INNOWEP®

quality + durability + haptic

UST®

Indentation
Scratch
Deformation
Tribology
Surface Profile
Haptics

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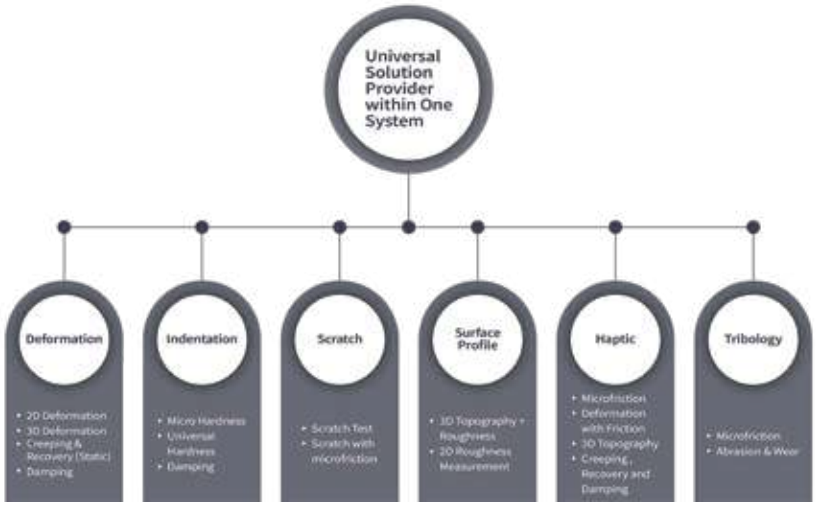
HIGHLIGHTS

- One machine for all measurements.
- All measurements with same resolution
- All measurements in real time, continuous and in-situ
- Mechanical property with local surface profile resolution
- Wide selection of tips from nanometer to centimeter

BASIC FUNCTIONS

Adequate measurements are of great importance for a reliable simulation and evaluation of micromechanical properties of materials and surface coatings, such as deformation of haptics. As material and coating behavior can vary considerably, a series of proper, real-time, quantitative measurements have to be performed with high resolution in the right dimension.

UST® - Universal Surface Tester, is by far the only open multi-modular system that provides a complete mechanical testing solution for the evaluation of bulk materials and surface coatings. Its unique configuration allows for a wide range of tip choices with various materials and sizes ranging from nanometer to centimeter.



UST® - Universal Surface Tester		Other Systems
• One machine for all tests • Same Resolution (60nm) • No need for correlation • Local resolution • Continuous measurement • Surface structure combined with properties	VS	• One machine for one type measurement • Different resolution • Need for further correlation • No record with local resolution • Point by point measurement • No surface structure vs. properties

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MEASUREMENT HEAD	100mN	1000mN	50N
Height Range	4 mm	4 mm	10 mm
Height Accuracy	60 nm	60 nm	50 nm
Load Range	1-100mN	10-1000mN	2-50N
Measure the Applied Load	NO	NO	YES
Auto Calibrate Tips	NO	NO	YES

X-Y TABLE TECHNICAL DATA

Speed	0,1 - 2 mm/s
Measurement Area	50mm x 50mm
X-Y Axis Displacement Resolution	1µm

NEW FEATURES - 2024 MODELS

Automated Z-Axis (also allows for automatic approach to the sample)
A step sequence programmer for defining measurement routines and introducing new modules
Auto-detection of the connected head

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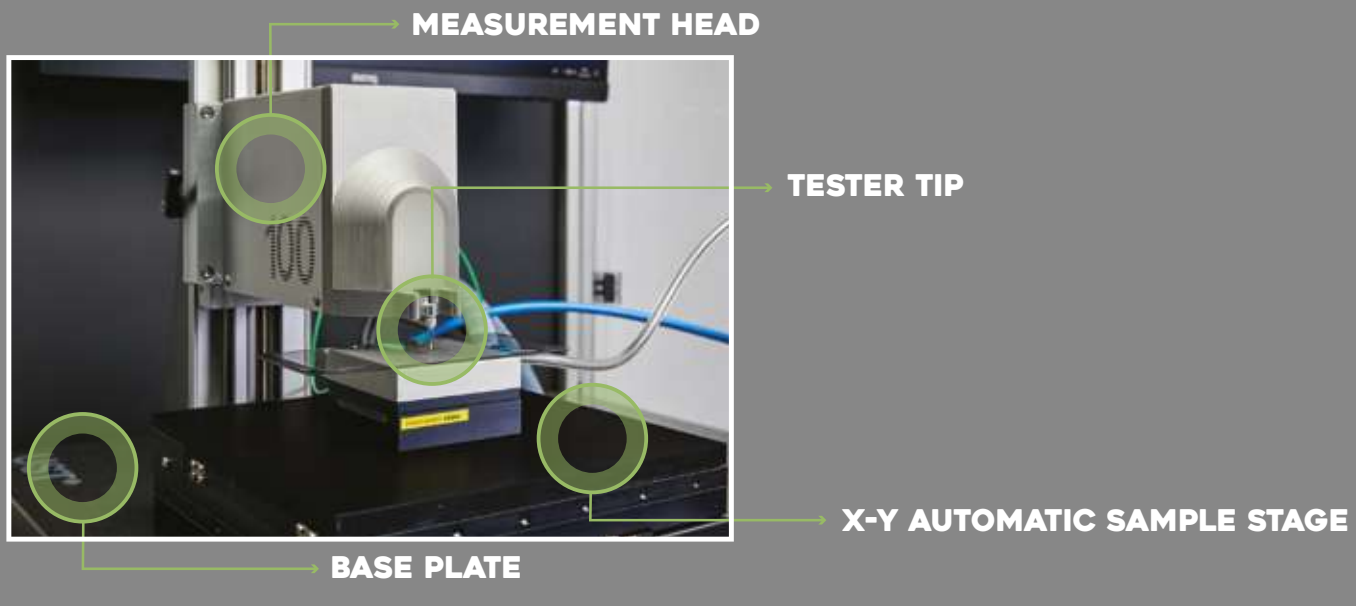
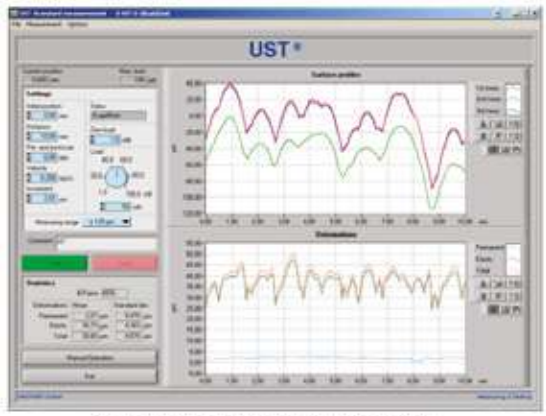
BASIC UNIT

Option 1:
UST® - 100
Load range: 1mN - 100mN

Option 2:
UST® - 1000
Load range: 10mN - 1000mN
(for harder surfaces and coatings)

Option 3:
UST® - 50N
Load range: 2N - 50N





Standard Measurement: 2D Deformation
(total, permanent and elastic deformation)

UST® - Universal Surface Tester includes:

- 2D Deformation Measurement
- Tip check Calibration
- 3 Standard Tips (2 Steel Cones, Ball)
- 1 Big Clamp
- 1 Small Clamp
- Tools
- Screws

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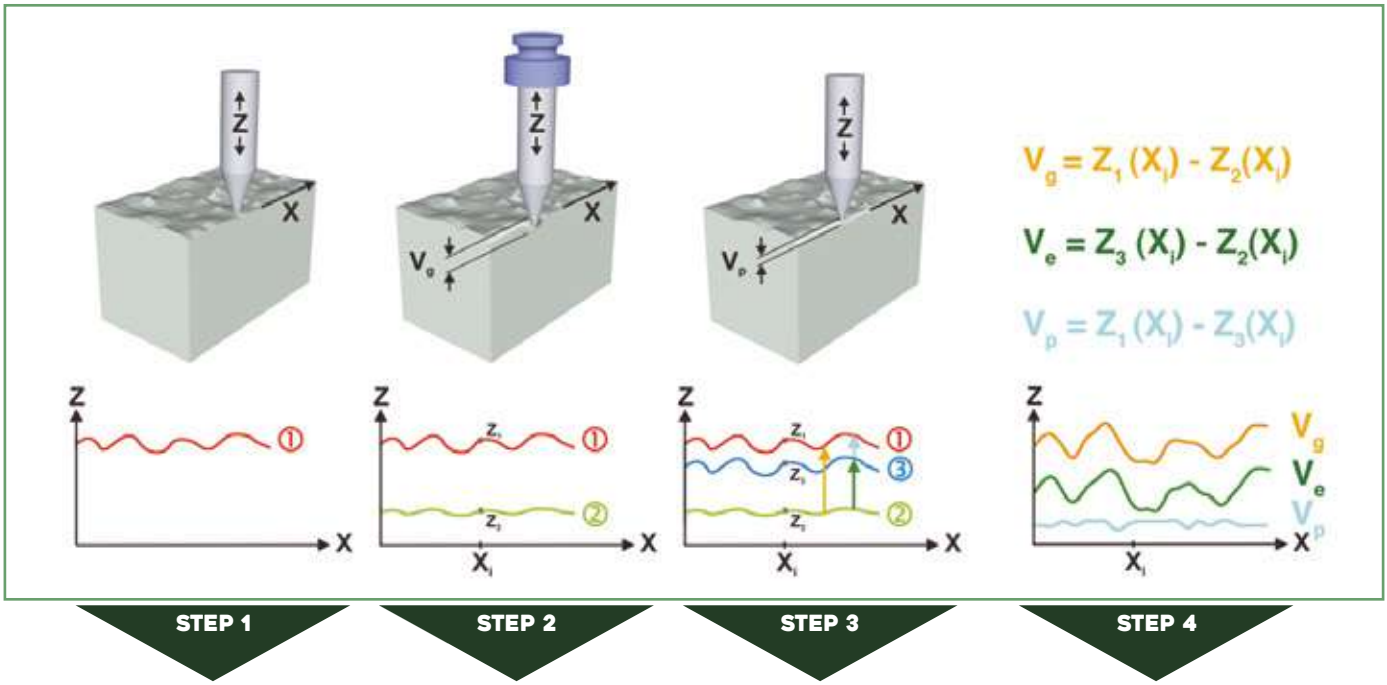
TEST PRINCIPLE OF UST® - WEINHOLD'S METHOD



Step 1 - Scan with no load. Surface structure is continously determined.

Step 2 - Scan on the same path with additional load to determine total deformation.

Step 3 - Scan on the same path with no load to determine the elastic deformation.

Total deformation = Step 1 - Step 2

Elastic deformation = Step 3 - Step 2

Permanent deformation = Step 1 - Step 3

STANDARDS AND SPECIFICATIONS

DIN EN ISO 14577-1 | DIN 4762, 4768 | ISO 4287, 4288

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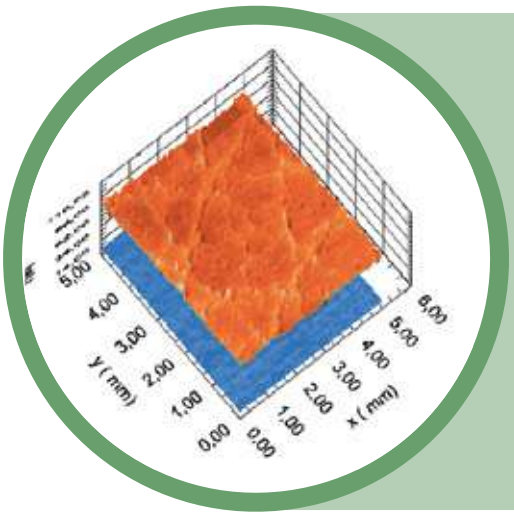
MODULES

A selection of 10 different modules is available for all types of measurements and applications. Each module includes all necessary hardware, software, suggested tip and necessary tools.

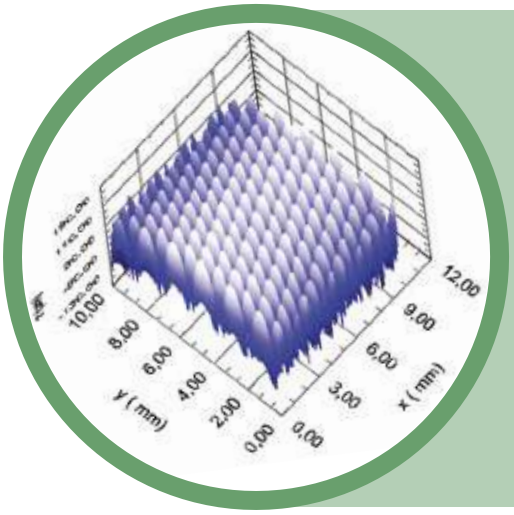


MODULE 1: 3D DEFORMATION

Performs several single scans automatically on an area and registers the 3D deformation properties of a complete surface.

- 3D Deformation

- Tips: Diamond Cone 60°/90°/120°
  Steel Cone 60°



MODULE 2: 3D TOPOGRAPHY

Performs several single scans automatically on an area and registers both: the 3D topography and the material properties of a complete surface.

- 3D Topography
- 3D Roughness
- Particle Mode
- Tips: Diamond Cone 60o | 90o | 120o
  Steel Cone 60o

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MODULE 3: SCRATCH

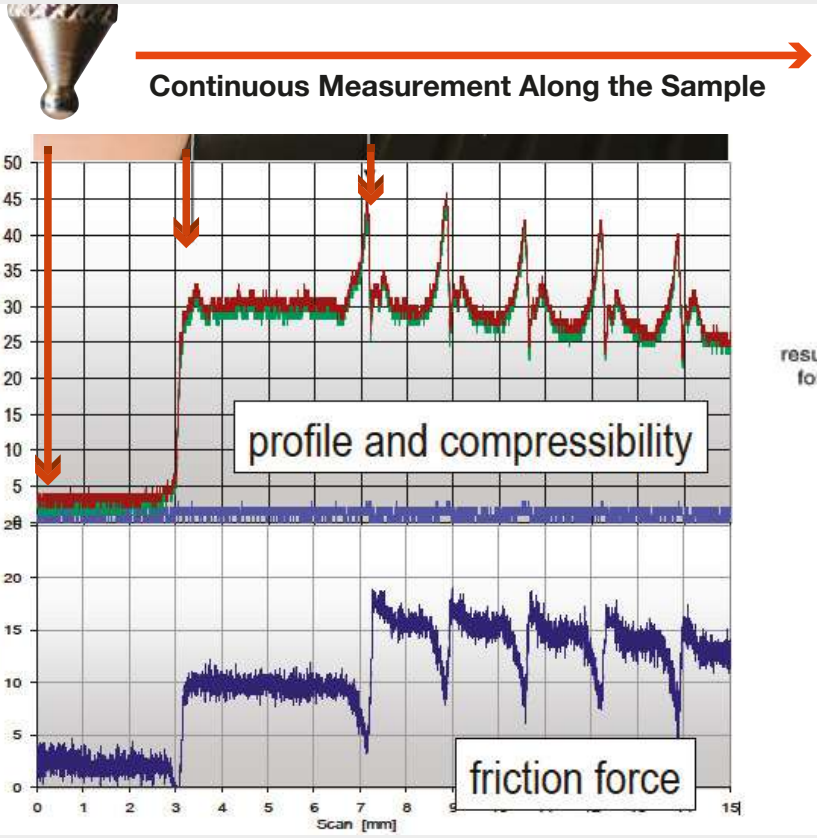
Standard Scratch (Budget Version)

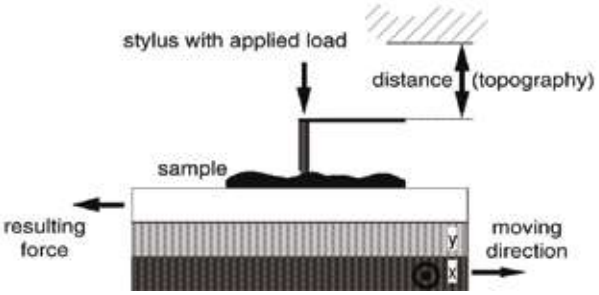
Standard scratch test with local surface profile
Tip: Scratch Diamond 5° undercut

Micro Scratch with Microfriction (Premium Version)

Hardware: - Friction table with high resolution piezo sensor
- Controller card for PC
- Sample fixing and clamping set

Tip: Scratch Diamond 5° undercut





Continuous measurements along one line on a sample made out of three different materials: wood, flat, polymer, polymer with grooves for the correlation of surface profile and microfiction.

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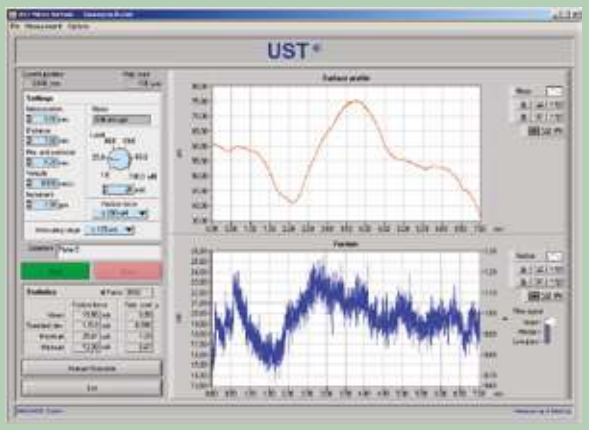
MODULE 4: MICROFICTION (STANDARD)

Measures the friction force between a sample and the tip during a scan with an accuracy in nM.

Hardware: - Friction table with sensor
- Controller card for PC
- Sample fixing and clamping

Micro Fiction + 2D Topography
Micro Fiction + 2D Deformation
Tip: Customized tip on request (e.g. haptical tip)

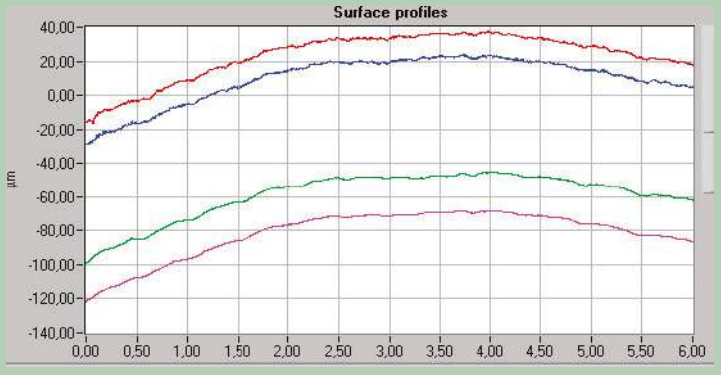


MODULE 5: ABRASION AND WEAR

Measures the abrasion rate with certain load repeating several times.

- Total Abrasion'
- Wear Rate
- Tip: Steel Ball 20mm

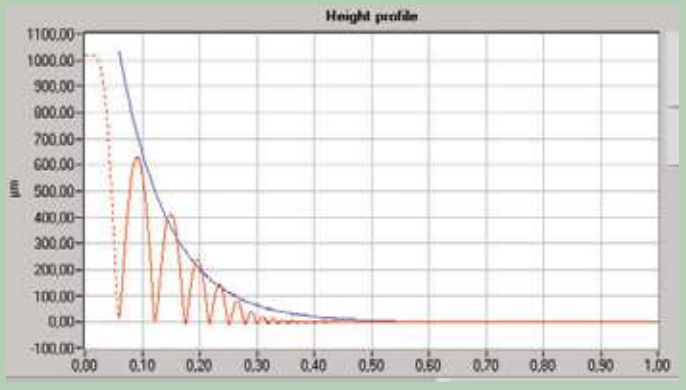
Red Line (1st measurement): surface profile
Blue Line (4th measurement): last measurement
Green Line (2nd measurement): with 1st load
Purple Line (3rd measurement): 50th Abrasion time



MODULE 6: DAMPING

Special measuring mode for examining the elastic behavior of soft materials.

- Surface height profile is continuously recorded.
- Damping Oscilation
- Tip: Papilary stylus or customized tip on request.



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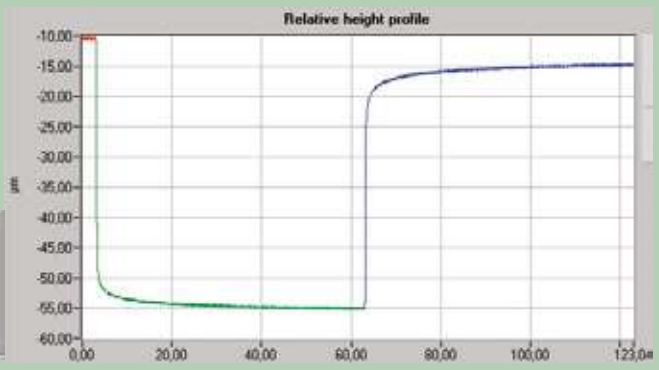
MODULE 7: VISCOELASTICITY (CREEPING & RECOVERY)

- 3-Step Measurement
- Materials reaction under strain and the relief property
- Tip: Customized tip on request

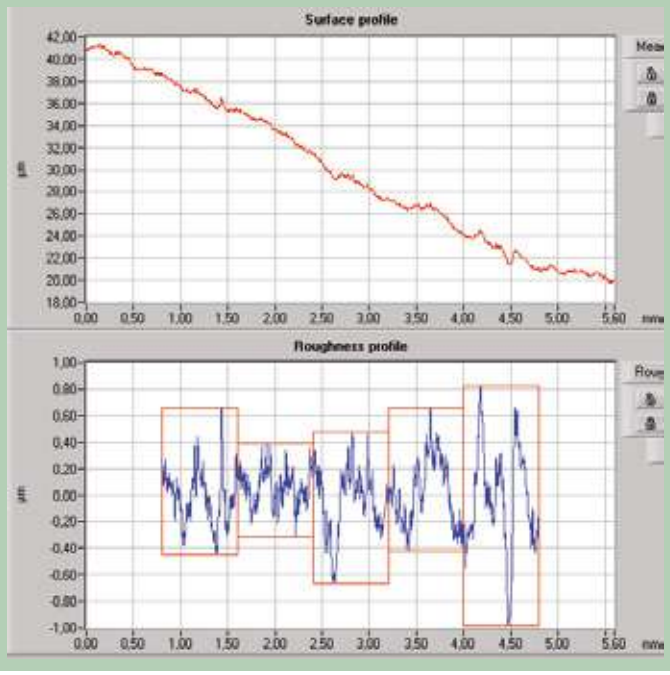


MODULE 8: UNIVERSAL HARDNESS

- According to DIN EN ISO 14577-1
- 2-Step Measurement
- Total Deformation
- Tip: Vickers Diamond | Berkovich-Diamond
  or customized tip on request

MODULE 9: UNIVERSAL HARDNESS

- According to DIN 4762, 4768 | ISO 4287, 4288
- Scan once with a certain load
- Ra, Rq, Rz
- Automatic filter selection
- Tip: Diamond Cone 60° | 90° | 120°
  Steel Cone 60°



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MODULE 10: TAX

High quality measurement module for the evaluation of the abrasive wear resistance on the micro and macro scale.

It is available as a module on **UST®** or provide as a micro-calotester: **TAPERADER®**

HARDWARE OPTIONS

1- Exchangeable Measurement Head: **UST® 100 mN** and **UST® 1000 mN**

2- Microscope: for documentation of the measurement process and results (photo function)

3- Videocamera: for documentation of the measurement process and results (video function)

4- Optical 3D Topography Module: non-tactile optical measurement of 3D topography

5- Vacuum Plate Package: for fixing samples. (Vacuum pump is included)

6- Mini-Clamping Tool Set: fixing tool for harder samples

7- Quick Plates: for easy and quick fixture of samples

UPGRADE OPTIONS

New X-Y automatic sample table and all software are available for upgrade. Please, contact our technical engineer department for detailed information.

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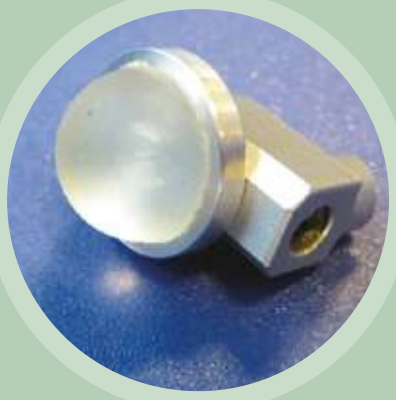
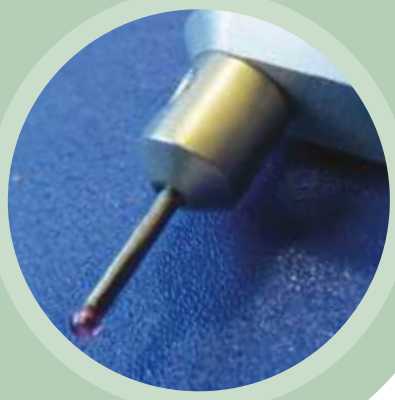
TIP OPTIONS

Steel Tip Groups
Steel ball: 0.8 mm
1.8 mm
5.0 mm
Steel Cibe: 60º

Other Tip Groups
Cutting tool
Aluminum ball 20mm
Table Tenis
Juby | Leather | Papillar

Diamond Tip Groups
Diamond Pyramid 60º
Diamond 60º
Diamond 90º
Diamond 120º





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