# by fascination in detail

Newest technologies and intuitive usage make the **Carat 930** an exceptional product for micro-hardness testing and optical analysis.
Measuring tasks are child's play and performed in a better and simple manner.
Our robust basic unit can be adapted optimally to your requirements with our software modules and the Carat sample clamping system.
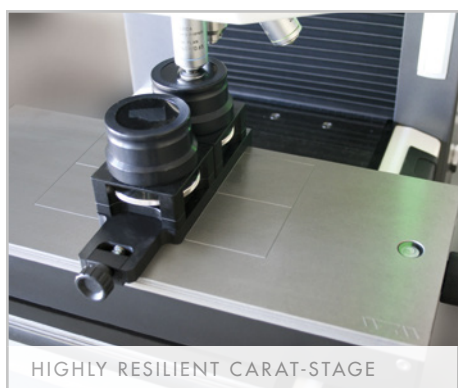
HIGHLY RESILIENT CARAT-STAGE

HAND WHEEL X-AXIS
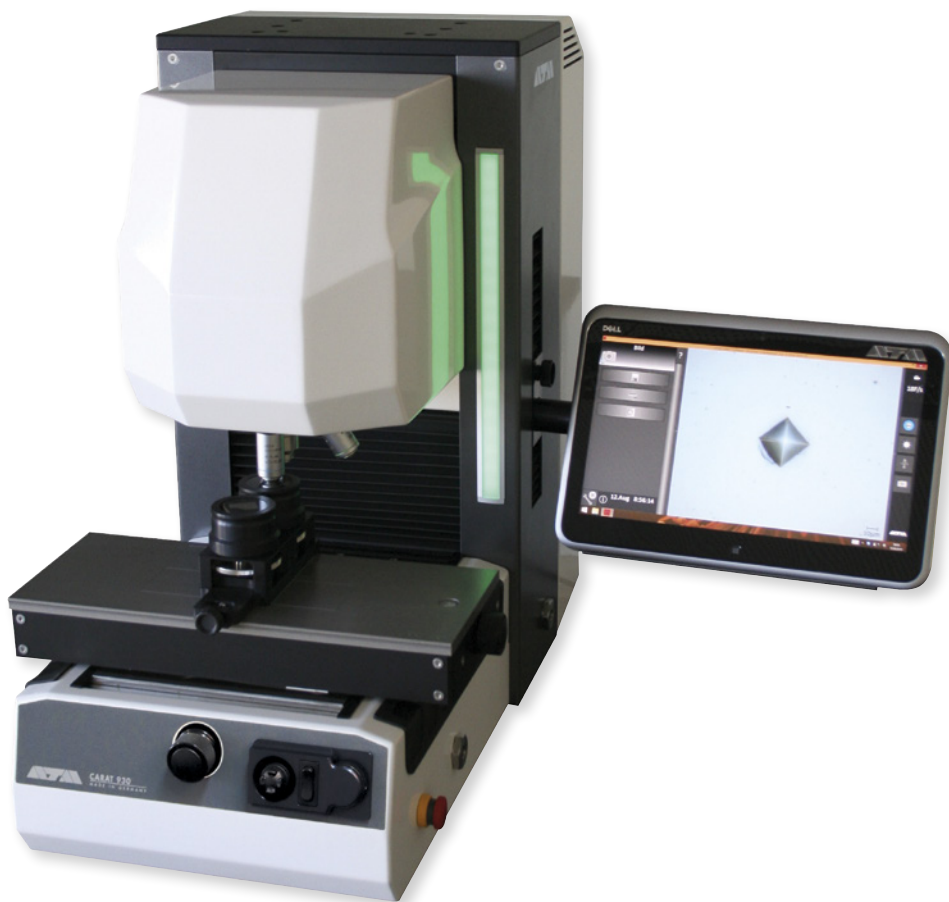
Even if a micro-hardness tester operates in a rather small dimension, our **safety concept** offers more protection for the user. Examples are the yielding rubber bar below the stage and the Emergency Stop button.
The indenter is equipped with an automatic load control. The generous light strip displays the machine's status.

SAFETY CONCEPT FOR X-AXIS

Z-AXIS

Y-AXIS

X-AXIS
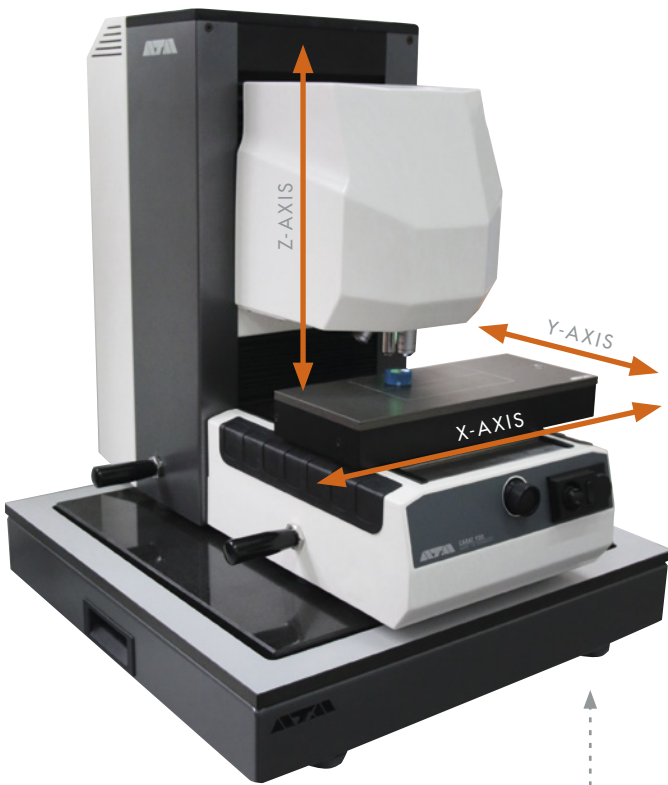
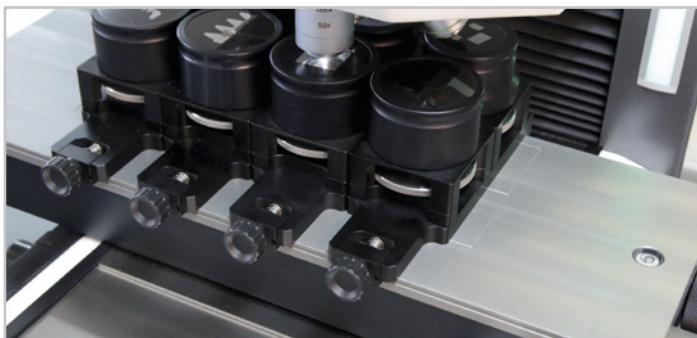VIBRATION-ABSORBING BASE

Fully automatic hardness testing

► Vibration-absorbing cast Aluminium body

► Load cell with microprocessor-based force control

► 8-times objective revolver (LED lighting)

► Fine-dynamical scrolling wheel and high-speed button for Z-axis control

► Carat sample clamping system

► Automatic plane detection with fully automatic rapid focusing (option)

► Safety concept

► Integrated levelling and transport assistances

► e-lab-ready

HAND WHEEL Y-AXIS   JOYSTICK (X-/Y-AXIS)

CONTROL ELEMENTS FOR MANUAL OPERATION

HIGH-SPEED BUTTON Z-AXIS

FINE-FOCUSING (Z-AXIS)

X-AXIS (CARAT STAGE)	160 mm | ► 250 mm
Y-AXIS (CARAT STAGE)	100 mm
MAX. TABLE LOAD	60 kg
Z-AXIS	150 mm
POWER SUPPLY	110 - 220 V (50-60 Hz, 1 Ph)
WxHxD	37.5 x 65 x 67 cm
WEIGHT	approx. 65 kg

► CARAT-STAGE WITH EXTRA LONG X-AXIS (250 mm)

The standard Carat stage takes three **easy clamping plates** with up to six samples. The longer stage takes four clamping plates with eight samples. The easy clamping system is also suitable for fast-lock vice 50 and unmounted samples.

very latest news

Many expansions in Carat software are inspired by our customers and so apparently small innovations have made our software modules even more efficient.

The intuitive control by touch or mouse forms the basis for modern image processing **(64-bit software (Win 7/8))**.
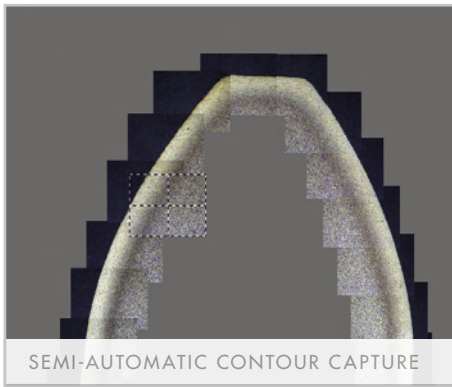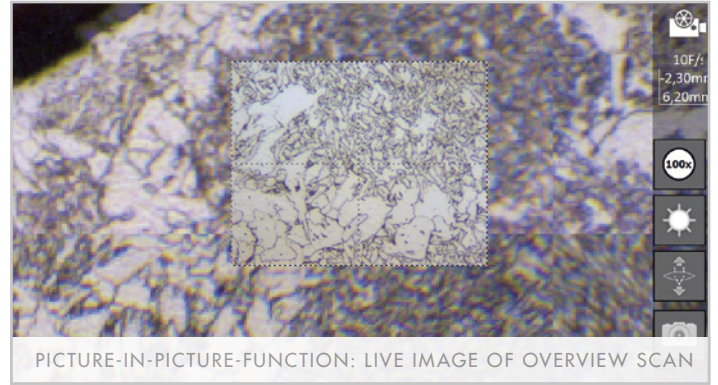
PICTURE-IN-PICTURE-FUNCTION: LIVE IMAGE OF OVERVIEW SCAN

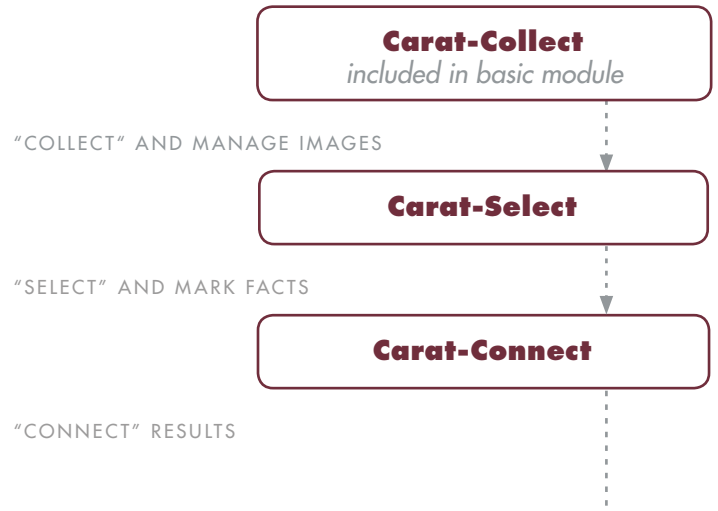

SEMI-AUTOMATIC CONTOUR CAPTURE
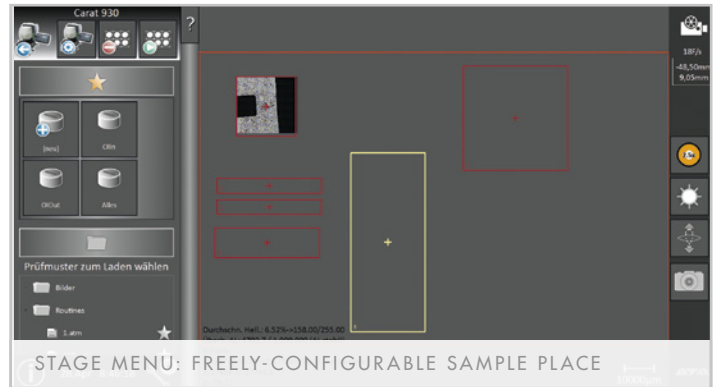
STAGE MENU: FREELY-CONFIGURABLE SAMPLE PLACE

software

CARAT-COLLECT

Image capturing with dynamic live image

► Objective-independent picture-in-picture function

► Freeze live image (e.g. during vibrations)

► Automatic brightness control

► Autofocus

► Sharpness reconstruction by plane scanning

► Scanning of surrounding area for overview images with integrated live image

► Overview scan with semi-automatic contour capture

► Live-image capture (save/clipboard/export in common image formats)

► Brightness correction of partial images of the overview scan

► Save configurations of a sample for reproduction and load them by shortcut (favorites) from the stage menu

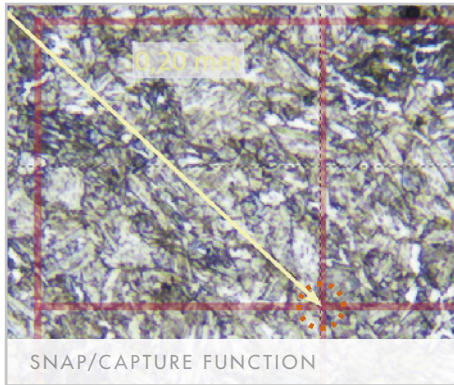► Freely configurable sample places (size, amount, position) in stage menu with large overview image

Carat-Collect
included in basic module

"COLLECT" AND MANAGE IMAGES

Carat-Select

"SELECT" AND MARK FACTS

Carat-Connect

"CONNECT" RESULTS

INTUITIVE CONTROL UP TO ANALYSIS

SNAP/CAPTURE FUNCTION

MEASURING OBJECT: GRID
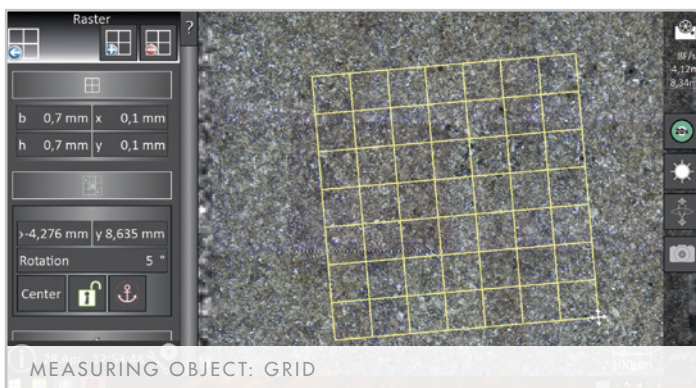
CARAT-SELECT

Measuring module

- ► Measuring functions: distances, angles, areas, circles and polygons with dimensioning
- ► Define grids
- ► Lock single measuring objects
- ► Keep selection of measuring object
- ► Magnetic reference points and lines
- ► Define zero position of coordinate system
- ► Align measuring elements by coordinate input
- ► Repeat moving coordinates by Enter
- ► Edit colour and font of measuring objekts

CARAT-CONNECT

Report generator

- ► Output overview images, value tables, diagrams
- ► Dynamic overview image, for example when changing the live image view
- ► Update of all elements in the report if there are changes in program
- ► Selection of parameters of a table and varying composition for multiple tables in a report
- ► Templates for hardness testing
- ► Reports according to DIN EN ISO 6507 und ASTM E-384
- ► Insert drawing elements such as rectangles and lines
- ► Define form fields
- ► Assign barcode scans
- ► Output formats: PDF, CSV and clipboard
- ► Optional interface modules: QDAS, ODBC/SQL
- ► Place existing forms into the background

Dynamic generation of a report means images and data can be modified at any time and be updated when the report generator is open. With a single click on the overview image you return to the live image directly. Also tables, curves and graphs can be corrected at any time by the program.

For **editing** the individualized report form, you can use standard forms which contain date elements, hardness testing tables and other exemplary elements.
Personalized form templates can be generated. Logos, background images and drawing elements complement the appearance of the report generator.

For **further processing**, tables can be copied into Word by clipboard. To use the statistical functions of excel, a CSV export is possible.
Interface modules can connect to existing data bases.

ANGLE DRAG POINTS CHD

CIRCLE WITH CONSTRUCTION LINES


SINTER TEST SERIES

from practice

Efficiency and reproducibility of different applications characterize our software module.

And additionally, welding module and grid for an area scan have been added at up to 6000 test points.

The opportunity to present hardness values in colours, especially here supports visual expressiveness. The colour values can be exported to Excel or even converted into a 3D representation.
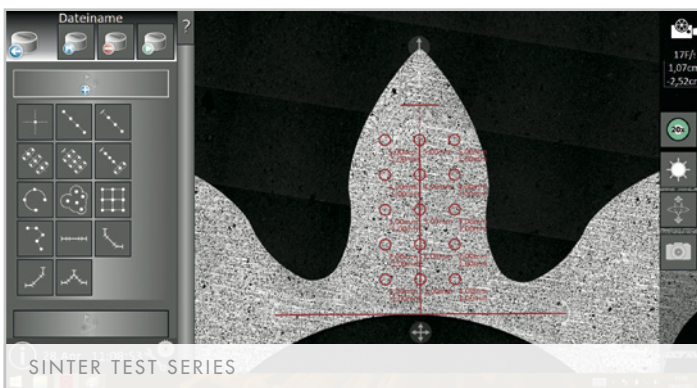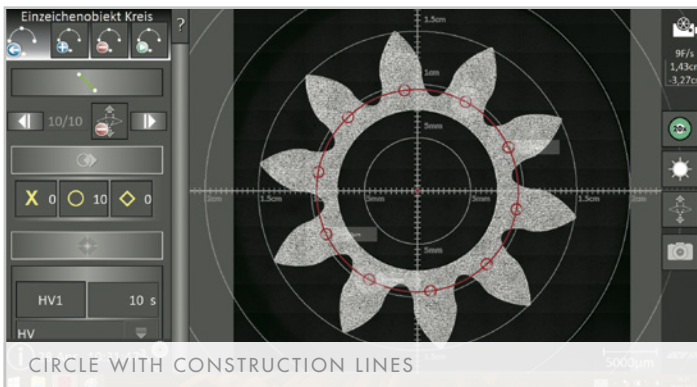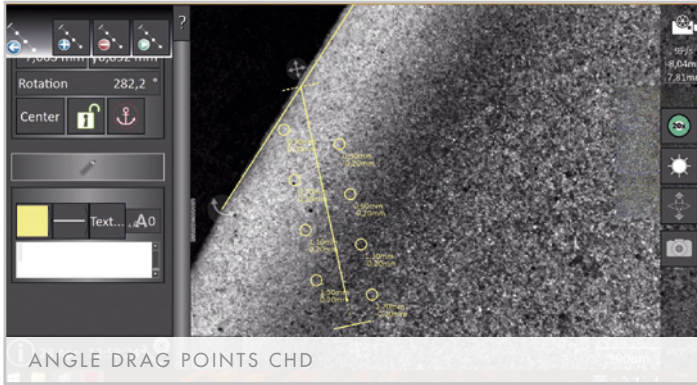
software

HARDNESS TESTING MODULE

Fully automatic and manual image analysis and hardness calculation

► Create single test points and series

► Align testing objects visually or parametrically

► Angle drag points for easy rotation of CHD or NHD test series

► Define the angle between border and test series (standard 90°)

► Assign different indentation states (planned, completed, incorrect indentation)

► Save and reload sets of test series for reproduction

► Misalignment of a sample surface can be compensated by pre-focusing testing positions

► CHD test series: define offset for a single or multiple rows

► Sinter test series

► Define tolerance band for hardness or CHD curve

► Circle or circle segment with concentric auxiliary circle lines

► Test point group

► Mark hardness values in colour

tech notes

► Force transducer with microprocessor-controlled force control

► Electronically controlled load application
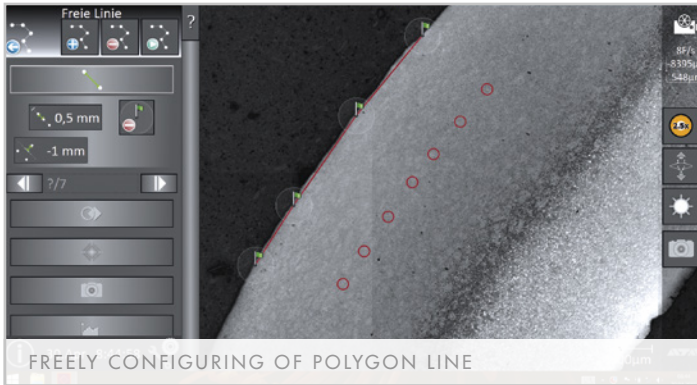
TEST LOAD	
FOR LOAD RANGE*	0.49 – 294.2 N
TEST METHOD*	HV 0.05 – HV 30
TOTAL TEST RAGE	1 g – 30 kg

* according to Vickers (DIN EN ISO 6507, ASTM E-384)

FREELY CONFIGURING OF POLYGON LINE

FREE LINE TEST SERIES

Polygon line

► Choose amount of points and angle between segments freely

► Set offset, for example at sample border
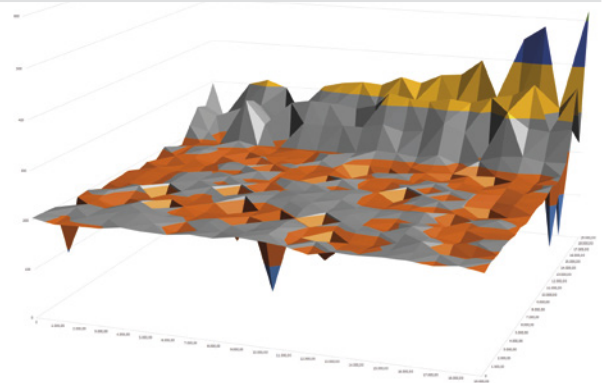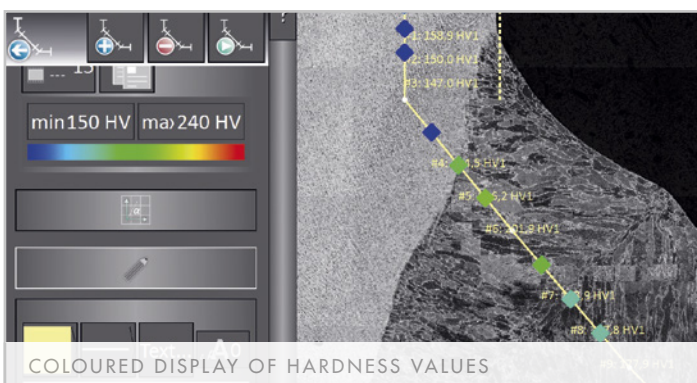
► Re-align single points individually, add or delete

HARDNESS PROFILE OF AREA BY GRID

GRID

for area scan

► Surface testing with definable grid with up to 6000 testing points

► Define number and distance of test points

► Acceleration of the test process by calculations in the background

COLOURED DISPLAY OF HARDNESS VALUES

3D VIEW OF SURFACE SCAN IN EXCEL

FILLET WELD TOOL WITH ADJUSTABLE OUTER ANGLES

WELD MODULE

for butt weld, (double) fillet weld

► Set up 5 zones of the test series: amount of points, distance and alignment in each zone (left, right, centred)

► Show std. tolerance borders to keep the required distance to sample border

► Change the exterior angle at the fillet weld

► Put out results labelled with zone names in report

for good reasons

Our **Easy-clamping system** has prevailed successfully in the cutting sector so we have adapted it for the Carat system. The Carat clamping plate is placed on the stage and fixed plane-parallel with a manual screw.
In addition to the fast-lock vice 50 for unmounted samples, the Carat sample holder is the base for mounted samples from Ø 25-50 mm. Alternatively, there is also an Easy clamping system for sample diameters from 50-70 mm.

The Carat-sample holder fixes the sample against the clamping ring from below. This ensures a flat test plane of all clamped samples and thereby provides a rapid change of view by the software.

2 SAMPLES WITH CARAT-SAMPLE HOLDER 25-50

1 SAMPLE WITH CARAT-SAMPLE HOLDER 50-70

SIDE-BY-SIDE POSITIONING OF CARAT-CLAMPING PLATES

The **universal clamping system** for Carat clamping plate 50-70 fixes coplanarly a wide variety of sample geometries. The easy-clamping function provides quick and easy change of the clamping vice (also fast-lock vice 50).
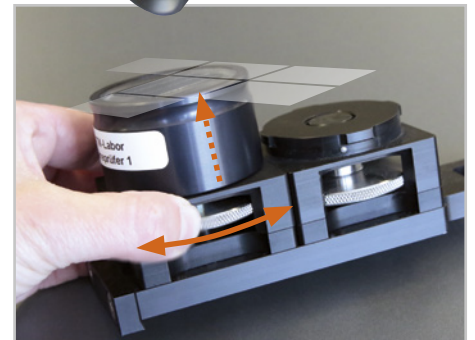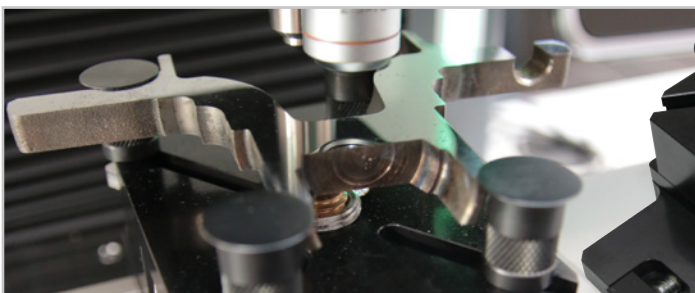

FLATNESS EXAMINATION OF ALL TEST PLANES

UNIVERSAL CLAMPING SYSTEM CARAT
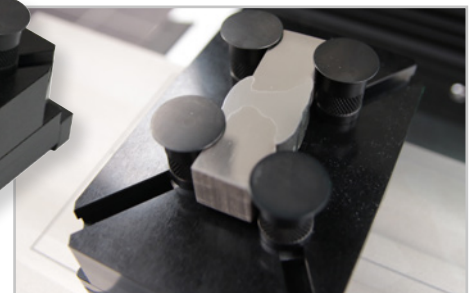
CLAMPING EXAMPLE

samples

► unmounted samples

► rectangular samples (15x27 – 48x75 mm)

► round samples (Ø 35 – 95 mm)

► max. sample height 21 mm

With our 64-bit software, we use the latest **computer and screen technology** such as the touch tablet PC, which can be latched in an adjustable holder on the machine.
Our free-standing system is equipped with touch-LED-TFT and an amazingly small Micro PC.