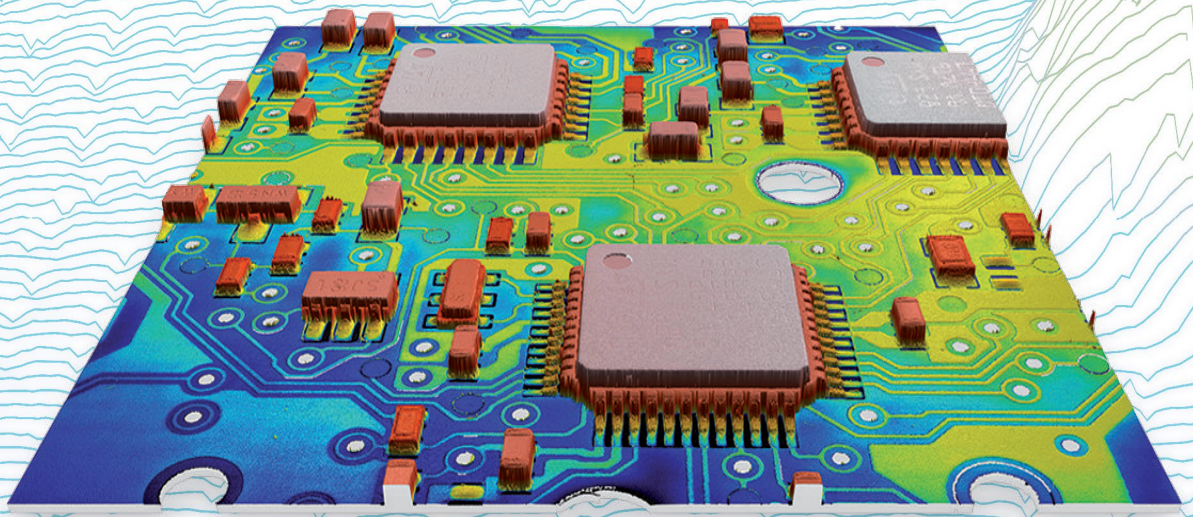
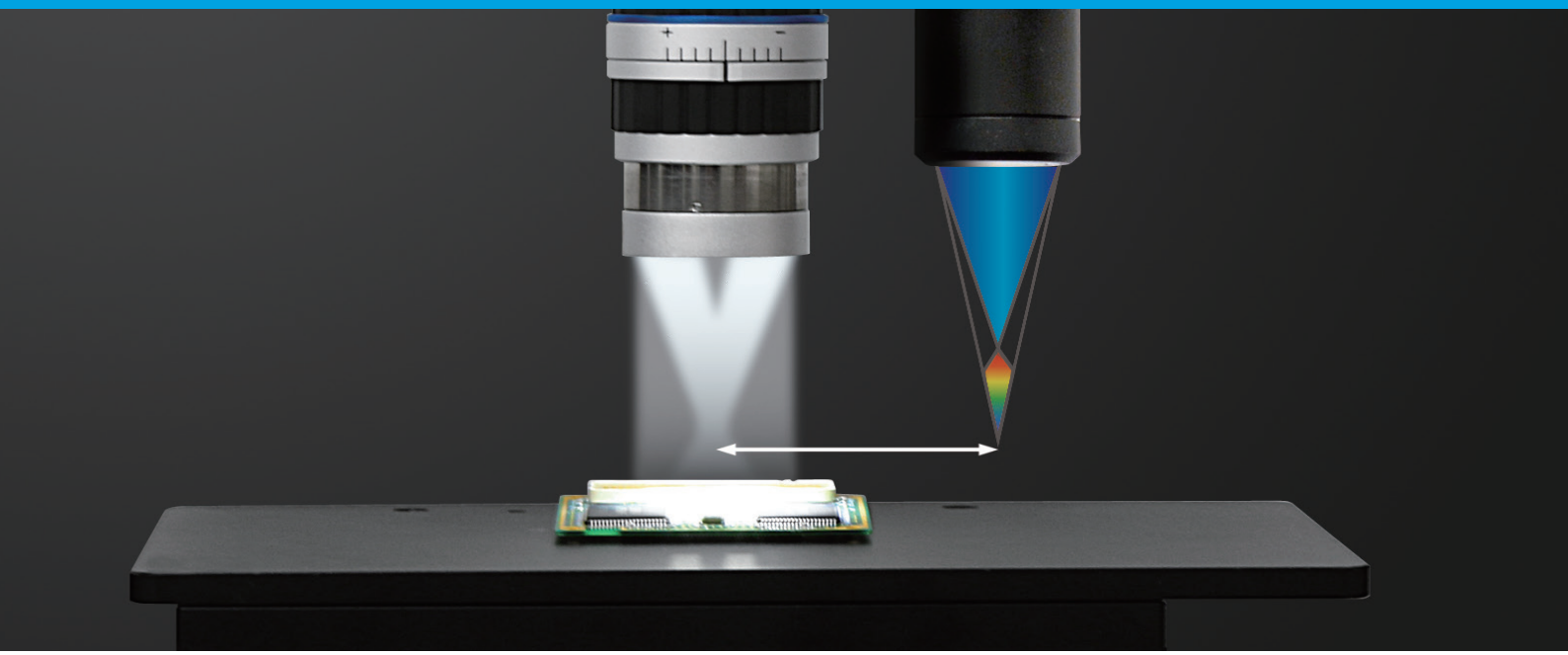
NPS



# *Metrology meets Microscopy*

*Nano Point Scanner | 3D Profilometry*



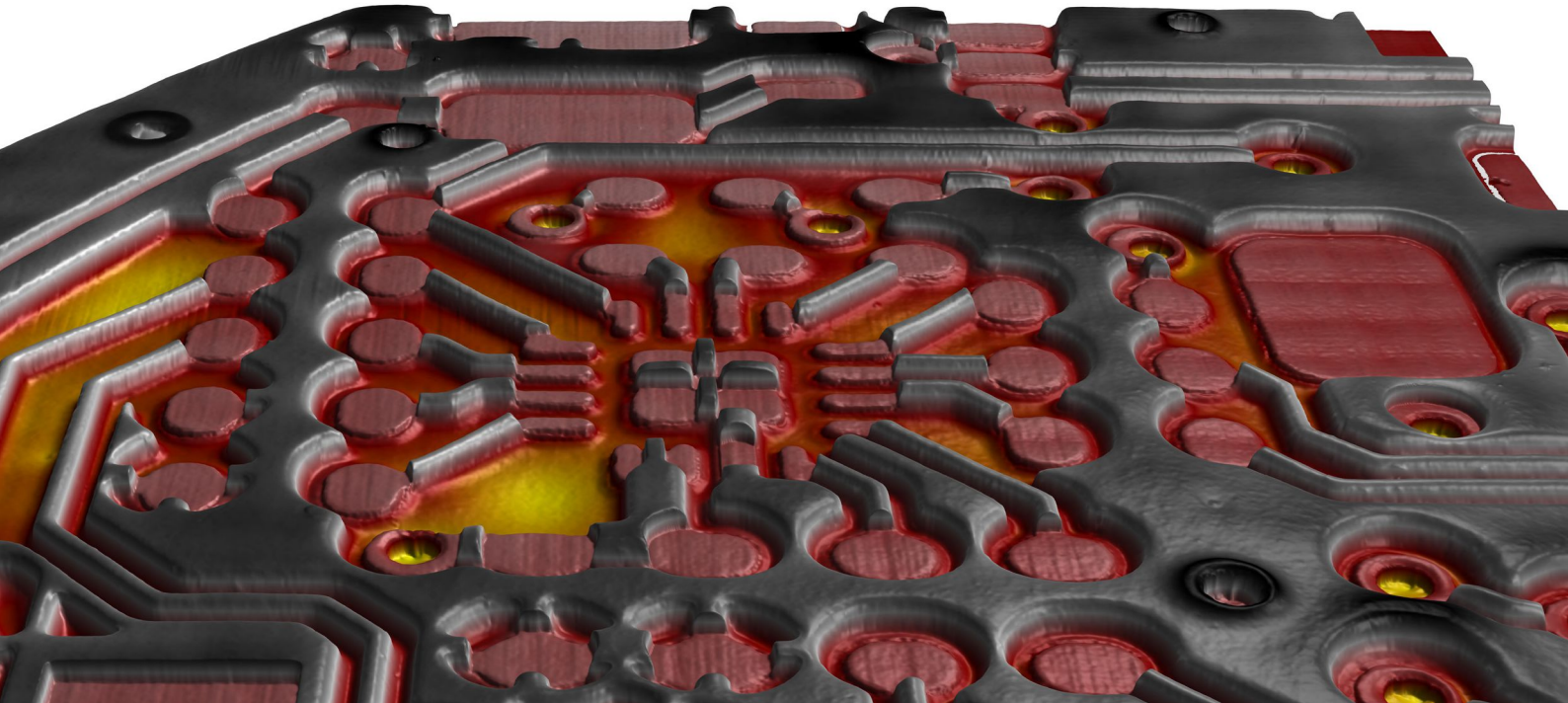
# *Nano Point Scanner + Hirox RH-2000:*

### *NPS White Light Confocal Profilometry*

- Submicron Z Precision
- Ultra Fast Profiling
- ISO Certified Measurement
- Automatization & Reports

### *HIROX 3D Digital Microscopy*

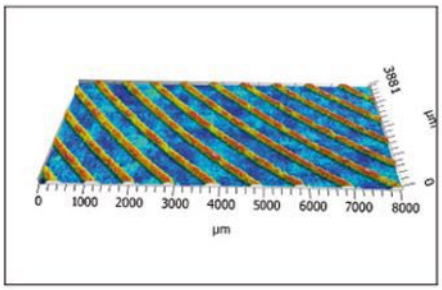
- High Resolution Image Quality
- Ultra Fast 3D Stacking
- Multiple Lighting Possibilities
- Full Flexibility: Sample & Stand



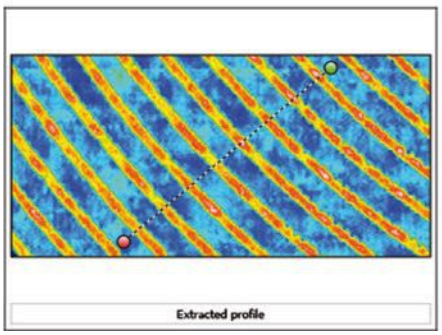
# NPS & Hirox: metrology meets microscopy

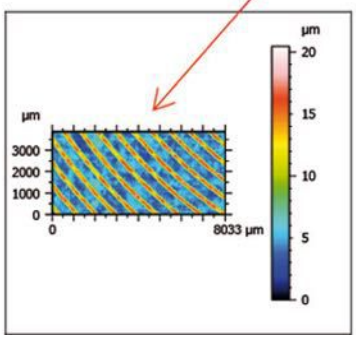

HIROX High Resolution stitching:


3D View NPS




Height Information




Extracted area: fast 3D scan

| Identity card | | |
|---|---|---|
| Duration of the measurement: | 23 m 49 s | |
| **Axis:** | **X** | |
| Length: | 8033 | µm |
| Size: | 919 | points |
| Spacing: | 8.75 | µm |
| **Axis:** | **Y** | |
| Length: | 3881 | µm |
| Size: | 226 | lines |
| Spacing: | 17.2 | µm |
| **Axis:** | **Z** | |
| Max: | 13.0 | µm |

# Introducing the Nano Point Scanner

## Confocal White Light Profilometry

## The NPS Technology

The NPS is an innovative non-contact confocal 3D profilometer measuring altitude in real time, for profile or surface scanning:

1. The white light LED beam is projected through a beamsplitter and a chromatic lens to the surface of the sample

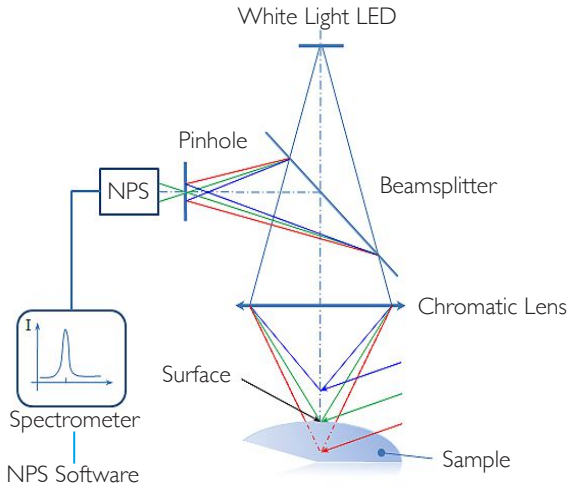
2. The reflected light beam from the sample is filtered in a confocal pinhole, isolating one single wavelength in perfect focus

3. The NPS spectrometer is accurately translating this wavelength into height information and display it visually in the NPS software

4. Up to 2000 height information per second are acquired in real time creating a profile when moving the XY stage

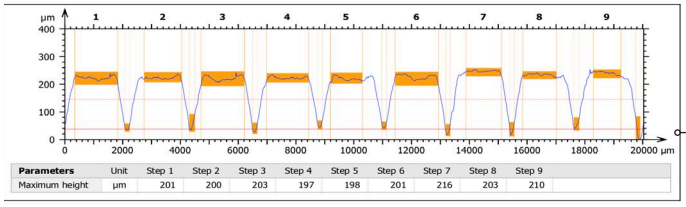
You can select between two modes: **Profile** or **Surface**

## NPS Confocal White Light Sensor



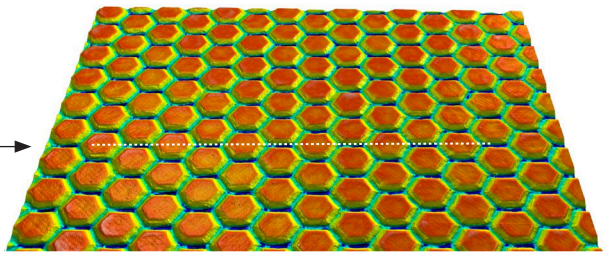

## High Speed Profile (1 axis scan)

By moving the sample with the high precision motorized XY stage in one axis, the NPS acquires a series of focused points at a chosen interval, creating a fast profile: the measurement of height, distance, radius, line roughness (Ra, Rz, Rt,...) and much more can be done within seconds!

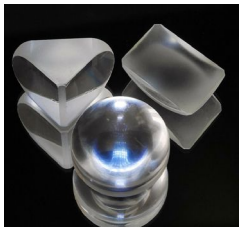



## High Resolution Surface (2 axis scan)

By creating a series of aligned profiles, the NPS acquires XYZ information creating a high resolution 3D surface: volume, surface roughness (Sa, Sz,...), complex shape, 3D waviness and much more can be measured – the duration of the scan is adjusted by the amount of lines, scanning speed and the dimension of the sample!



## Works On Any Type Of Surface



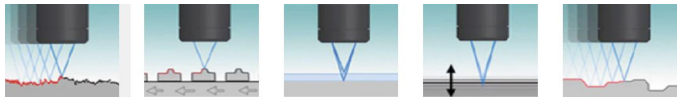
The confocal system generates a sharply focused observation plane. Points located above or below the object surface are completely out of focus, so that the type of material does not matter: the sample can be mirror, shinny, reflective or rough, it can be opaque or completely transparent

## Quality and Standards Compliance - ISO

ISO 25178-602

White light chromatic confocal technology is ISO certified for roughness measurement and is currently used by many companies and research centers all over the world.
The NPS allows high precision XYZ axis measurement beyond the limitation of optical depth of field.

## Wide Range of Measurements



roughness shape thickness height topography

## Unlimited Applications

Aerospace
Automotive
Optical Lens
Watch Makers

Semiconductor
Micro Electronics
Mobile Phone
Displays

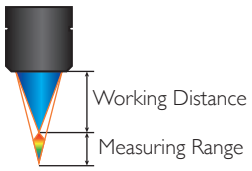
Archeology
Art Restauration
Security Printing
Rasor Blades

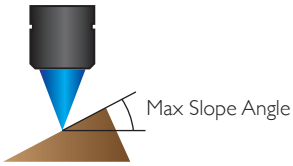
# The NPS Sensors

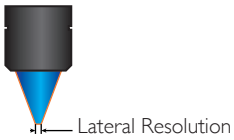
## The right sensors for your requirements

The NPS System provides a wide range of sensors to achieve seamless highly accurate measurement. Depending on your application, you can select the best sensors for your needs: small measuring range for highest accuracy and roughness measurement or large measuring range for tall sample and form measurements.

## NPS Sensors Specifications




| NPS SENSOR | NP1 | NP2 | NP3 | NP4 | NPX [3] |
|---|---|---|---|---|---|
| Measuring Range | 150 µm | 400 µm | 1400 µm | 4000 µm | 1000 µm |
| Working distance | 3.3 mm | 10.8 mm | 12 mm | 16,2 mm | 18,5 mm |
| Max Sample Slope [1] | 42.5° | 28° | 25° | 21° | 44° |
| Lateral Resolution | 1 µm | 1.8 µm | 2.6 µm | 4.6 µm | 4 µm |
| Height Accuracy [2] | 20 nm | 45 nm | 150 nm | 300 nm | 100 nm |
| Suitable for Roughness | OK | OK | OK | | OK |

1. Max Sample Slope on perfect mirror surface
2. Min Z measurement depends on XY stage
3. NPX is not compatible with delta shift on the 100x100 mm stage

## NPS Advantages

*NPX sensor*

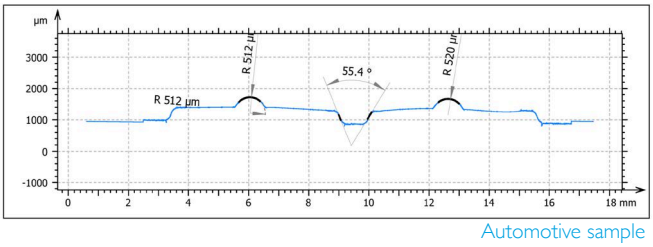
*NP4 sensor*

| RELIABLE | UNIVERSAL | POWERFUL |
|---|---|---|
| ISO CERTIFIED | NON CONTACT | FAST PROFILE |
| HIGH REPEATABILITY | WORKS IN AMBIANT LIGHT | NO STITCHING |
| HIGH RESOLUTION | MIRROR & TRANSPARENT | LARGE AREA 3D |

# Multiple measurement possibilities

By combining high precision measurements with advanced metrology software, the NPS will match all your metrology requierements

## PROFILE & MULTI PROFILE



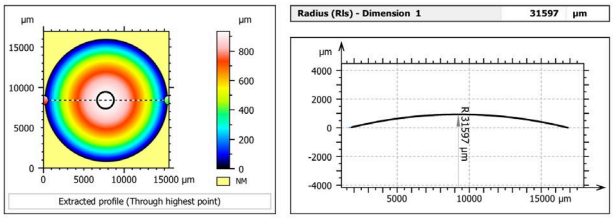

Automotive sample

The fastest way to execute a measurement! After scanning between two points, the NPS will display the profile: you can then adjust the level, measure horizontal & vertical distances as well as Ra, Rz and Rt measurements.

For advanced measurement, select the desired Hirox Map template inside the NPS menu.

With the new programable multi profile function, simply execute several individual profiles combined in one single report.

## SHAPE & FORMS




Optical Lens

Surface shape and geometry can be easily measured: on a spherical object, the measurement results of a curvature can be compared to manufacturing specification for example.

Other shapes such as lines, planes, spheres, cylinders or free-form are typical objects that the NPS can measure: length, height, radius, angle, volume and much more.

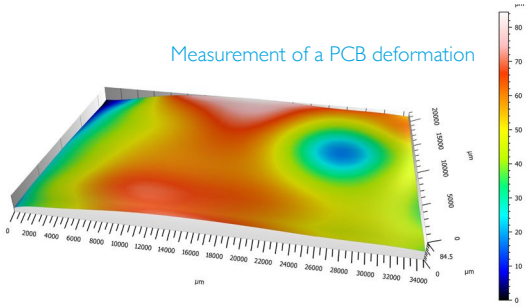
With large measuring ranges up to 4000 micrometer, various shape and forms can be captured and measured.

## FLATNESS, WAVINESS & COPLANARITY

Warp, Deformation, Waviness, or Flatness are easily measured on large areas with the Nano Point Scanner! Thanks to XY stage up to 500x500mm, it's possible to measure defects that can occur from machine or work anomaly, residual stress, vibrations, or heat treatment for example.

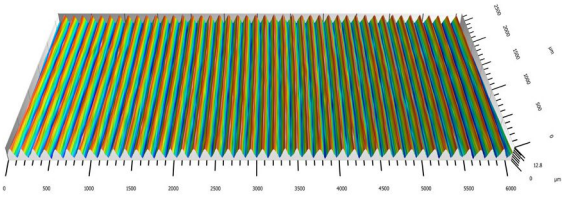
Coplanarity is another parameter that required long distances and high level of Z accuracy. This can be done either thanks to a profile or a surface.

Measurement of a PCB deformation



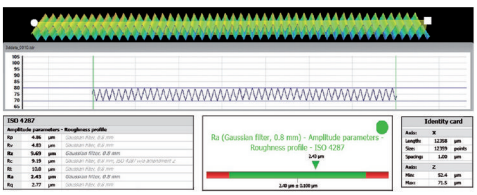
## ROUGHNESS, TEXTURE & DEFECTS

Surface metrology determines surface topography, which is essential for confirming a surface's suitability for its function. Surface measurement includes profile roughness (Ra), surface roughness (Sa), surface texture, asperity and structural characterization.
For manufacturing and design purposes, measurement is critical to ensure that the finished material meets the design specification.



Measurement of Mahr PRN-10 Roughness Standard

- ▸ Distances
- ▸ Volume
- ▸ Roughness
- ▸ Waviness
- ▸ Roundness
- ▸ Topography
- ▸ Flatness
- ▸ Coplanarity
- ▸ Deformation
- ▸ Tribology

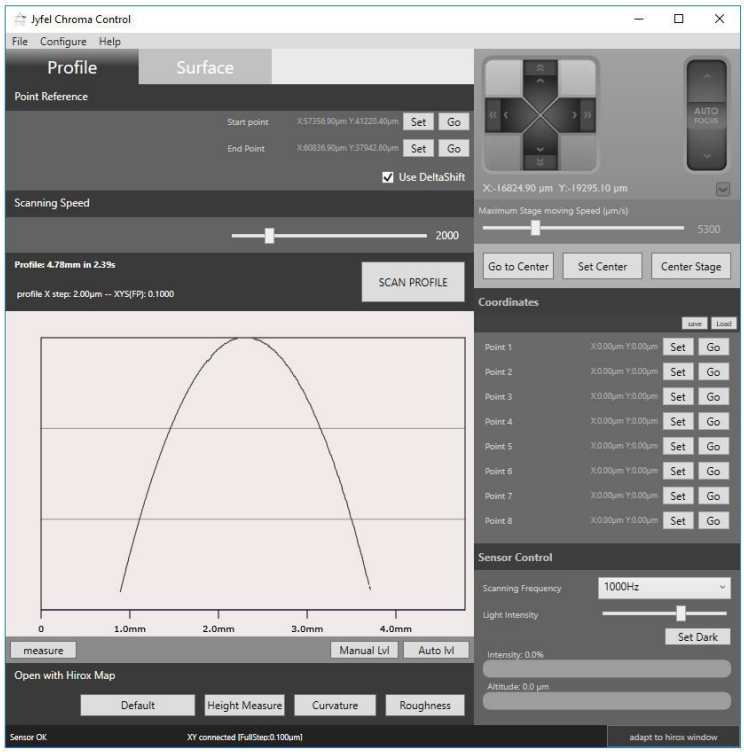


# NPS Interface: fast and easy

A dedicated software to get quickly and easily the best out of white light confocal technology!

## Profile or Surface?

Simply use the high resolution optics from the RH-2000 to do the selection of the points of interest (deltashift function) and let the NPS do the rest: profile, multi profile or surface are just a few clicks away




## Fast Scan!

Select the scanning speed, X and Y steps are displayed, as well as the total scanning area: start the scan!

## Live Display

View the profile or false colour scan displayed in real time during the scan.

## Level & Measure

For fast tests and measurements, use the built-in auto function to adjust the level, then measure height and distances directly within the NPS interface.

## XYZ & Auto Focus

Speed control: fine tune the Hirox XY motorised movement!
Auto Focus: bring your sensor to the center of the measuring range with just one-click!

## Point of Interest

Set, Go and Save:
multiple points of interest can be easily used for Profile, multi-Profile or Surface scans!

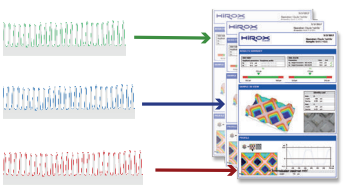
## Sensor Control

Adjust Frenquency and Light intensity according to the reflectivity of your sample and the acqusition speed you wish

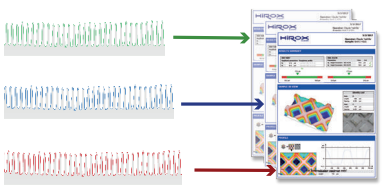
## Easy Measure and Report with Hirox Maps

You can customize up to 4 Templates for profile or surface. Apply them to your sample automatically in one click

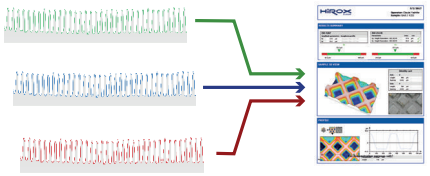
Create your first inspection report and use it as template for similar samples



Scan all your samples and it will generate a report for each sample



Get statisitcs, averages and Fail / Pass of all your samples in one single excel file

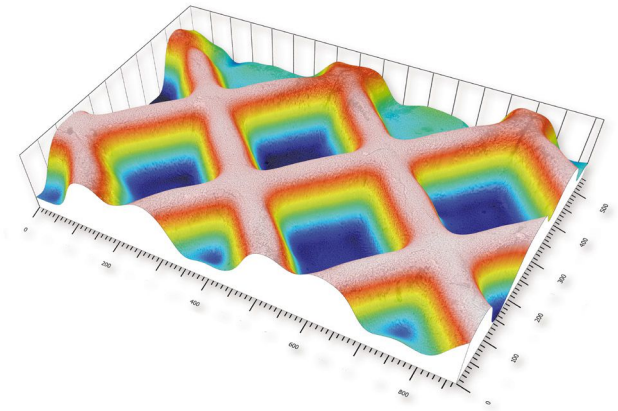


# Hirox Maps - Advanced Metrology software

By combining High precision measurement with Advanced metrology software, the NPS will match all your metrology requierements

## Hirox Maps Mountains Technology!

The Mountains technology is the most advanced metrology solution on the market:
- Real time imaging of 3D surface topography
- 3D surface overlays for fast feature location: height color + intensity images from the NPS combined
- Remove data acquisition and sample artifacts
- Extraction of area, Level correction, Shape Correction
- Full measurement suite on profiles and 3D data with user and process tracability

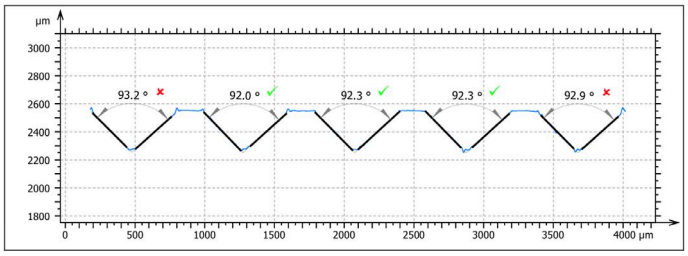


## Powerful & Simple

While many functions involve complex calculations, every effort is made to ensure that accessing and using these functions is as easy as possible.

Also, once a measurement report has been done, all the parameters used can be easily applied to a new sample with tolerance limits showing in green / red.

Every report can then become a measurement template for fast and easy workflow with fail / pass!



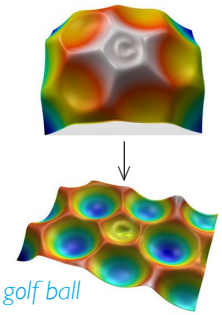

*automatic display of tolerance: angle measurements on a thread*

## ISO & National Metrology Standards

Mountains Map has an installed base of 10,000+ licenses worldwide, supports ISO and national metrology standards.
Mountains Map works in over 10 languages!


## Form Removal & Non Measured Points

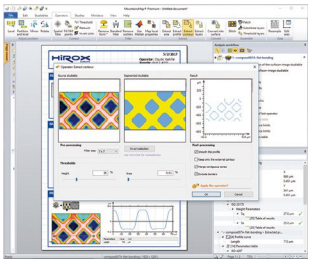
The NPS software always exports unprocessed raw data, which can then be filtered in Hirox Maps. You can for example display or fill the non measured points, but also remove the form to keep only the surface

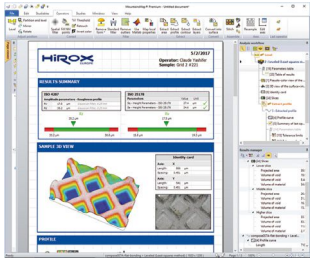


*Form removal of a golf ball*

## Easy Reporting

- Easy integration into lab and production environments - export of all numerical results.
- Easy publication - export analysis documents, pages and individual images up to 1200 dpi.





## Analysis Automation

Powerful automation tools ensure high productivity: series of surface data sets can be analyzed automatically and common sequences of analysis step can be saved for insertion any future analysis document.

Pass/fail criteria can be specified for any parameter and green (pass) / red (fail) «traffic lights» are displayed automatically on the report. Alll the results can be extracted as CSV / Excel format.

# Hybrid Digital Microscopy: NPS & RH-2000

## Optical 3D surface metrology for industry and research

The perfect combination between optical excellence and non contact metrology:
HIROX RH-2000 3D digital microscope with the NPS - universal solution for your application!

### Hirox Optics - High Resolution

**Highest optical power**
from 0,1x up to 10.000x

**Multiple lighting technologies**
BF / DF / POL / DIFF / UV,...

**Patented HIROX rotary head**
360° motorized inspection

### NPS Sensors - High Precision

**Wide measuring range**
from 100µm up to 24.000µm

**Big working distance**
from 3mm up to 25mm

**Various type of measurement**
form, flatness, roughness,...

### Z axis - Ultra Fine Steps

**Motorised Z axis**
30 mm with 50 nm steps

**Additional manual Z**
80 mm manual Z axis

**Special design**
compact or bridge system

### XY axis - High Accuracy

**Wide range of movement**
from 40x40 mm to 500x500 mm

**Special high precision stage**
110x75mm movement

**Small XY steps**
from 0.1 µm

### Delta Shift Function

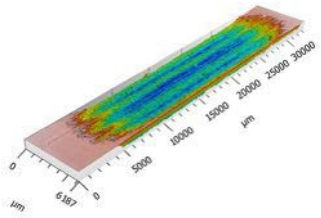
*Hirox 3D mouse:*
*- easy XYZ movement*
*- set start / end / scan*

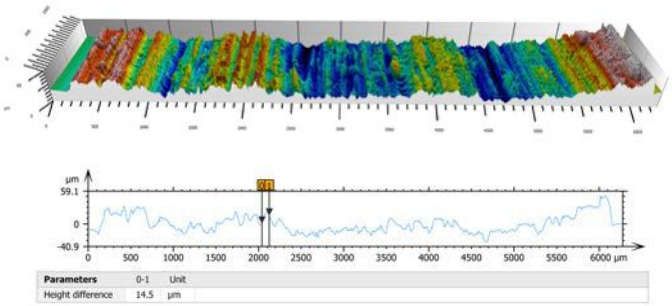
*example of stand 500x500mm XY stage with bridge structure*

# High Precision 3D scans

Research & Development, Process & Production Control, Laboratory and more!

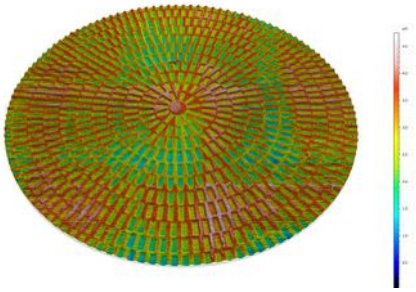
## Tribology

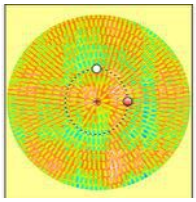


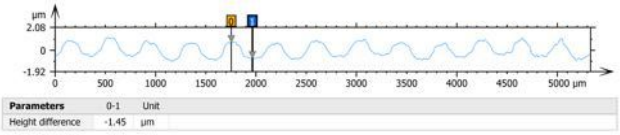


The NPS system revealed complex scratch paterns on a sratch test tribology sample.

## Fresnel Lens

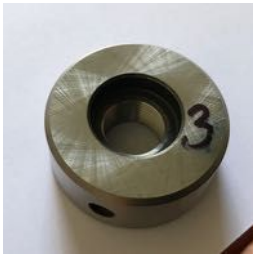




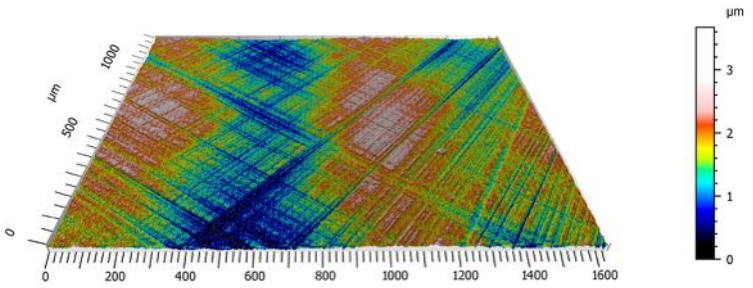


Pattern measurement on a complex lens structure

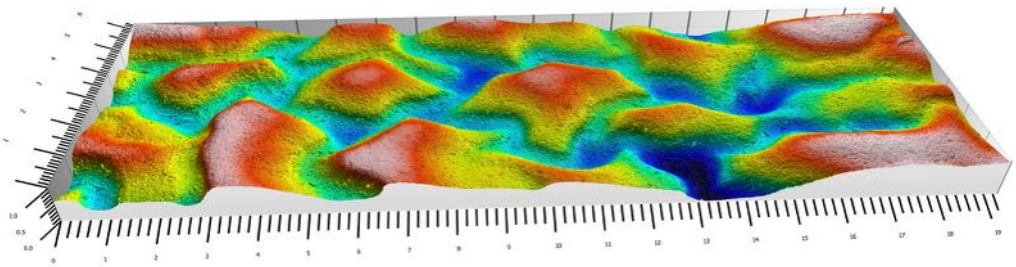
## Scratch Tests



Measurement of submicron scratches on a metal surface

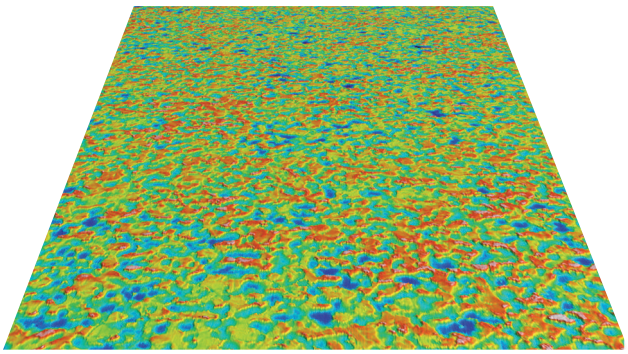


## Atacama Stone

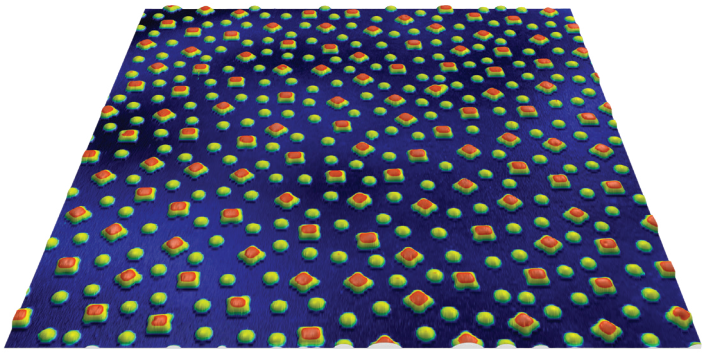


The Atacama stone is a rare artefac due to its complex surface structure. The NPS high accuracy measurement helped the Museum of Natural History in Madrid to visualise better the surface.

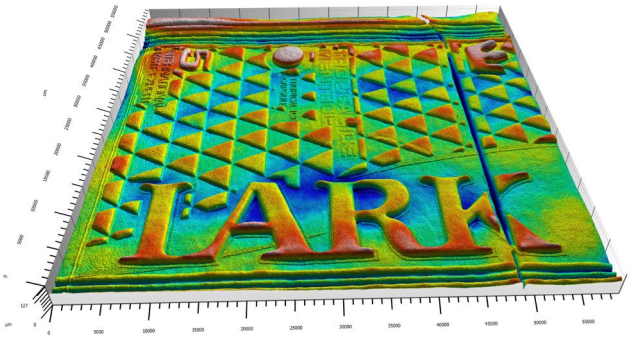
# High Precision 3D scans



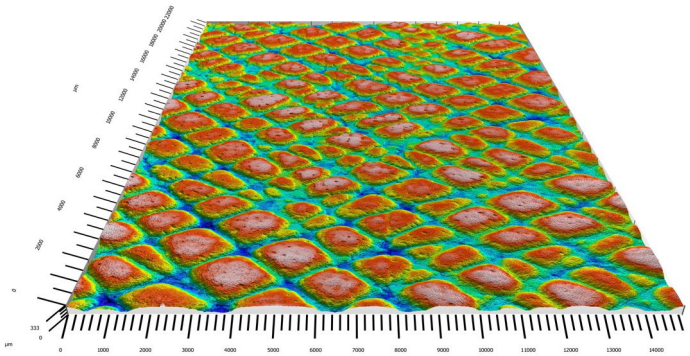
Steel surface



Basketball surface

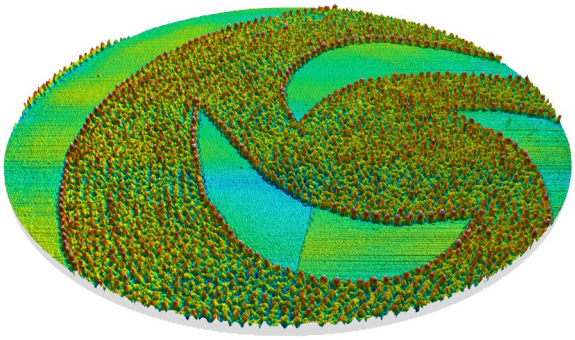



3D packaging

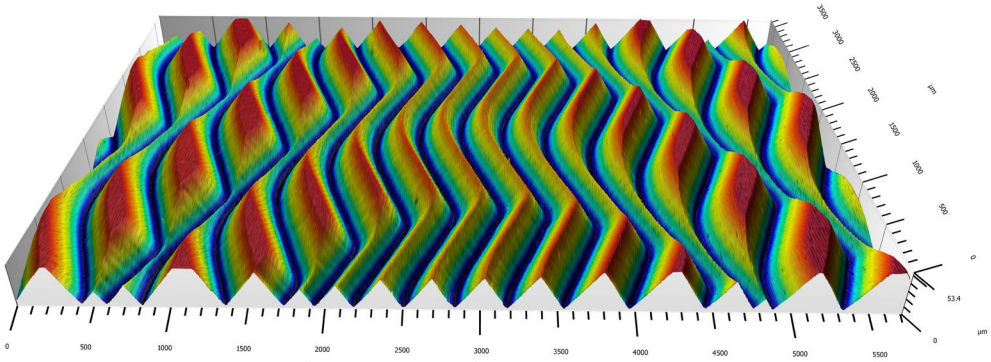


Leather surface


Bullet casing



Shaving Head



Part of a mechanical watch

# System Configuration

*Choose the NPS sensor that fits your application!*
*Choose the Hirox lens that fits your application!*
*Choose the stand that fits your application!*


| MOTORIZED XY STAGE | 110 X 75 | 100 X 100 | 200 X 100 | 500 x 500 | other dimension |
|---|---|---|---|---|---|
| Dimensions | 110mm x 75mm | 100mm x 100mm | 200mm x 100mm | 500mm x 500 mm | on request |
| Step per pulse | 0.05µm | 0.1µm | 0.1µm | 0.2 µm | on request |
| Position Accuracy | 1µm | 1µm | 1µm | 4µm | on request |
| Speed | 5mm/s | 10mm/s | 10mm/s | 10mm/s | on request |
| Max Z Vibration Noise | 100 nm | 200 nm | 200 nm | 500 nm | on request |
| Suitable for Roughness | OK | OK | OK | | on request |

| NPS SENSOR | NP1 | NP2 | NP3 | NP4 | NPX [3] |
|---|---|---|---|---|---|
| Measuring Range | 150 µm | 400 µm | 1400 µm | 4000 µm | 1000 µm |
| Working distance | 3.3 mm | 10.8 mm | 12 mm | 16,2 mm | 18,5 mm |
| Max Sample Slope [1] | 42.5° | 28° | 25° | 21° | 44° |
| Lateral Resolution | 1 µm | 1.8 µm | 2.6 µm | 4.6 µm | 4 µm |
| Height Accuracy [2] | 20 nm | 45 nm | 150 nm | 300 nm | 100 nm |
| Suitable for Roughness | OK | OK | OK | | OK |

1. Max Sample Slope on perfect mirror surface
2. Min Z measurement depends on XY stage
3. NPX is not compatible with delta shift on the 100x100 mm stage

| SOFTWARE | |
|---|---|
| Operating System:<br>Windows 7, Windows 8, Windows 10 | NPS software: Selection of calibrated sensors, Setup of XY stage, Light Intensity & Scanning Frequency, XYZ movement control.<br>Profile mode: Acquisition and live display of profile, height / length measurement, level correction, multi profile, export in Hirox Maps pre defined template including: height, roughness, curvature and default, saving and loading XY coordinates, delta shift function |
| Recommended PC:<br>min i5 6th Gen. min 8GB RAM | Surface mode: Acquisition and live display of profile and height information, export in Hirox Maps pre defined template<br>Hirox Map - Mountains: processing of NPS files for advanced measurement including line and area roughness, volume, shape removal, tolerances with pass/fail display, batch processing, export in STL and other 3D formats, and much more |


## Contact

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