Anton Paar

Quality Control of **Hard Coatings**

Mechanical Surface Characterization

Hard Coatings Quality Control

PVD and CVD hard coatings influence our lives in hidden ways. When it comes to microelectronics, data storage, solar products, cutting tools, and even types of medical equipment, hard coatings play a critical role. Monitoring the quality of coating by measuring surface mechanical properties such as adhesion, friction, wear, and hardness determines its lifetime and performance.

And that's where Anton Paar can help. We have the world's broadest industrial portfolio of hard coating measurement instruments.

Whether it's for the perfect coating formulation or incoming and final product quality checks, our robust instruments, ready for any rough industrial environment, have got you covered.

The broadest industrial portfolio on the market: Novice or expert – we have a solution that's right for you.

Instruments built to last: Ready to use in any rough industrial environment for at least 15 years.

Expertise meets decades of experience: More than 2,000 instruments sold.

Measure wherever: In the lab or directly at your production site.

Results you can rely on: Verify instrument performance on your own schedule with our reference sample kits.

FIND OUT MORE

www.anton-paar.com/apb-hard-coatings

Anton Paar
Certified Service

"We're confident in the high quality of our instruments. That's why we provide **a full warranty for three years**."

All new instruments* include repair for three 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 three-year warranty.

SERVICE AND SUPPORT DIRECTLY FROM THE MANUFACTURER

Our comprehensive service provides you with the best individual coverage for your investment so that maximum uptime is ensured.

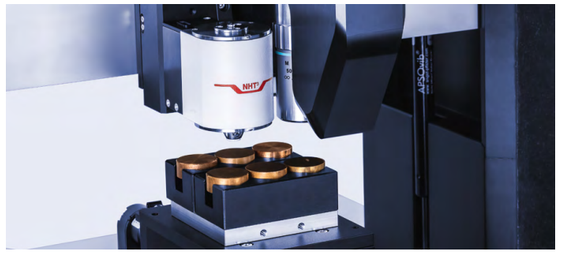
SAFEGUARDING YOUR INVESTMENT

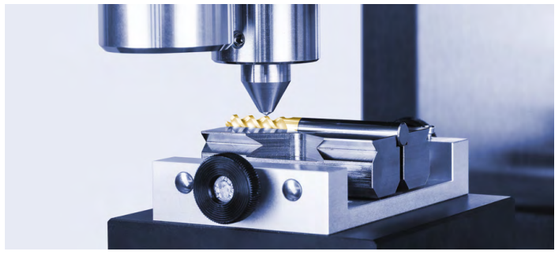
THE SHORTEST RESPONSE TIMES

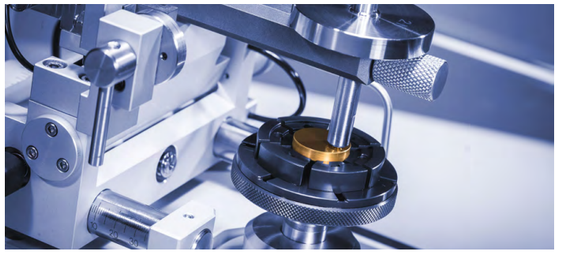
CERTIFIED SERVICE ENGINEERS

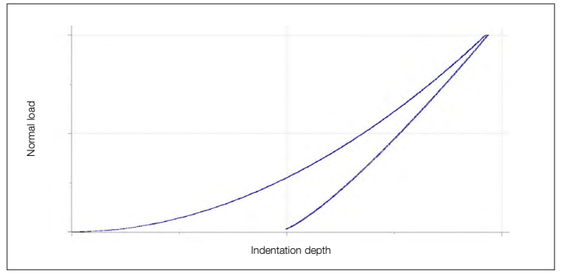
OUR SERVICE IS GLOBAL

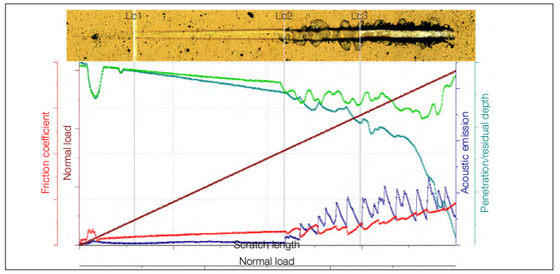
Surface Characterization Technologies

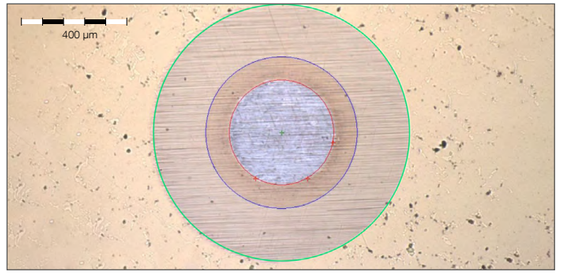


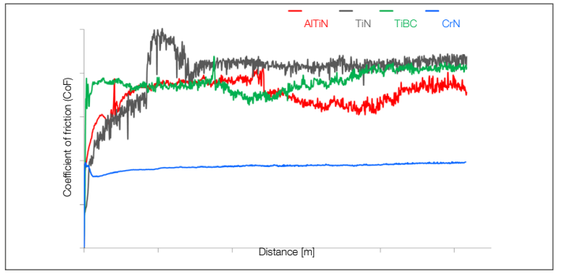












Indentation Testing

For some applications, the harder the material, the better the performance. With our indentation testers, easily determine certain properties – hardness, elastic modulus, and depth profiling – for a wide range of materials. By measuring coating hardness, you can estimate its resistance to plastic deformation and check your final product's quality and performance.

The instrumented indentation technique involves pressing an indenter of known geometry into the specific area of material. While doing so, both penetration depth and normal load are recorded.

The resulting load vs. penetration depth curves provide you data specific to the mechanical nature of the material under examination. Analysis of this curve is automatic, according to the ISO 14577 standard.

The results comply with industry standards (e.g., ISO 14577, ASTM E2546).

Scratch Testing

Adhesion is another important aspect in the quality of a coating. If the coating doesn't adhere well to the substrate and delaminates, peels off, or chips, your final product will have limited lifetime. But our scratch testers let you easily determine coating adhesion.

The purpose of a scratch test is to generate progressive damage to a coating. A diamond indenter is drawn across the coated surface of the material under examination at a constant speed and under a constant, incremental, or progressive load.

The load at which the coating starts to delaminate is called critical load (Lc). With this critical load data, you can quantify the adhesive properties of different film-substrate combinations via different sensors (acoustic emission, penetration depth, friction force) and video microscope observations.

The results comply with industry standards (e.g., ISO 20502, ASTM C1624).

Coating Thickness Determination

Thickness is an important characteristic of a coating that you need to monitor and control in order to guarantee a constant level of performance.

Rotating a ball of known diameter against the coating grinds a small crater into both the coating and the substrate, which provides a tapered cross section of the film when viewed under an optical microscope.

With this method, our Calotest instruments measure the thickness of coatings in just one to two minutes.

The results comply with industry standards (e.g., ISO 26423:2009, ISO 1071-2, VDI 3198).

Tribological Testing

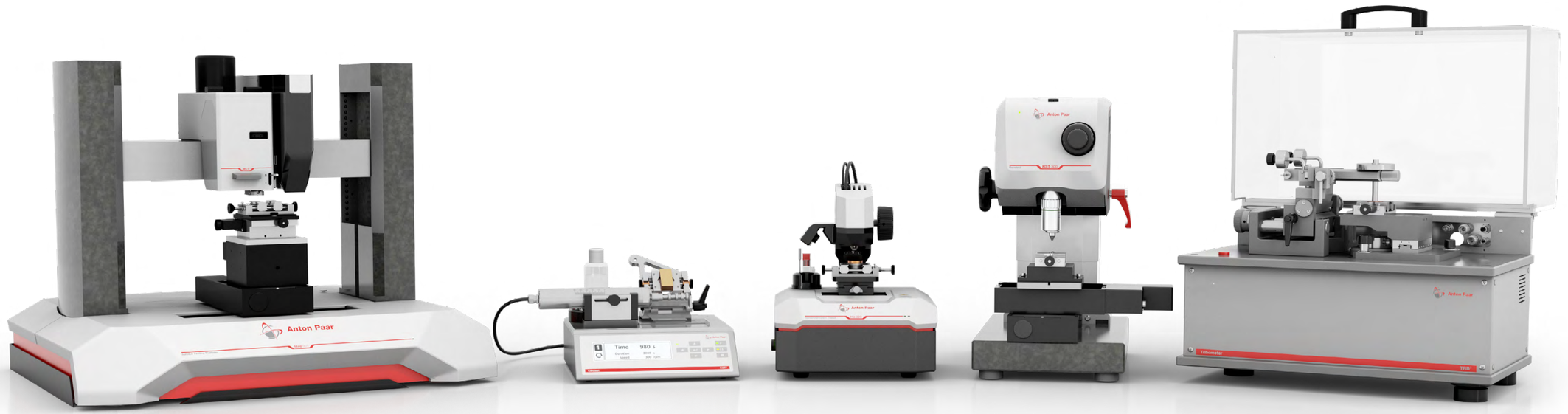
Friction and wear are two of the mechanical properties directly linked to the lifetime of a coating.

With our tribometer, simulate usage conditions of a final product and get fast feedback on friction and wear of a coating.

A static partner (pin, ball, etc.) is mounted on an elastic arm and loaded with a known normal load on a moving sample. The resulting frictional forces acting between the static partner and the moving sample are measured by very small deflections of the arm using two LVDT sensors. You can determine wear rates of both the static partner and moving sample from the volume of material lost during a specific friction run.

The results comply with industry standards (e.g., ASTM G99).

Anton Paar Instruments



MCT³
MICRO COMBI TESTER

Leveraging decades of experience, we've developed the broadest industrial portfolio of instruments for the mechanical surface characterization of hard coatings, giving you a range of options to find the solution that fits your needs. Designed to withstand the roughest industrial environments over a long lifetime, these instruments give you best-in-class measuring speed, flexibility when it comes to setup locations, and reliable, trustworthy results.

CAT²
CALOTEST

Quick, easy, inexpensive coating thickness determination. Coating thicknesses between 0.1 µm and 50 µm.

- Conduct measurements in just two to five minutes without sample preparation
- Automatic, fully customizable data report
- Accurate thickness results for single and multi-layers
- No matter the shape, size, or form, perform quality control tests directly at your production line with the flexible arm

Hit 300
NANOINDENTATION TESTER

The simplest-to-use nanoindentation tester on the market. Load range: 0.1 mN to 500 mN.

- Less than half the price of comparable instruments
- Active anti-vibration isolation for environment-independent installation
- Ready to start measuring in 15 minutes
- Top surface referencing allows you to conduct measurements 2x faster than with comparable instruments
- Up to 600 measurements per hour while you're away completing other tasks
- Install the compact benchtop instrument in an area under 1 m^2
- Dynamic mechanical analysis with Sinus mode

RST³
REVETEST® SCRATCH TESTER

The industrial standard: More than 1,500 Revetest® instruments sold. Large load range: 0.5 N to 200 N.

- The patented, synchronized panorama combines a scratch panorama image with measuring data, which lets you check your coating quality whenever you want
- Conduct scratch tests and conventional hardness testing with one instrument, saving you money and space
- Perfect results even for curved and uneven surfaces via active force feedback control
- Acoustic emission sensor for brittle failure events detection
- Friction and wear determination via multi-pass scratch testing

TRB³
PIN-ON-DISK TRIBOMETER

The standard for measurement of friction, wear, and lubrication. Load range: up to 60 N.

- Two friction force sensors to minimize errors caused by thermal drift
- Tribometer and modelization software delivers ultimate control and cutting-edge analysis
- Real-time environmental condition monitoring with integrated temperature and humidity sensors
- Calibrate your instrument whenever you want in less than five minutes
- Reference sample kit for easy performance verification, ensuring your instrument is always in top condition with results you can rely on
- Wide range of testing parameters, contact geometries, and add-on options

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