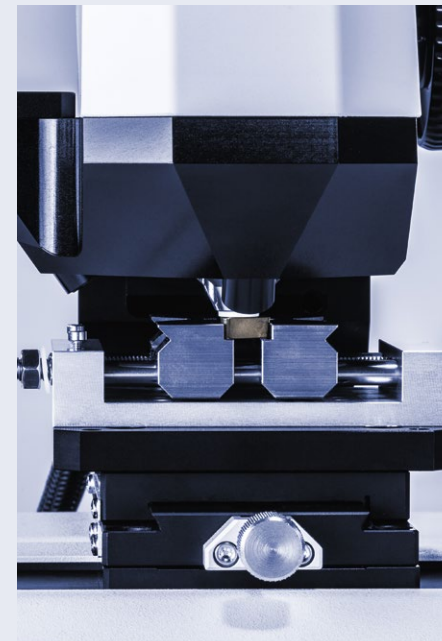
NOT AN EXPERT, NOT A PROBLEM

Indentation testing is incredibly convenient with Hit 300 – no expertise is necessary. The indenter is already mounted. Exchange and calibration take less than 15 min. The top surface reference ring makes any subsequent measurement correction due to thermal influences negligible and protects the measuring part from collision. The only input the step-by-step software needs is the type of sample and the measuring mode and then you're good to go.



HIT YOUR TARGET EVERY TIME

Achieve <1 mm accuracy. How? A unique 2-laser targeting system directly marks where the sample is going to be measured.



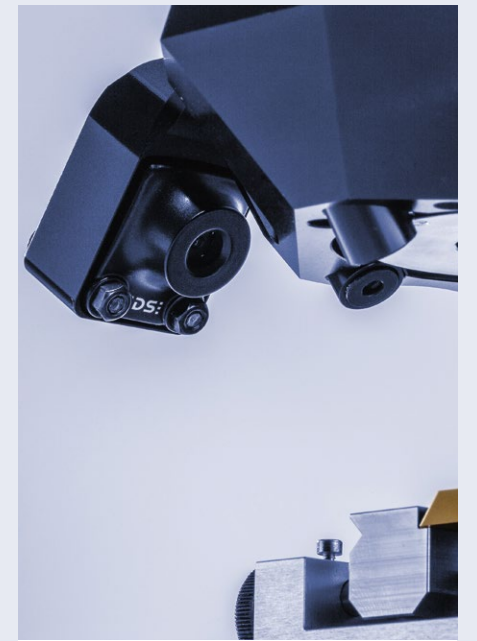
600 MEASUREMENTS/HOUR WHILE YOU'RE AWAY.

Define arrays of indentation measurements, with spacing from a few micrometers to several millimeters, with the accurate X motorized table. Run up to 600 measurements per hour while you're away doing something else.



MEASURE WHEREVER, FROM LABS TO PRODUCTION FACILITIES

Install your instrument wherever you want. It's compact and the integrated active anti-vibration table is the fastest, most efficient vibration damping solution on the market.



CLEAR VIEW OF THE SAMPLE

Optionally equip Hit 300 with an optical video camera to further visualize the measured sample area. The high resolution camera provides a >6.5 cm x >6.5 cm view of your sample, while a digital zoom, controlled by the software, allows observing the tiniest details of its surface.

Open the box and start measuring in 15 minutes

From instrument installation to first measurement in 15 minutes, from training to results in an hour. The software interface has everything you need in a single view. The interface leads you through the whole measurement procedure so the only thing you need to think about is which sample you want to measure next.

① INSTALL THE SAMPLE



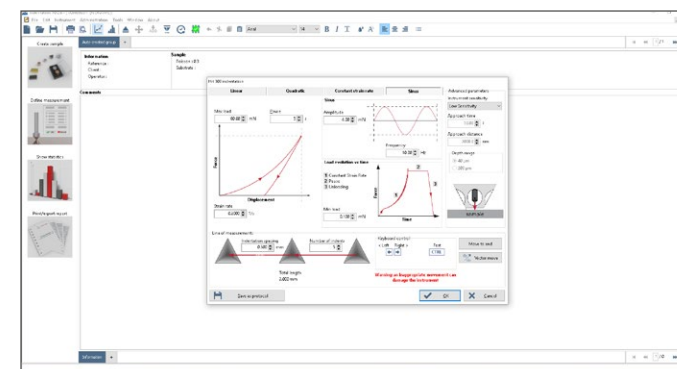
Start with the fused silica reference sample in the accessory kit with each instrument. Then mount your own sample.

② IDENTIFY THE SAMPLE



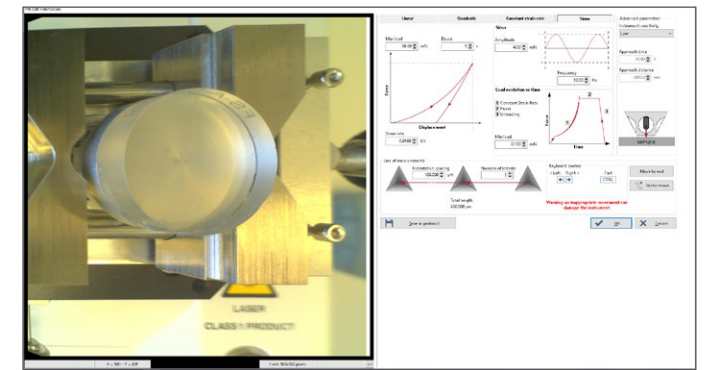
Create a new measurement group by identifying your sample and its material properties. Don't know what they are? Simply select the material from the pre-configured list and proceed to the measurement window without manually entering the material properties.

③ CHOOSE THE INDENTATION MODE



Choose between the 3 quasi static modes: linear, quadratic and constant strain-rate or the dynamic sinus mode. After choosing the mode, see the corresponding illustration of the indentation curve in the same window.

④ CHOOSE THE PARAMETERS



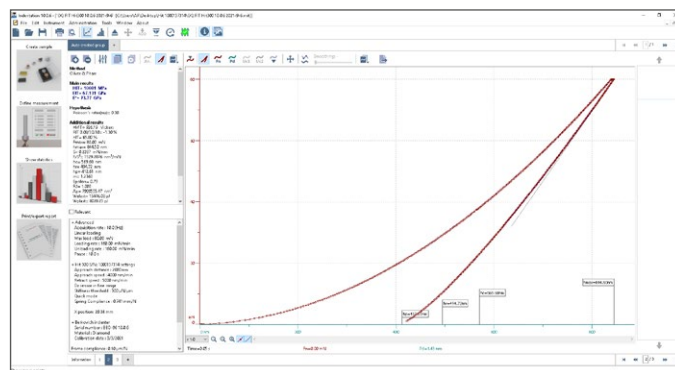
To make the measurement definition easier, the different parameters are illustrated with pictures. The meaning of each parameter is additionally described in the "hint" boxes which appear when the cursor is on the name of a parameter.

⑤ HIT THE SAMPLE WITH THE LASER



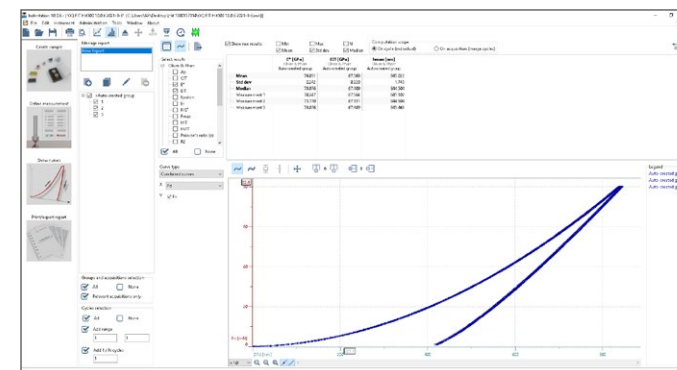
Now target the area to be measured with the laser. The indent is set at the intercept of the two laser lines. Add a camera, to more closely observe the area below.

⑥ PERFORM THE MEASUREMENTS



Perform the measurement automatically. Monitor the indentation curve live on-screen.

⑦ ANALYZE THE RESULTS



With only one click on the "analyze statistics" icon, your measurement results are ready to be displayed and analyzed. Multiple additional analyses can be added.

⑧ EXPORT AND PRINT THE REPORT



Click and export your measurement results as a PDF report. Additionally, export your data as txt file, choose the number of data points, plot them in different forms and much more.

**No matter
the material,**
Hit 300 delivers
high-quality
results

Hit 300 offers by default the two most popular indentation modes: quasi static mode with different types of loading segments (linear, constant strain rate and quadratic), and a dynamic mode (Sinus mode) also known as “Continuous Stiffness Measurement.”

Quasi static mode is most commonly used to perform standard instrumented hardness and instrumented elastic modulus measurements on many different types of coatings and bulk materials (e.g metals, ceramics, polymers). Dynamic mode is used to obtain depth-related properties of coatings and specially treated surfaces and to acquire information on the viscoelastic properties of polymers.

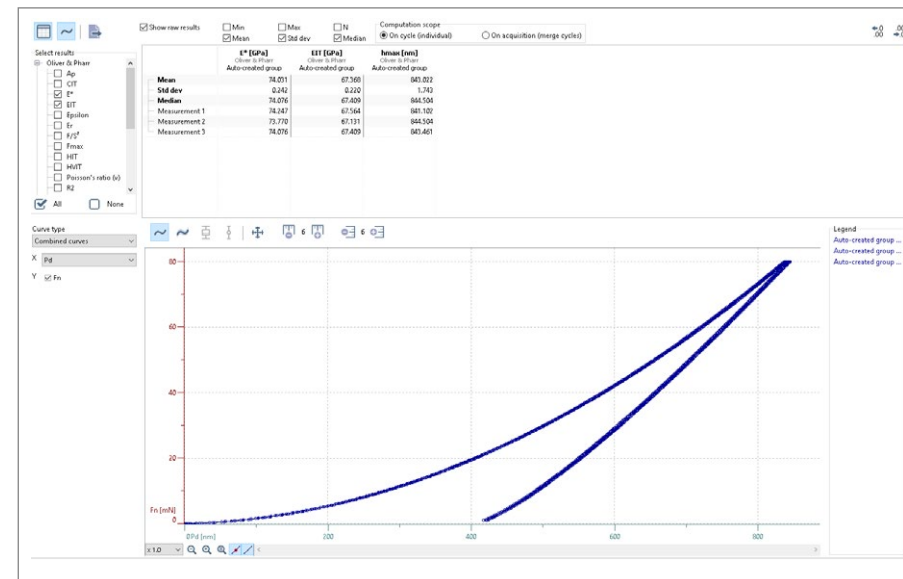


Figure 1: Typical force vs. displacement curve

COATINGS

To measure the instrumented hardness and elastic modulus of thin coatings, quasi static mode is used with a penetration depth that should not exceed 10 % of the coating thickness. To evaluate the depth-related properties of a sample, i.e. the evolution of mechanical properties over depth, sinus mode is the perfect choice. Hit 300 is specially designed to measure hard coatings like PVD/CVD in the tooling industry, and DLC coatings for piston rings or nozzles in the automotive industry.

Measurements of H_{IT} and E_{IT}

Here's an example where five measurements were performed to obtain the instrumented hardness and elastic modulus information on a 3.7 μm -thick DLC BCR coating. Quasi static mode with linear loading and the maximum force of 25mN was used.

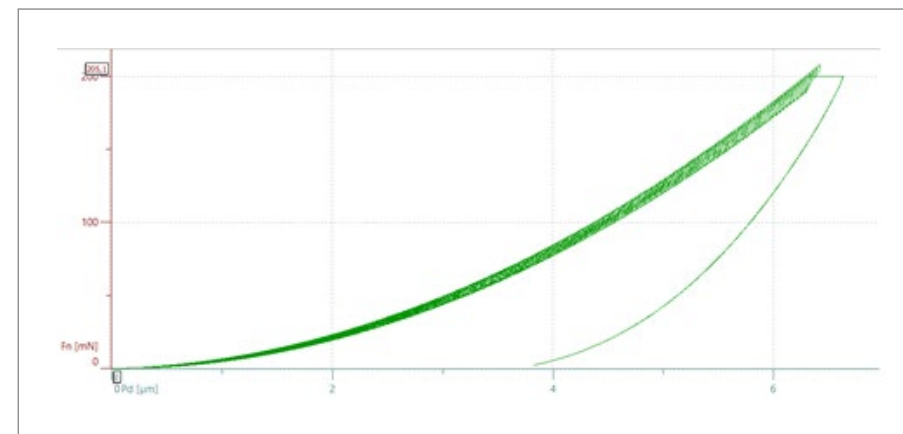


Figure 2: Typical indentation curve

BULK POLYMERS

If you need information on the viscoelastic behavior of polymers, sinus mode with constant strain rate loading is the perfect choice. Viscoelastic properties are represented by the storage and loss moduli and the loss factor ($\tan \delta$), shown in the statistics window. The higher the loss factor, the more viscous the material.

For example, three sinus measurements on a PMMA sample with the maximum load of 200mN, sinus amplitude maximum 20mN and oscillating frequency 5 Hz.

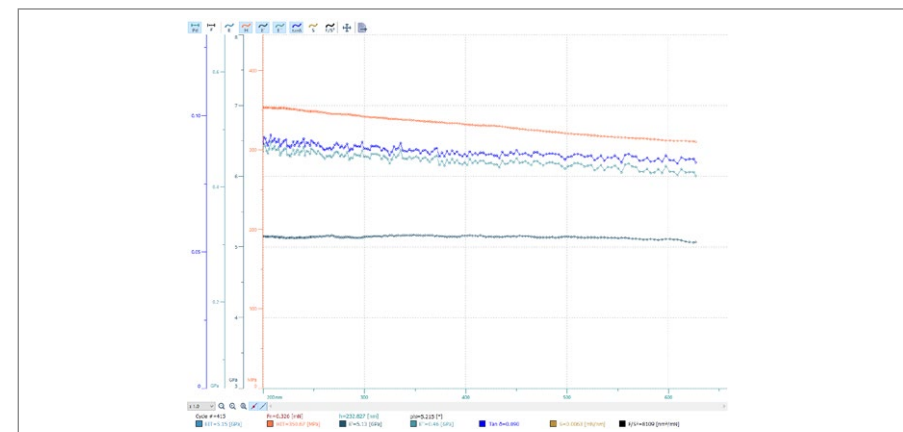


Figure 3: Result E'/E'' curve, tan Delta

Get to know the instrument and the field

NEW TO THE FIELD?

Want to learn more about instrumented indentation testing? We’ve got a textbook, articles and multiple application reports for you. Our educational package has the theoretical basics, along with typical samples (fused silica, copper, DLC, PMMA), and measurement procedures/parameters. It’s a great way to get to know the instrument and the field. The package is available on request. When you’re ready to measure, “Recommended Parameters and Troubleshooting for Instrumented Indentation Testing” is at hand.

And remember: You’ll always have personal support from our expert network. Just contact a member of our global support team and they’ll be happy to assist.

MORE ABOUT THE THEORY OF INSTRUMENTED INDENTATION TESTING:

www.anton-paar.com/wiki-iit

APPLICATION REPORTS:

www.anton-paar.com/hit300-documents

HIT 300



Maximum load	500 mN
Load noise floor [rms]	≤ 1 µN
Load resolution	0.02 µN
Depth range	200 µm
Depth resolution	0.01 nm
Depth noise floor [rms]	≤0.3 nm
Frame compliance	≤0.3 µm/N
Motorized X table travel range	40 mm
Manual Y table travel range	40 mm
Anti vibration table included	Yes, active electronic system
Laser indicating indentation position	Crosshair
Optional video camera	≥3x magnification, resolution 5,04 megapixel
Dimensions (width x depth x height)	269 mm x 259 mm x 420 mm
Weight	13,5 kg
Standard compliance	ISO 14577, ISO 19278, ASTM E2546

FIND OUT MORE



www.anton-paar.com/hit300



“
We are confident in the high quality
of our instruments. That’s why we provide
full warranty for three years.
”

All new instruments* include repair for 3 years.
You avoid unforeseen costs and can always rely on your instrument.
Alongside the warranty we offer a wide range of additional services and maintenance options.

*Due to the technology they use, some instruments require maintenance according to a maintenance schedule.
Complying with the maintenance schedule is a prerequisite for the 3-year warranty.

