SENSOFAR

METROLOGY

Product Guide

S neox

Five Axis

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Basic features

Description

The S neox Five Axis 3D Optical profiler combines a high-accuracy rotational module with advanced inspection and analysis capabilities. This enables automatic 3D surface measurements at defined positions which are combined to create a complete 3D volumetric measurement. S neox 3D measurement technologies cover a wide range of scales, including form (Ai Focus Variation), sub nanometric roughness (Interferometry) or critical dimensions that require high lateral resolution as well as vertical resolution (Confocal).

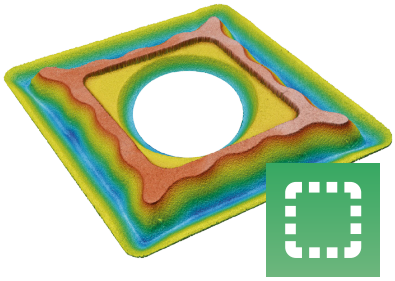
The S neox Five Axis system makes it possible to take automatic 3D surface measurements at defined positions, and combine them to create a complete 3D volumetric measurement or to inspect the surface finish at specific positions around the sample.

Technology

Our systems operate with different optical measurement techniques. Joining these technological benefits, incorporating the latest technology and the software which runs them, results in high-level equipment of maximum competitiveness in the market.

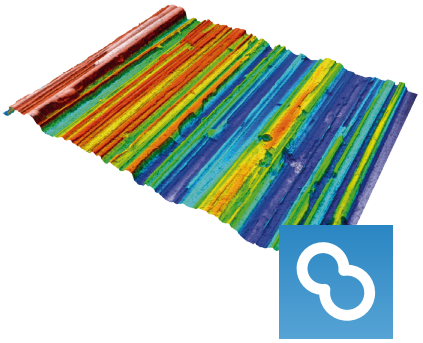
Learn more about Sensofar's technologies >

AI FOCUS VARIATION



Active illumination Focus Variation is an optical technology developed for measuring the shape of large rough surfaces. This technology is based on Sensofar's extensive expertise in the field of combined confocal and interferometric 3D measurements. It is specifically designed to complement confocal measurements at low magnification. It has been improved with active illumination to get a more reliable focus location, even on an optically smooth surface. Highlights of the technology include high slope surfaces (up to 86°), the highest speeds (mm/s), and large vertical range measurements.

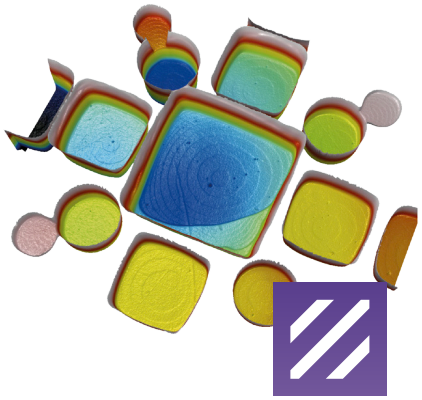
CONFOCAL



Confocal is an optical technology developed to measure the surface height from smooth to very rough surfaces. Confocal profiling provides the highest lateral resolution that an optical profiler can achieve. Thus, spatial sampling can be reduced to 0.01 µm, which is ideal for critical dimension measurements. High NA (0.95) and magnification (150X) objectives are available to measure smooth surfaces with steep local slopes over 70° (for rough surfaces up to 86°). In addition, the proprietary confocal algorithms provide vertical repeatability on the nanometer scale.

Sensofar develops a Continuos Confocal algorithm to acquire in continuous Z axis scan. As a result, acquisition speed is roughly 3X faster than Sensofar's own Confocal approach while maintaining comparable repeatability and accuracy.

INTERFEROMETRY



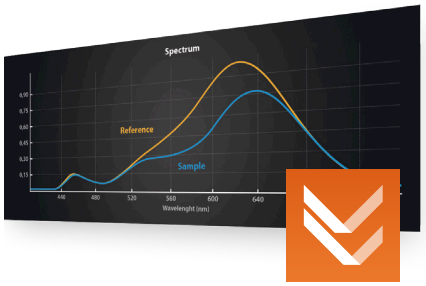
Interferometry has been developed to measure the surface height of very smooth to moderately rough surfaces, achieving the same system noise at any magnification.

- **PSI**: Phase Shift Interferometry has been developed to measure the surface height of very smooth and continuous surfaces with sub-Angstrom resolution, for all numerical apertures (NA). Very low magnifications (2.5X) can be employed to measure large fields of view with the same height resolution.

- **EPSI**: Extended Phase Shift Interferometry combines two interferometric technologies, CSI and PSI, overcoming the limitations of the two by achieving 0.1 nm of measurement noise in a larger range of some hundreds of microns.

- **CSI**: Coherence Scanning Interferometry uses white light to scan the surface height of smooth to moderately rough surfaces, achieving 1 nm height resolution at magnification.

SPECTROSCOPIC REFLECTOMETRY

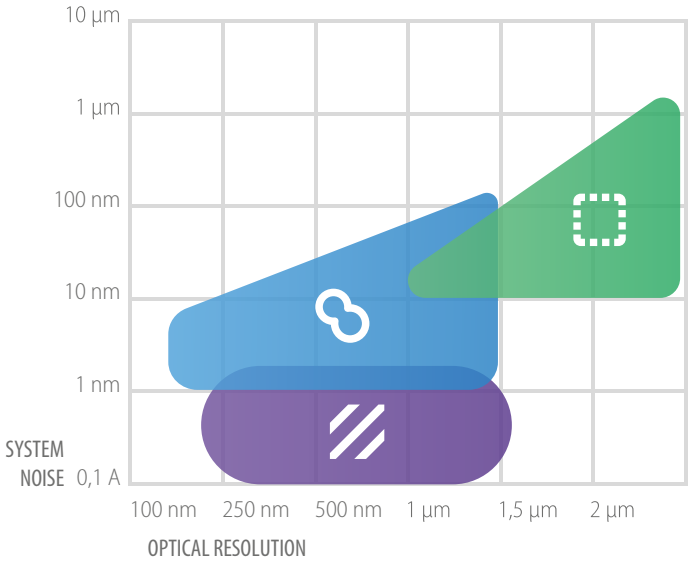


For samples with transparent layers, spectroscopic reflectometry is the key to performing thickness measurements quickly, accurately, and non-destructive.

■ Techniques comparison

	Ai Focus Variation	Confocal	Interferometry
Magnification	High magnifications up to 150X	High magnifications up to 150X	Low magnifications down to 2.5X (large FOVs with Armstrong system noise)
NA	Even NA slopes up to 86º with scattering surfaces can be measured	Very high NA from 50X magnifications allowing measurement of slopes up to 70º for smooth surfaces (86º for rough surfaces)	The highest NA is 0.70 (100X)
System noise	The minimum system noise is 10 nm	High repeatability (low noise) for high NA, from 0.90 NA, the noise is close to 1 nm	High repeatability independently from the NA for PSI down to 0.01 nm and CSI down to 1 nm
Optical resolution	Short wavelength and high NA, lateral resolutions up to 0.44 µm	Short wavelength and high NA, lateral resolutions up to 0.15 µm	Short wavelength, lateral resolutions up to 0.20 µm
Acquisition speed	Speedy acquisition of 200 planes in 3 seconds	Fast acquisition for 20 planes, 3 seconds	Speed does not depend on the magnification
Film thickness	Not applicable	Thick film (several mm) measured with low NA, and thin film (2 µm) measured with high NA. The substrate image coincides with the focus position allowing measurement of the rough substrate	Transparent films from 50 nm to 1.5 µm with reflectometry (10X MR) and thickness measurement from 1.5 µm to 100um in CSI mode

SYSTEM NOISE VS OPTICAL RESOLUTION



Configuration

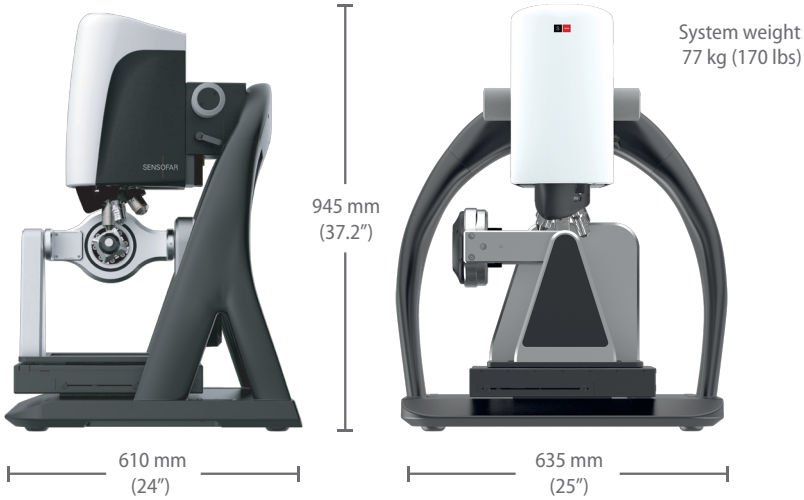
The S neox Five Axis is a modular system with several optional parts. It is composed of a system unit, an electronic controller and a main controller.

■ Hardware options

The sensorhead is mounted on an adjustable column supported by a standard base. The sample is clamped in the rotational module to be placed under the objective. The Five Axis rotational module is installed on the top of a motorized XY stage. A manual tip-tilt is an option on the system unit. Ring light is included in the system by default.

Finally, the system has a Z stage with 40 mm of travel length. Optionally, for highest accuracy and repeatability measurements a PZT vertical scanner with 200 µm travel length is recommended.

■ Mechanical dimensions



Specifications

■ System specifications

Measuring principle	Confocal, PSI, ePSI, CSI, Ai Focus Variation and Thin Film
Observation types	Brightfield, Sequential Color RGB, Confocal, Interferential Phase Contrast
Measurement types	Image, 3D, 3D thickness, profile and coordinates
Camera	5Mpx: 2448x2048 pixels (60 fps)
Total magnification (27") / Display Res.	60X - 21600X / 0.001 nm
Field of view	from 0.018 to 6.7 mm (single shot)
Max. extended measurement area	10x12 (Max. Resolution); 175x175 (Low resolution) (500 Mpx)
Confocal frame rate	60 fps (5Mpx); 180 fps (1.2 Mpx)
Vertical scan range	Vertical scan range-Linear stage: 40 mm; Piezoelectric scanner: 200 µm (Optional)
Max. Z measuring range	PSI 20 µm; CSI 10 mm; Confocal & Ai Focus Variation 34 mm
XY stage range	Motorized: 154x154 mm
LED light sources	Red (630 nm); green (530 nm); blue (460 nm) and white (580 nm; center)
Ring light illumination	Green ring light compatible with 6 position nosepiece
Nosepiece	6 position fully motorized
Sample reflectivity	0.05 % to 100%
Sample weight	Up to 3 Kg
User management rights	Administrator, supervisor, advanced operator, operator
Power	Line Voltage 100-240 V AC; frequency 50/60 Hz single phase
Computer	Latest INTEL processor; 3840x2160 pixels resolution (4K) (27")
Operating system	Microsoft Windows 10, 64 bit
Environment	Temperature 10 ºC to 35 ºC; Humidity <80 % RH; Altitude <2000 m

ROTATIONAL STAGE[1]

Max. measurable diameter	200 mm
Max. clamping diameter[2]	20 mm
Max. workpiece weight	3 kg
Accuracy (A)	5 Arc sec/º
Bidirectional repeatability (A)	10 Arc sec
Resolution (B)	0.5 Arc sec
Straightness error[3]	3.6 µm / 40 mm
Parellelism error[3]	53.9 µm / 40 mm
Flatness error[4]	20 µm

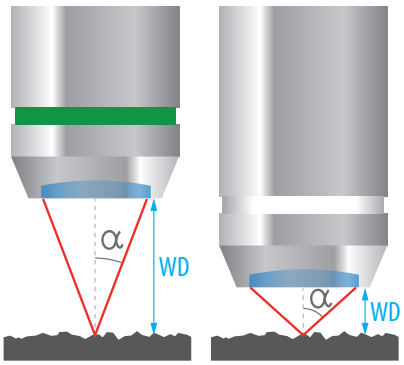
1 All values according to ISO1101 at 20ºC +/- 1º in an anti-vibration environment. **2** ER32 collet holder. **3** St Flatness deviation according to ISO25178-2 taken on a SiC reference flat mirror and 20X objective in Confocal acquisition mode. **4** All values are taken with a 20X objective in Confocal acquisition mode and 40 mm evaluation length.

Objective lenses

The S neox uses premium objective lenses designed to correct for chromatic aberrations and produce sharp, flat, and clear images with high contrast and high resolution. In addition, phase Fresnel lenses improve the operability and the working distance, meaning that S neox lenses provide the most extensive available working distance for each NA.

The S neox also uses objective interferometry lenses. The MC series are based on a Michelson interferometer with an external reference mirror mounted on two tip-tilt screws. The MR series are based on Mirau lenses that create interference internally by dividing the wavefront with a beamsplitter. The MC series are ideal objective lenses for very flat and thin samples due to their low magnification and numerical aperture. The MR series can have up to 0.7 NA.

BASIC PARAMETERS FOR SYSTEM OPERATION

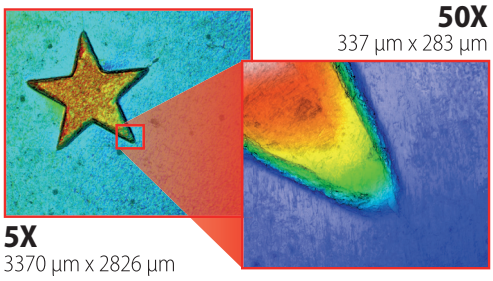


Here are some useful concepts that will help you through the operation of the S neox system. These will help to understand all the product specifications of your optical metrology tool for surface measurement.

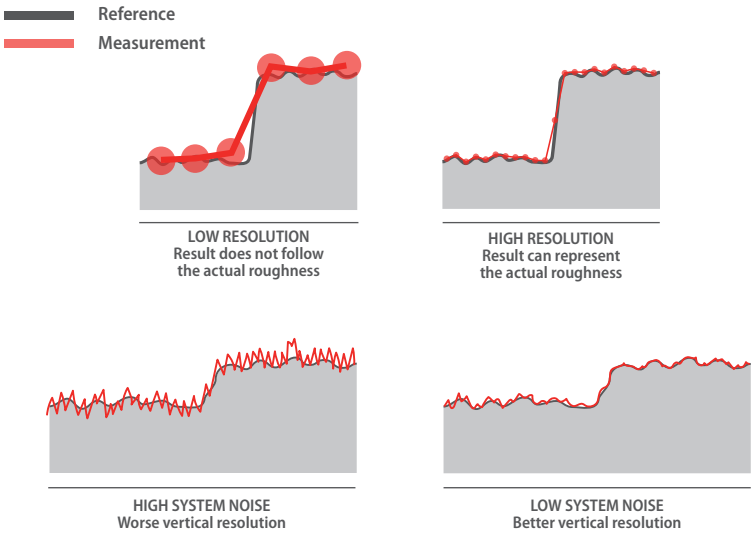
- **Numerical Aperture (NA)**: determines the largest slope angle on the surface that can be measured and affects optical resolution. Its mathematical expression is NA=n·sinα, where n is the index of refraction of the working medium (air, water, or oil) and α is the maximum half-angle of the cone of light that enters or exits the lens.

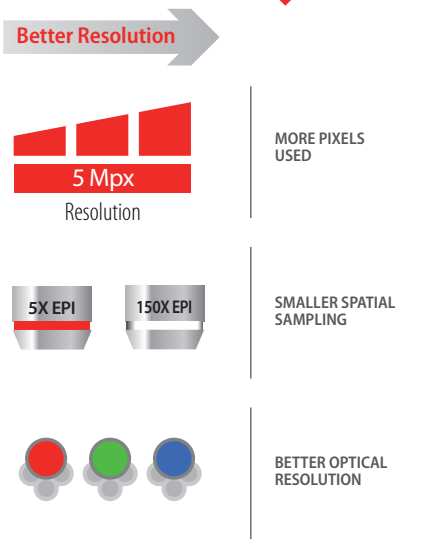
- **Working Distance (WD):** distance is taken from the end of the objective at which the focus plane is found.

- **Field of View (FOV)**: area of the sample that is measured; depends on the magnification.



- **Resolution**: smallest detectable distance between two features of the sample. For 2D images, the lateral resolution depends on: i) the number of used pixels of the camera and ii) the dimensions of the field of view. It can be pixel-size limited (spatial sampling) or optically limited (optical resolution). For the 3D case, the vertical resolution is related to the system noise.





SELECTION GUIDE

The objective lens selection depends on the application, the sample under test, and the 3D optical profiler placement conditions.

S neox uses brightfield and interferometry objective lenses. Therefore, a vibration-isolated environment is required to perform interferometric and confocal measurements at high magnifications. The following table tries to classify the sample under test by its surface finish and geometry to the best technique.

Surface under test description	Optical technique	Objective needed	Description
Smooth surface			
High local slope	Confocal	50X to 150X	High light efficiency and high numerical aperture
Low local slope with few nanometer features (flat samples)	Confocal Interferometry (CSI)	50X to150X 10X to 100X	High repeatability, moderate numerical aperture and low to high magnification
Low local slope and large FOV	Interferometry (ePSI or PSI)	2.5X to 5X	Low magnification and high repeatability
Rough surface			
Large FOV	Confocal Interferometry (CSI)	10X to 20X 10X to 20X	Extended measurements and moderate numerical aperture for low magnification
High local slope with few nanometer features	Confocal	50X to 150X	High numerical aperture and magnification
High aspect ratio	Confocal	10X to 100X SLWD	Low numerical aperture and super long working distance
High local slope	Ai Focus Variation	5X to 20X	Low magnification
Form and shape	Ai Focus Variation	5X to 20X	Low magnification
Transparent layers			
Thin film	Reflectometry	10X	Low magnification
Thick film	Confocal Interferometry (CSI)	5X to 20X 2.5X to 10X	Low magnification for CSI and high NA for confocal

OBJECTIVE LIST

	Magnification	NA	WD (mm)	FOV[1] (µm)	Spatial Sampling[2] (µm)	Optical Resolution[3] Green (µm)	Optical Resolution Blue (µm)	Optical Resolution Red (µm)	Optical Resolution White (µm)	Maximum Slope[4] (º)	System noise[5] (nm)
Brightfield	**2.5X EPI**	0.075	6.50	6756 x 5652	2.76	2.16	1.87	2.57	-	4	300
	5X EPI	0.15	23.50	3378 x 2826	1.38	1.08	0.94	1.29	-	9	100
	10X EPI	0.30	17.50	1689 x 1413	0.69	0.54	0.47	0.64	-	17	30
	10X SLWD	0.20	37.00	1689 x 1413	0.69	0.81	0.70	0.96	-	12	50
	20X EPI	0.45	4.50	845 x 707	0.34	0.36	0.31	0.43	-	27	8
	20X EPI	0.60	3.00	845 x 707	0.32	0.27	0.23	0.32	-	37	6
	20X ELWD	0.40	19.00	845 x 707	0.34	0.41	0.35	0.48	-	24	10
	20X SLWD	0.30	30.00	845 x 707	0.34	0.54	0.47	0.64	-	17	20
	50X EPI	0.80	1.00	338 x 283	0.13	0.20	0.18	0.24	-	53	4
	50X EPI	0.80	2.00	338 x 283	0.13	0.20	0.18	0.24	-	53	4
	50X EPI	0.95	0.35	338 x 283	0.13	0.17	0.15	0.20	-	72	3
	50X ELWD	0.60	11.00	338 x 283	0.13	0.27	0.23	0.32	-	37	5
	50X SLWD	0.40	22.00	338 x 283	0.13	0.41	0.35	0.48	-	24	15
	100X EPI	0.90	1.00	169 x 141	0.07	0.18	0.16	0.21	-	64	3
	100X EPI	0.90	2.00	169 x 141	0.07	0.18	0.16	0.21	-	64	3
	100X EPI	0.95	0.32	169 x 141	0.07	0.17	0.15	0.20	-	72	2
	100X ELWD	0.80	4.50	169 x 141	0.07	0.20	0.18	0.24	-	53	3
	100X SLWD	0.60	10.00	169 x 141	0.07	0.27	0.23	0.32	-	37	12
	150X EPI	0.90	1.50	113 x 94	0.05	0.18	0.16	0.21	-	64	2
	150X EPI	0.95	0.20	113 x 94	0.05	0.17	0.15	0.20	-	72	1

1 Maximum field of view with 3/2" camera and 0.5X optics.

2 Pixel size on the surface.

3 L&S: Line and Space, half of the diffraction limit according to the Rayleigh criterion. Spatial sampling could limit the optical resolution for interferometric objectives.

4 On smooth surfaces, up to 71º. On scattering surfaces, up to 86º.

5 System noise is measured as the difference between two consecutive measures on a calibration mirror placed perpendicular to the optical axis. For interferometry objectives, PSI, 10 phase averages with vibration isolation activated. The 0.01 nm is achieved with a Piezo stage scanner and temperature-controlled room. Values for green LED (white LED for CSI). Resolution HD. Values obtained in a VC-E vibration environment.

	Magnification	NA	WD (mm)	FOV[1] (µm)	Spatial Sampling[2] (µm)	Optical Resolution[3] Green (µm)	Optical Resolution Blue (µm)	Optical Resolution Red (µm)	Optical Resolution White (µm)	Maximum Slope[4] (º)	System noise[5] (nm)
Interferometry	**2.5X TI[6]**	0.075	10.30	6756 x 5652	2.76	2.16	1.87	2.57	2.34	4	PSI/ePSI 0.1 nm (0.01 nm with PZT) CSI 1 nm
	5X MC	0.14	13.00	3378 x 2826	1.38	1.15	1.00	1.37	1.25	8	
	10X MC[7]	0.10	25.00	1689 x 1413	0.69	1.62	1.40	1.92	1.75	6	
	10X MR	0.28	8.00	1689 x 1413	0.69	0.58	0.50	0.69	0.63	16	
	20X MC[7]	0.10	16.70	845 x 707	0.34	1.62	1.40	1.92	1.75	6	
	20X MR	0.38	6.00	845 x 707	0.34	0.43	0.37	0.51	0.46	22	
	50X MR	0.50	3.60	338 x 283	0.13	0.32	0.28	0.38	0.35	30	
	100X MR	0.70	2.00	169 x 141	0.07	0.23	0.20	0.27	0.25	44	

1 Maximum field of view with 3/2" camera and 0.5X optics.

2 Pixel size on the surface.

3 L&S: Line and Space, half of the diffraction limit according to the Rayleigh criterion. Spatial sampling could limit the optical resolution for interferometric objectives.

4 On smooth surfaces, up to 71º. On scattering surfaces, up to 86º.

5 System noise is measured as the difference between two consecutive measures on a calibration mirror placed perpendicular to the optical axis. For interferometry objectives, PSI, 10 phase averages with vibration isolation activated. The 0.01 nm is achieved with a Piezo stage scanner and temperature-controlled room. Values for green LED (white LED for CSI). Resolution HD. Values obtained in a VC-E vibration environment.

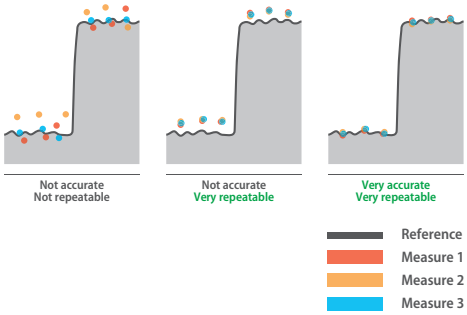
6 The objective comes with an adapter that makes it compatible with the nosepiece. The nosepiece is encoded but not motorized with the 2.5XTI in the turret. System is no longer parfocal.

7 Not parfocal.

Accuracy and repeatability

The following brief descriptions of statistical concepts are applied to metrology and will help you understand the performance specifications according to NPL (National Physical Laboratory).

- **Uncertainty**: generic term for the quantification of doubt in a measured value. It is shown as an expanded uncertainty U.
- **Precision**: dispersion of a number of measurements when repeated. More often called repeatability, quantified by the standard deviation σ.
- **Accuracy**: qualitative term describing the closeness of a measured value to the true value. Low values of U and σ concerning the measured value provide highly accurate systems.



Standard	Value (nm)	Piezoelectric scanner[1] U , σ	Linear scanner [1] U , σ	Technique
Step height	48600	U = 300 nm σ = 10 nm	U = 300 nm σ = 35 nm	Confocal & CSI
	7616	U = 79 nm σ = 5 nm	U = 70 nm σ = 12 nm	Confocal & CSI
	941.6	U = 7 nm σ = 1 nm	U = 14 nm σ = 4 nm	Confocal & CSI
	186	U = 4 nm σ = 0.4 nm	U = 4 nm σ = 1 nm	Confocal & CSI
	44.3	U = 0.5 nm σ = 0.1 nm	U = 0.5 nm σ = 0.15 nm	PSI
	10.8	U = 0.5 nm σ = 0.05 nm	U = 0.5 nm σ = 0.15 nm	PSI
Areal roughness (Sa)[2]	0.79	U = 0.04 µm σ = 0.0005 µm	U = 0.03 µm σ = 0.002 µm	Confocal, AiFV & CSI
Profile roughness (Sa)[3]	2.40	U = 0.03 µm σ = 0.002 µm	U = 0.025 µm σ = 0.004 µm	Confocal, AiFV & CSI
	0.88	U = 0.015 µm σ = 0.0005 µm	U = 0.015 µm σ = 0.004 µm	Confocal, AiFV & CSI
	0.23	U = 0.005 µm σ = 0.0002 µm	U = 0.01 µm σ = 0.001 µm	Confocal, AiFV & CSI

1 Values obtained in a VC-E vibration environment. Objective used for Confocal and Ai Focus Variation 50X 0.80 NA and for CSI and PSI 50X 0.50 NA. Resolution 1220x1024 pixels. Uncertainty (U) according to ISO/IEC guide 98-3:2008 GUM:1995, K=1,96 (level of confidence 95%). σ according to 25 measures.

2 Area of 1x1 mm.

3 Profile of 4 mm length.

Standard configuration

System

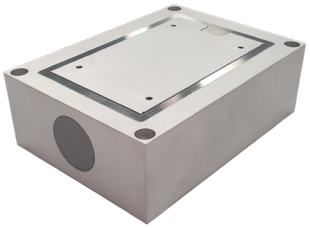
S neox Five Axis uses microdisplay technology to be able to acquire in Ai Focus Variation, Confocal and Interferometry modes.

The standard configuration includes:

- Sensorhead
  - Four high-power LEDs integrated into the light source (RGB & white)
  - A Hi-Res CMOS camera with 2448x2048 pixels (5Mpx)
  - A Z stage with 40 mm of travel length
  - A 6-position motorized nosepiece
  - Ring light pack
- Postioning stage
  - 2-axis rotational module
  - Flat holder
  - Motorized XY stage 154x154 mm (6x6")
- High stand
- Main controller
- 4K monitor of 3840 x 2160 pixels (27")
- Electronic controller
- Joystick
- Emergency stop
- Calibration pack

Options for sensorhead are as follows:

- Piezo: the PZT scanner z-axis is optional for S neox. This scanning device has a total travel length up to 200 µm with piezo resistive sensors for high position resolution of 0.7 nm and 1 nm of accuracy on the full travel range. It improves the interferential measurements with repeatability down to 0.01 nm.



PN SSN090FA00 | S neox Five Axis 3D Optical Profiler

PN SSN090FAP00 | S neox Five Axis 3D Optical Profiler w/Piezo

Rotational module

The Five Axis rotational stage is made up of a high-precision motorized rotation axis with 360º endless rotation, 1 arc sec positioning repeatability and a motorized tilt axis, -30º to 110º, 1 arc min positioning repeatability, with limit switch. It is equipped with a System3R clamping system.

PN UPG5AXIS090 | S neox Five Axis Upgrade Kit

For users with an S neox looking to upgrade to the capabilities of the S neox Five Axis, please note that this product number only includes the rotational module and the SensoFIVE acquisition software. It does not include calibration specimens, holders, the XY stage, or the stand compatible with this setup. Before making this purchase, please contact sales@sensofar.com to ensure you have all the necessary components for the upgrade.

Main controller and Monitor

The main controller set an HP computer (latest INTEL processor) with Windows® 10 64-bit, a high-resolution display of 3840x2160 pixels (27"), keyboard and mouse.

PN PR001541SV | HP computer Sneox Five Axis

Main controller features	
	HP Workstation Z1 MT G8
Operating system	Windows® 10 Enterprise LTSC 64-bit
Processor	Intel® Core™ i7-11700 (3.20 GHz, 8 cores)
RAM Memory	32 Gb DDR4
Hard Drive	256 GB SSD PCIe® NVMe™ 1 Tb SATA (7200 rpm)
Graphics	NVIDIA® GeForce RTX™ 3070 (dedicated 8 GB GDDR6)
Network	Intel® I219LM GbE LOM
Dimensions (W x H x D)	15.4 x 37 x 36.5 cm // 6.06 x 14.56 x 14.37 in
Weight	5.95 Kg // 13.11 lb
Power Supply	500 W 92% efficient, wide-ranging, active PFC

Monitor features	
	LG 27UL500
Dimensions (W x H x D)	62.2 x 45.9 x 20.8 cm - 24.5 x 18.1 x 8.2 in
Weight	5.13 Kg - 11.31 lb
Power Supply	29.5 W

XY Stage

Motorized XY stage optimized for 2D and 3D measurement. The user can center the sample by using a 3D external joystick (included) or the virtual joystick of the software. Travel range of 154x154 mm (6x6"). This stage allows measured extended measurements, the system automatically moves the sample and measures contiguous fields of view, stitching the results and getting larger measurements areas. Metric accuracy of 0.15 µm and unidirectional repeatability of ±0.7 µm. Maximum load capacity up to 20 kg (44 lbs). Sample plate with rotator to center the sample more easily is optional.

PN XYH10509000 | Motorized 154x154 mm (6x6") XY stage

Joystick

The joystick enables you to easily navigate digital models or camera positions in 3D space. Simply push, pull, twist or tilt the mouse controller cap to pan, zoom and rotate your model precisely and intuitively.

It features programmable function keys for access to application commands such as: Autofocus, Image view, Autolight, etc.

PN PR000724SV | Space Mouse

Ring light pack

Ring light is based on an LED ring for illuminating samples in a uniform and efficient manner. It is mounted above and around the objective, the ring light provides more signal for both Confocal and Ai Focus Variation techniques. Out of the box, this new illumination option is controlled through the SensoFIVE user interface to deliver white light to the sample. There are two ring light models: one for 5X and 10X magnification and another for 2.5X and 20X magnification. The ring light pack includes two ring lights, controller and cabling.

The appropriate objective lenses are shown on the side of the light where the connector is attached. In addition, the light is designed to be placed fully over the objective. There is a mechanical stop at the appropriate position, so when you put it on, it is pushed all the way onto the objective. This ensures proper illumination at the focal plane.

PN RLN09001 | S neox Ring Light

Emergency stop

Emergency stop function and emergency switching off function button.

PN PR001638 | Emergency Stop

Calibration pack

The calibration pack is composed of a reference mirror and a calibration specimen. These two are attached to a specific fixture and this, in turn, is attached to the flat holder.

A reference mirror of high surface finish quality (lambda/10) is included. It is used to calibrate the brightfield and interferometry lenses.

PN ESPJCAL20 | 2 inch calibration mirror

Calibration specimen designed to calibrate Ai Focus Variation and Confocal Continuous techniques. The nominal roughness is Sa 0.80 µm. The engraved area size is 20x20 mm.

PN PR001417 | Calibration specimen

The calibration rod is a gage made of wear-resistant, hardened, multi-aged, ground and lapped steel under DIN 2269. Manufacturing tolerance is ±1.0 µm.

The standard configuration of the S neox Five Axis comes with a 5 mm diameter rod.

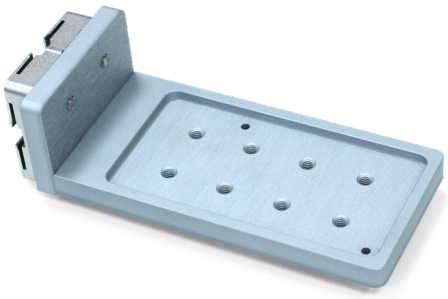
PN PR001484 | 5Axis Calibration Rod

Optional parts

Holders and Collets

In the rotational module there is a System 3R chuck where two holders, one for flat samples and the other for rotational ones, can be attached. Fifteen collets by Rego-Fix are included in a separate box to attach them to the rotational collet holder.

FLAT HOLDER



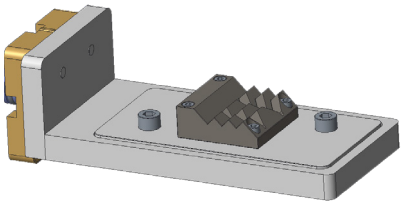
This holder is for flat samples. Surface measurements can be taken as in a regular S neox. There is a 2x4 array of M6 tapped holes. The distance between holes is 25 mm. The Flat holder is included in the standard configuration of the system.

Flat holder	
Max. sample weight	3 kg (6.6 lbs)
Max. sample dimensions	117 x 60 mm (4.6 x 2.36 in)
Sample material	Solid surfaces
Sample preparation	None

PN HOLD3RFLAT00 | Flat sample holder (System3R Chuck)

Insert holder

The insert holder helps position this kind of cutting tools. In this way, the insert remains ideally placed for correct measurement. The insert holder can only be installed on the flat holder.



PN PR001667 | Insert holder for flat holder

ROTATIONAL COLLET HOLDER

The Rego-Fix ER is a cylindrical collet holder. A run-out of 10 µm is assured with the set ER16 and ER32, and 30 µm with the ER25.

Rotational Collet holder	
Max. sample weight	3 kg (6.6 lbs)
Max. sample lenght	150 mm (5.9 in)
Sample material	Solid surfaces
Sample preparation	None

A sets of precision collets made by Rego-Fix are included with each rotational holder.

Collets box	
Shank clamping range	1 - 20 mm
Tolerance	1 mm
Runout (TIR)	5 µm

PN HOLD3RER1100 | Collet chuck & collet set ER11 1-7mm

PN HOLD3RER1600 | Collet chuck & collet set ER16 1-10mm

PN HOLD3RER2500 | Collet chuck & collet set ER25 1-16mm

PN HOLD3RER3200 | Collet chuck & collet set ER32 2-20mm

Besides, there are two 3-jaw chuck holders that work with samples diameters from 0 to 32 mm and from 0 to 44 mm.

PN HOLD3R3J2000 | 3-Jaw Chuck 0-32mm

PN HOLD3R3J3000 | 3-Jaw Chuck 0-44mm

■ Tip-tilt

A manual tip-tilt stage is used to balance the tilt of the surface under measurement. It allows the surface to be placed perpendicular to the optical axis. It is of great benefit when taking interferometric measurements, as it places the surface at a position called null fringes. It is placed over the XY stage.

PN 5AXISTIPTILT090 | Tip-tilt stage for H105 XY stage

Sample supports

Samples must be held by both the flat holder and rotation collet holder but a rotary plate can be used by removing the rotational module.

PN RPH105 | Rotary plate for 154x154 mm XY stage

Basemounts

When the S neox Five Axis is used in a vibration environment, it is required to isolate the vibrations. The active vibration-isolation table is an intelligent device that actively senses the vibration and compensates for it by using fast actuators.

ACTIVE VIBRATION ISOLATION SUPPORT

The AVIT 5 is a state-of-the-art active benchtop vibration isolation system. Aside from its low-profile carbon design, the AVIT 5 has expanded application capabilities. The main features are the automated transport locking mode and fully automatic load adjustment, making handling extremely straightforward. The control technology is based on piezoelectric-type acceleration pickup, fast signal processing, and electro-dynamic force transducers. Isolation starts at 0.6 Hz, effectively isolating disturbing vibrations. Active isolation in all six degrees of freedom. The dimensions are 600x600x92 mm, and the maximum load capacity is 105 Kg (232 lbs). Smooth top surface.

PN TAB25 | AVIT5 Active vibration isolation

Calibration standard

Optional calibration standard can be used to check the accuracy of the system, as well as to calibrate the step height measurement. All calibration standards are made with monocrystalline silicon. There are several step heights available from a few nm to some tens of microns.

STEP HEIGHT

Step height standards designed to calibrate and check the accuracy of the systems. The nominal step height is 20 µm. The chip size is 16 mm x 16 mm. To improve handling, the standards are mounted on borosilicate glass measuring 50 x 50 mm as substrate and are stored in a membrane box. It is certificated by Sensofar or by CEM (the national metrology institute of Spain) .

PN PR001820 | Step height 1 µm (Sensofar traceable)

PN PR001820C | Step height 1 µm (CEM traceable)

PN PR001001 | Step height 10 µm (Sensofar traceable)

PN PR001001C | Step height 10 µm (CEM traceable)

PN PR001741 | Step height 20 µm (Sensofar traceable)

PN PR001741C | Step height 20 µm (CEM traceable)

PN PR001749 | Step height 50 µm (Sensofar traceable)

PN PR001749C | Step height 50 µm (CEM traceable)

LATERAL CALIBRATION STANDARD

The lateral calibration standard is manufactured with anti-reflective chromium on soda-lime glass using highly accurate semiconductor manufacturing equipment. The overall scale extends over 150 mm with 0.01 mm increments with all labeling in mm. The ruler is designed to be viewed from either side as the markings are both right-reading and mirror images. The overall size is 25 x 180 x 3 mm thick. They are ideal for measuring magnification simultaneously in X and Y directions or to determine image distortions such as skew, pincushion, barreling or other non-linearities. The measurement uncertainty (accuracy) is ± 0.5 µm over 0-10 mm and ± 2.5 µm over the entire 150 mm length as measured by the NPL (National Physical Laboratory). The standard is offered as a certified reference material (a traceable standard), recertification is recommended in 5-year intervals.

PN PR001149 | Lateral calibration standard (NPL traceable)

ROUGHNESS STANDARD

Areal roughness standard with typical roughness of Sa 790 nm. This traceable high precision areal standard, is designed to calibrate the metrological characteristics of areal surface topography measuring instruments. It is calibrated by NPL.

PN PR001641 | Roughness standard 790nm NPL calibrated

CERTIFIED CALIBRATION RODS

Set of 5 calibration rods from 1 to 5 mm certified by Tekniker.

PN PR001687 | Five calibration rods 1-5 mm with certificate (Tekniker)

Software

SensoFIVE

SensoFIVE is a 64-bit software that runs the S neox Five Axis, controlling the hardware in the Five Axis module and managing data acquisition. This includes its XYZ, rotation and elevation movements, light sources, and measurement techniques.

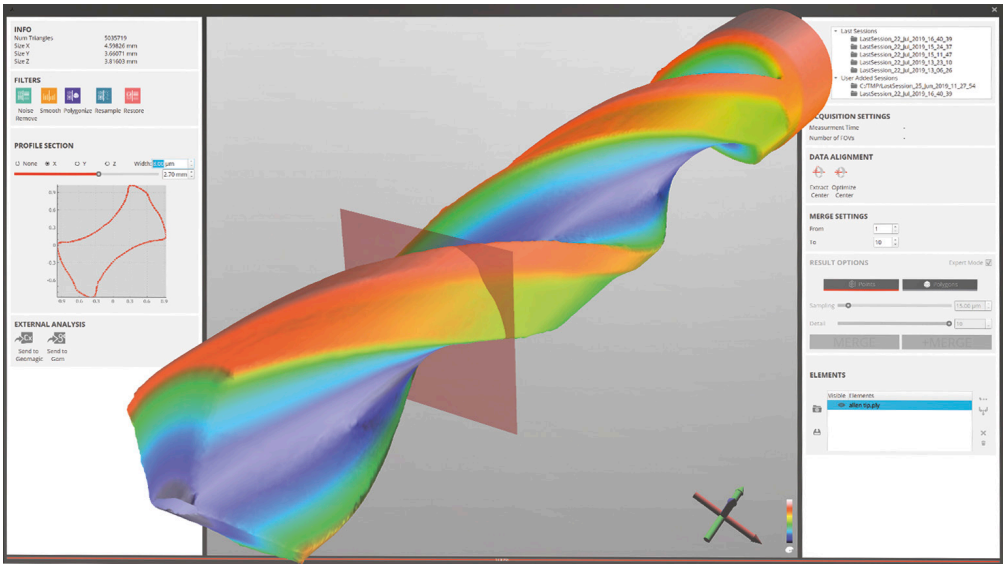
SensoFIVE has two main parts: the interface for equipment control (visible below) and the "Merge Window," another part of the software that facilitates the visualization and manipulation of complete 3D measurements. To build a 3D measurement, the Five Axis takes a series of topographies assembled to form the final shape. The individual topographies can be visualized and analyzed on SensoVIEW, while the 3D measurements are displayed through the Merge Window.

SensoFIVE's acquisition part provides an interface with which any measurement can easily be taken:

- The system is automatically optimized depending on the measurement technique selected (Confocal, Interferometry, or Ai Focus Variation).

- Type of measurement: Image, 3D, 3D auto, profiles, and coordinates.
- Sample viewing is very accessible and flexible with all live image options.
- Type of observations: Brightfield, Sequential Color RGB, Confocal, Interferential Phase Contrast.
- The user can adjust several acquisition parameters to best suit the intended measurement. To optimize the acquisition for varying 3D surfaces, SensoFIVE allows for the configuration of autofocus settings to reduce the acquisition time, using HDR (High Dynamic Range) algorithms to improve the illumination of complex 3D structures or selecting from different Z-scan options.
- SensoFIVE's acquisition interface enables the control of the rotational and elevational module, providing various measurement options.
  - Discrete topographical measurements in different XYZ, elevation, and rotation coordinates. Those positions can be saved in what is known as 5MRs (Five Axis Measurement Recipes), which make the automation of roughness measurements on shaped specimens possible.
  - 3D data taken at different rotation angles. This option adds a new dimension to the sample image, enhancing our understanding of its three-dimensional form.

For full 3D measurements, the "Merge Window" displays data which offers the chance to:

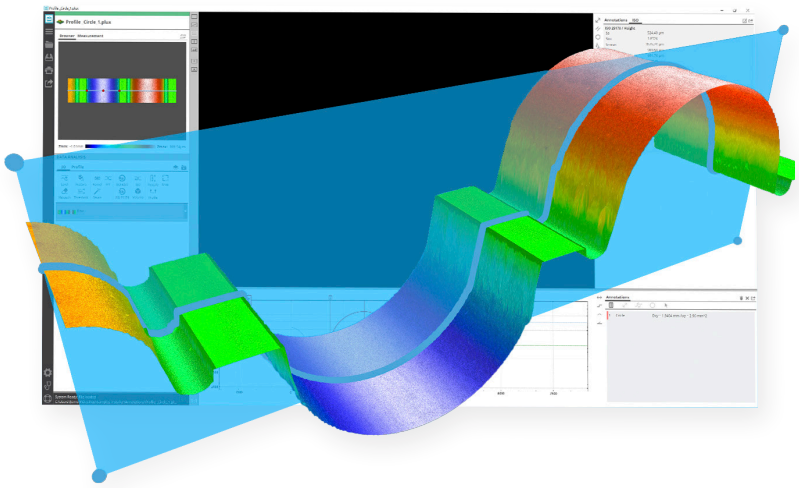


- Set the merging options like sampling, prefiltering (noise removal, smoothing), and the result type (point cloud or mesh).
- Apply filters (restore, resample, smooth, remove noise) for refining merged data.

- Use the Unroll option to extract a cylindrical shape from the 3D measurement, generating a topography for further analysis in tools like SensoVIEW.
- Include another 3D measurement, display different measurements together, and merge for a final measurement with complete information.
- Choose the output data format: STL, IGS, STEP, or PLY.
- Export data to 3D analysis tools (Geomagic, Gom, Polyworks, SensoMAP).

SensoVIEW

SensoVIEW is an ideal software for a broad range of analysis tasks. The system comes with a fully functional license of SensoVIEW and can be installed in as many computers as you want to review, measure and report.



Main tasks are:

- 3D (isometric) and 2D (contour, profile, histogram & bearing curve) interactive views providing multiple scaling, display & render options.
- A comprehensive suite of operators and filters to retouch data points, restore non-measureable data, form removal (plane, sphere or polynomial), apply a range of filers (thresholding, smart, kernel, ISO, FFT and rescale) and/or generate alternative layer by cropping, subtracting, retouching, rotating or extracting profile for examination and analysis.
- Calculation of shape and roughness parameters. A complete selection of ISO 25178 3D areal surface texture parameters: height, spatial, hybrid, functional and volumetric.
- 3D measurement of points, distances, radius and angles with automatic edge detection of circles and lines.
- 2D measurements of distance, step height, radius and angle with smart fitting.
- Analysis templates and customized reports.
- Export JPG, TXT, TIFF, STL, Normal Map.

PN SENSOVIEW | SensoVIEW

Optional Softwares

Geomagic® Wrap

Geomagic Wrap delivers the most easy-to-use, affordable, fast, accurate path from point clouds to 3D polygonal and surface models that can be used instantly in downstream engineering, manufacturing, engineering, art, industrial design and more. As part of your 3D digital thread, Geomagic Wrap provides the digital bridge to allow you to create perfect data to use directly in 3D printing, milling, archiving and multiple other 3D uses. Features:

- Unroll geometry: Complex cylindrically-wrapped geometery can now be flattened for better analysis.
- Dimension tools: fundamental measuring tools to improve fast analysis of scanned parts.

PN GEOMAGICWRAP00 | Geomagic Wrap w/ 1st Year Maintenance

After the first year it is optional to renew the maintenance yearly. This allows the customer access to updates, new versions and technical support.

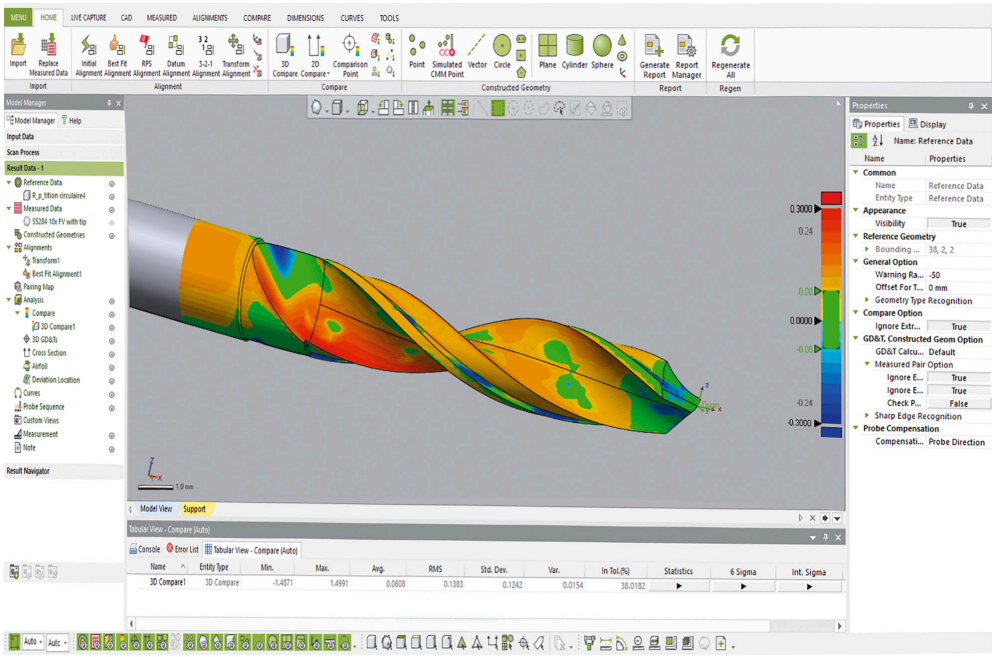
PN GEOMAGICWRAPREN | Geomagic Wrap Maintenance Renewal

Geomagic® Control X

Geomagic Control X is a comprehensive metrology software platform that delivers the industry's most powerful tools within straightforward workflows. Features:

- Scan Processing Automation: scan registration, merging, clean-up, and other pre-inspection processes can now be designed and automated within Geomagic Control X.
- Deviation Location: with Geomagic Control X 2018 you can analyze the size, shape and location of deviation groups.

- Airfoil Analysis: whether you are working on turbines, blisks, blings or blades, Geomagic Control X 2018 provides a fast and intuitive way to gather profile measurements.
- Multi-Alignment Inspection: the new Multi-Alignment Inspection capability allows you to create repeatable inspection routines that require measurement in different alignment environments.
- Custom Reporting.
- Enhanced UI/UX.
- Enhanced Scanning and Import Capabilities.

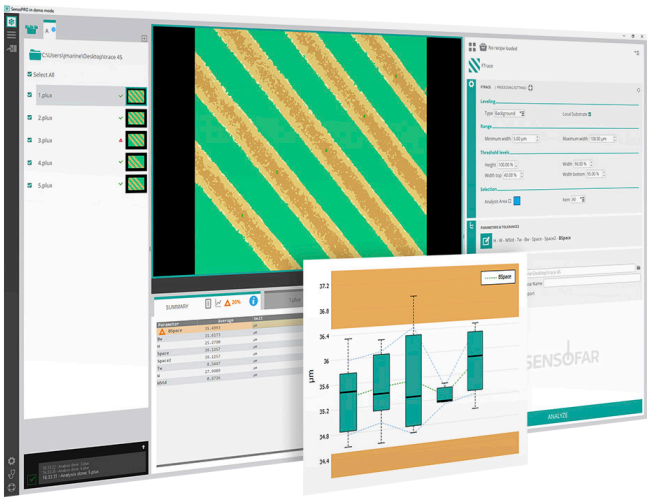


PN GEOMAGICCONTROLX00 | Geomagic Control X w/ 1st Year Maintenance

After the first year it is optional to renew the maintenance yearly. This allows the customer access to updates, new versions and technical support.

PN GEOMAGICCONTROLXRE | Geomagic Control X Maintenance Renewal

SensoPRO



SensoPRO is the 64-bit data analysis solution from Sensofar. It provides an environment for quality assurance (QA) engineers and technicians to quickly and easily analyze production parameters. When combined with SensoSCAN acquisition program, SensoPRO provides a one-click solution for data acquisition through data analysis.

Included by default plugins:

- **Step height**: analyze a single step height with any shape in the given FOV.
- **Step height ISO**: analyze single step height standards according to ISO 5436-1:2000 7.1 Type A1.
- **Surface texture**: analyze surface texture in accordance with the surface texture parameters defined by the ISO 25178. Commands and events provide a means to remotely inspect a sample and perform measurements based on acquisition recipes. Once a proprietary application has been developed using SensoSCAN SDK, it can be used with multiple system
- **Surface texture profile**: analyze amplitude parameters of a centered profile on the surface, in accordance with ISO 4287: Geometrical product specifications (GPS) – profile standard. The surface has to be processed following ISO 16610: Geometrical product specifications (GPS) – Filtration, to obtain the profile roughness parameters (Rx) and separate them from the waviness parameters (Wx).

PN SENSOPRO | SensoPRO analysis software

OPTIONAL PLUGINS

This Plugin-based data analysis approach also provides a high degree of flexibility and specificity, making use of targeted algorithms that are optimized to the exact application needs.

Plugin	Description	PN
Aspheric	Analysis of deformation coefficients and the residual roughness from aspheric surfaces.	SENSOPROASPHERIC
Ball Bond	Dimensions of the primary bonding structure of wires on PCBs.	SENSOPROBALLBOND
Ball Stitch	Analysis of multiple parameters of wire bonding structures, such as height and diameters.	SENSOPROBALLSTITCH
Barcode	Read a sample's barcode and calculate the desired dataset's flatness (Sz).	SENSOPROBARCODE
Blobs	Detection of blobs present on a surface.	SENSOPROBLOBS
Bolet	Analysis of squared-shaped structures of the MEMs.	SENSOPROBOLET
Bump	Analysis of bumps across a surface.	SENSOPROBUMP
Bump Distance	Calculates the distances between rectangular bumps, along with their height and width.	SENSOPROBUMPDISTANCE
C Trace	Analysis of trenches across a non-completely flat surface.	SENSOPROCTRACE
C Trench	Analysis of traces across non-completely flat surface.	SENSOPROTRENCH
Center Dimple	Enables the characterization of concave and convex dimples right at the center of the circular pad area.	SENSOPROCENTERDIMPLE
Center Width	Width and height of a very critical structure on PCBs.	SENSOPROCENTERWIDTH
Chip Angle	Provides the angle between each chip and its closest substrate area within a chip array.	SENSOPROCHIPANGLE
Circle centers	Analysis of circle diameteres and distance between circle centers.	SENSOPROCIRCLECENTERS
Circle Mark	This plugin computes the average, maximum, and minimum groove depth, the inside and outside diameters, and the concentricity.	SENSOPROCIRCLEMARK
Circle Pad	Analysis of conductive circular pads on the surface of a printed circuit board (PCB).	SENSOPROCIRCLEPAD
Circle Pad Concentricity	This plugin includes concentricity between the top and bottom circles, diameters of both top and bottom circles, and sectional depths	SENSOPROCCONCENTRI
Color Concentricity	Analysis of concentricity between three circles of the topography using color information.	SENSOPROCCONCENTRI
Concentricity	Analysis of the concentricity between two circles of different depths.	SENSOCONCETRI
Concentricity A	Analysis of concentricity of -two non-consecutive circles.	SENSOCONCETRIA
Concentricity B	Analysis of concentricity of checking structure in a PCB.	SENSOCONCETRIB
Cross A Pad	Analysis of concentric cross-like pad structures in PCBs.	SENSOPROCROSSAPAD
Cross B Pad	Analysis of cross-like pad structures with two different depths in PCBs.	SENSOPROCROSSBPAD
Cross Kerf	Analysis of kerf marks in the form of a cross present on a wafer.	SENSOPROCROSSKERF
Cruz	Analysis of cross-shaped structures of the MEMs.	SENSOPROCRUZ
C Trace	Analysis of trenches across a non-completely flat surface.	SENSOPROCTRACE

C Trench	Analysis of traces across a non-completely flat surface.	SENSOPROCTRENCH
D Distance	Analysis of the most and least prominent distance between the selected areas.	SENSOPRODDISTANCE
Dimple	Analysis of single dimple structures on a printed circuit board (PCB), both above the surface (bump) and below (hole).	SENSOPRODUALHOLE
Dimple T	Analysis of height of dimple as a control parameter for a good connection between PCB's layers.	SENSOPRODIMPLE
Display Lens	Height, width, and radius of display lenses.	SENSOPRODISPLAYLENS
Double Circle	Analysis of the inner and outer diameters of a PCB's pad.	SENSOPRODOUBLECIRCLE
Double Step Height	Analysis of a double step height in the given FOV.	SENSOPRODOUBLESH
Dual Hole	Analysis of dual round hole structures (also known as vias), either individually or in any pattern.	SENSOPRODUALHOLE
Edge	Analysis of cutting edges.	SENSOPROEDGE
F Trace	Analysis of all kinds of trace marks across a surface, including diagonally oriented traces.	SENSOPROFTRACE
Flatness	Analysis of flatness following ISO 12781.	SENSOPROFLATNESS
Four Step Height	Analysis of the height of the layers that compose a PCB.	SENSOPROFOURSH
Glass Bump Height	Quantifies bumps between a glass plate sample and a photomask.	SENSOPROGBUMPHEIGHT
Glue	Analysis of different glue traces for optimizing glue dispense.	SENSOPROGLUE
Glue Height	Analysis of different glue traces for optimizing glue dispense.	SENSOPROGLUEHEIGHT
Groove Profile	Analysis of barbs and depths of a laser cut.	SENSOPROGROOVEPROF
Groove Spacing	Measurement of the width and length of a laser's groove.	SENSOPROGROOVESPACIN
Halfcut	Depth and width of the cutting groove of a wafer.	SENSOPROHALFCUT
Hole	Analysis of round hole structures (aka vias), either individually or in any pattern.	SENSOPROHOLE
Image trace	Performs a mean and perpendicular profile analysis of a diagonal single trace.	SENSOPROITRACE
IMCC	Analysis of intermetallic layer coverage (IMC).	SENSOPROIMCC
L Groove	Dimensional analysis of an L structure present in semiconductors.	SENSOPROLGROOVE
L Pad	Analysis of L shaped pad structures found on PCBs.	SENSOPROLPAD
Laser Cut	Analysis of laser cut across a surface.	SENSOPROLASERCUT
Laser Drill	Analysis of the height of a wafer's pad.	SENSOPROLASERDRILL
Laser Groove	Analysis of the height and the width of laser grooves present on Flexible Printed Circuits (FPCs).	SENSOPROLASERGROOVE
Laser Hole	Analysis of laser hole structures (aka vias), either individually or in any given pattern.	SENSOPROLASERHOLE
LED Angle	Analysis of the left and right angles of a microlens.	SENSOPROLEDANGLE
LED Chip	Analysis of several critical dimensions in PCBs for MicroLEDs.	SENSOPROLCHIP
Multiple Step Height	Analysis of the height difference between five separate levels.	SENSOPROMULTIPLESTEP
Pad	Analysis of the pad structures found on PCBs, either individually or in any given pattern.	SENSOPROPAD

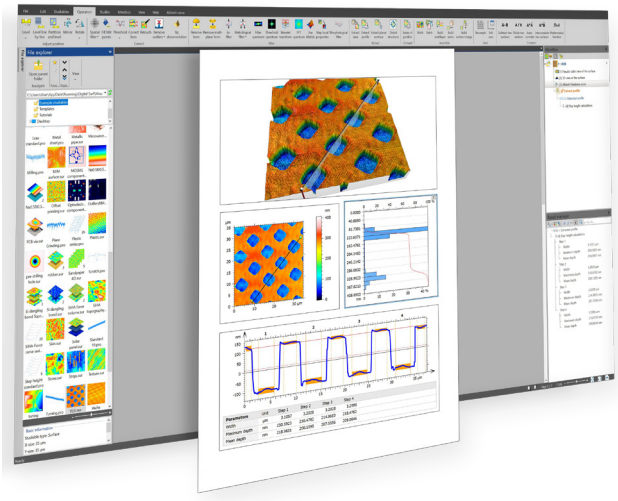
Pad Coplanarity	Detects and analyzes all rectangular pads on PCBs, providing data on their position, area, and coplanarity.	SENSOPROPADCOP
Pad Distance	Measures the distance between pads in PCBs.	SENSOPROPADDISTANCE
Panel Particle Height	Measures the height of airborne particles present in panels.	SENSOPROPPARTHEIGHT
Piller	Analysis of round piller structures, either individually or in any given pattern.	SENSOPROPILLER
Panel Slope	Quantifies the slope on a panel's edge, as it can affect its light transmittance properties.	SENSOPROPANELSLOPE
Piller	Analysis of round piller structures, either individually or in any given pattern.	SENSOPROPILLER
POP Trim	Measure multiple width and height statistics of a trench on a PCB.	SENSOPROPOPTRIM
Power	Determines the power and irregularity of flat lenses.	SENSOPROPOWER
Probe Mark Depth	Analysis of probe marks in PCB pads.	SENSOPROPROBEMARK
Profile Trace	Measure the lateral distances between traces in a 2D image.	SENSOPROPROFILETRACE
PTV	Analysis of conformal structures to ensure all the other structures on the PCB are in the proper position.	SENSOPROPTV
Q Groove	Analysis of the depth of a groove created by a small indentation or channel in quartz material.	SENSOPROQGROOVE
R Bump	Analysis of rectangular hole structures (also known as vias), either individually or in any given pattern.	SENSOPRORBUMP
R Hole	Analysis of rectangular hole structures (also known as vias), either individually or in any given pattern.	SENSOPRORHOLE
R Pad	Analysis of rectangular pad structures found on PCBs.	SENSOPRORPAD
Resist Bridge	Analysis of structures that prevent solder mask paste flow from one solder point to another.	SENSOPRORBRIDGE
Slope Groove	Analysis of the height and width of slopes present on a PCB's groove.	SENSOPROSLOPEGROOVE
Slot Hole	Analysis of the rotation of non-circular holes and slots.	SENSOPROSLOTHOLE
Solder Mask	Analysis of Solder Mask traces. Solder Mask layers are usually applied to printed circuit boards (PCB) as protective layers.	SENSOPROSOLDERMASK
Spacer	Analysis of spacers across a surface.	SENSOPROSPACER
Spheric	Analysis of radius and the residual roughness from Spheric surfaces.	SENSOPROSPHERIC
Square	Automatic detection and analysis of squared pads with two different depths.	SENSOPROSQUARE
Square Groove	Analysis of the width and depth of grooves within squares in PCBs..	SENSOPROSQUAREPAD
Square Pad	Analysis of square pads on Solder Resist Opening (SRO).	SENSOPROSQUAREPAD
Step Height	Analysis of a single step height present on a surface.	SENSOPROSTEPHEIGHT
Step Height ISO	Analysis of a single standard step heights according to ISO 5436.	SENSOPROSTEPHEIGHTISO
Step Number	Finds defects in optical surfaces and characterizes their size.	SENSOPROSTEPNUMBER
Stud Thickness	This plugin enables automated measurement of critical dimensions on stud-like structures, including height, radius, and distances between circular features.	SENSOPROSTUD
Surface Texture	Analysis of surface texture in accordance with the corresponding parameters defined by ISO 25178.	SENSOPRO
Surface Texture Profile	Analysis of amplitude parameters of a centered profile on the surface, in accordance with ISO 21929.	SENSOPRO

T Padl	Analysis of T shaped pad structures found on PCBs.	SENSOPROTPAD
Taper Anglel	Analysis of an etched film dimensions.	SENSOPROTAPERANGLE
Three Step Height	Analysis of the height difference between three different levels.	SENSOPROMULTIPLESTEP
Trace Climb	Thickness analysis of an inclined trace.	SENSOPROTRACECLIMB
Traces	Analysis of trace marks across a surface.	SENSOPROTRACE
Trench	Analysis of trenches across a surface.	SENSOPROTRENCH
Trim	Characterizes the blades that cut the wires after the wire bonding.	SENSOPROTRIM
Trim2	This plugin automatically measures key geometric parameters in 2.5D packaging wafers.	SENSOPROTRIM2
Triple Bump	Analysis of bumps with three-step-height.	SENSOPROTRIPLEBUMP
V Groove	Angle analysis of the v-shaped grooves in optical communications.	SENSOPROVGROOVE
V Hole	Excels at detecting V-shaped holes as small as 200 nm, meticulously crafted using laser technology.	SENSOPROVHOLE
VTP	Analysis of conformal structures, to ensure all the other structures on the PCB are in the right position.	SENSOPROVPT
Wafer Glue	Analysis of the glue between the die and the PCB board.	SENSOPROWAFERGLUE
Wafer Groove	Analysis of key parameters for the cut practiced on a wafer for chip separation, known as Sawing process.	SENSOPROWGROOVE
Wafer Groove Single Line	Analysis of one dicing trace.	SENSOPROWGSL
Wafer Groove Single Line Far	Analysis of three dicing traces.	SENSOPROWGSLF
Wafer Groove Two Lines	Analysis of two dicing traces.	SENSOPROWGTL
Wafer Groove Two Lines Far	Analysis of three cuts made during dicing.	SENSOPROWGTLF
Wafer Pad	Analysis of pads on the surface of a wafer, either individually or in any given pattern.	SENSOPROWPAD
X Pad	Analysis of cross pad structures found on PCBs.	SENSOPROXPAD

SensoMAP

SensoMAP software is the perfect surface imaging, analysis, and metrology solution fully integrated with Sensofar 3D optical profilers. Designed for use with the broadest range of research and industrial applications, it includes:

- Imaging – Visualization of surface data using cutting-edge imaging technology and intelligent filters, with thresholds and form removal displayed directly in 3D to provide immediate visual feedback and greater precision in data preparation.
- Metrology – Analytical studies in accordance with the latest standards and methods, including stitching for large and complex datasets, improved levelling with automated exclusion management, robust handling of end effects on sloped profiles in compliance with ISO 21920, and enhanced Rk/Sk analysis with direct parameter selection and clear double filtering information for greater transparency and confidence in roughness and bearing ratio studies.
- Report Creation – a creation of detailed, accurate, multi-page surface analysis reports in a smart desktop publishing environment with powerful automation features to speed up analysis.



SensoMAP is a powerful 3D analysis, documentation, and reporting tool. It contains a complete and comprehensive set of tools, surface transformations, and measurements focused on obtaining 3D data for your sample. These include:

- Position adjustment (mirror, rotate)
- Surface correction (spatial filtering, fill non-measured points, threshold, outliers...)
- Filtering (metrological filter, remove form, morphological filter...)
- Extraction (profile, contour, area, channels, detect structures...)

- Assemble options (patch, stitch, create series of surfaces...)
- Comparison (subtraction, division or intercorrelation between surfaces)
- 2D and 3D advanced visualization modes (configurability of the frame style, palette, rendering, axis settings…)
- Geometrical analysis (manual measurements, step height, contour analysis in profiles...)
- Structural Analysis (fractal, volume, peak count distribution...)
- Roughness Analysis (2D and 3D roughness parameters)
- Frequency Analysis (texture direction, frequency spectrum, average power spectral density...)
- Functional analysis (Abbot curve, Sk parameters, volume parameters, histogram...)
- Shell analysis (freeform visualization, roughness and texture parameters, topography extraction, hole filling, and .ply export)
- CAD comparison (automatic or manual alignment, adjustable color maps for deviation display, and partial shell analysis to compare specific regions against nominal models)
- Contour analysis (Enhanced management of segments in contact, improving precision in contour studies)
- Interoperability (Support for SFD 2.0 format, extending compatibility with the latest surface data exchange standards).

SensoMAP is a scalable software available on two product levels:

SensoMAP Standard provides the features required for standard surface imaging and analysis. In addition, it has numerous optional modules that can be added anytime for advanced and specialized applications.

PN SENSOMAPV11 STD | SensoMAP Standard analysis software v10

SensoMAP Premium is a much more powerful solution in terms of features. It includes all the modules except Advanced contour, Shell extension, Shell topography, Shell CAD compare, Colocalization, Lead analysis (Twist), Fiber analysis, Scale-sensitive fractal analysis and Thickness analysis. Other highly specialized modules can be added if required.

PN SENSOMAPV11 PRE | SensoMAP Premium analysis software v10

SensoMAP Software Network License allows using the software on several computers on a network. The number of computers that can use the software simultaneously depends on the number of "seats" purchased with the network license.

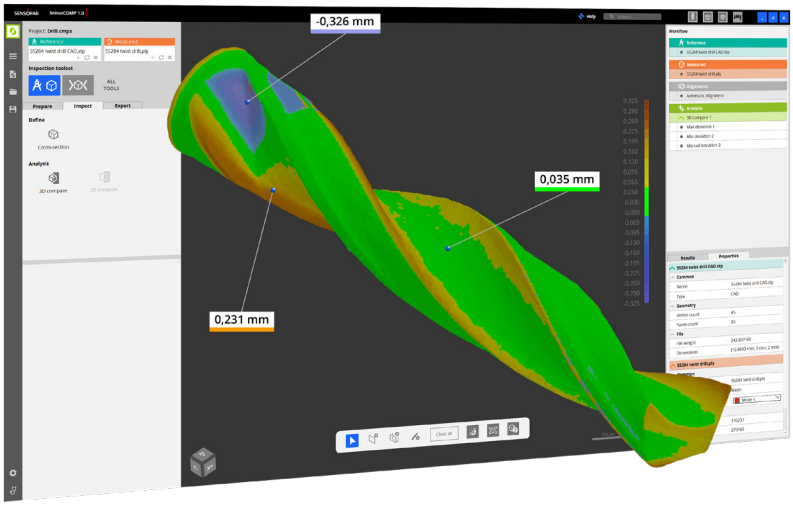
PN SENSOMAPV11 NET | SensoMAP Software network license v10

OPTIONAL MODULES

Module	Description	PN
4D Surface change	Analyze surface change with respect to time, temperature, or another dimension. Quantify wear & deposit.	SENSOMAPV11 M 4DSC
Advanced contour	Advanced dimensioning and tolerancing, DXF CAD compare, Gothic arch.	SENSOMAPV11 M ADVCONT
Advanced profile	Advanced profile filtering, fractal and Fourier analysis, statistical analysis of series of profiles.	SENSOMAPV11 M ADVPROF
Advanced topography	Advanced studies, parameters & filters for 3D ("areal") surface texture analysis.	SENSOMAPV11 M ADVTOPO
Automotive	Assess functional performance with a full set of profile parameters developed by the automotive industry.	SENSOMAPV11 M AUTO
Colocalization	Colocalize and adjust surface and image data from different detectors or instrument types.	SENSOMAPV11 M COL
Contour	Basic geometric dimensioning & tolerancing of contour profiles and horizontal contours extracted from images and surfaces.	SENSOMAPV11 M CONT
Fiber analysis	Analysis of fiber morphology, including diameter and direction, on topographical data, among other data types.	SENSOMAPV11 M FIBER
Fourier & Wavelets	FFT-based texture analysis, advanced FFT filtering and multi-scale analysis by wavelets.	SENSOMAPV11 M FFTWAVE
Lead analysis	2nd generation lead (twist) analysis for the automotive industry.	SENSOMAPV11 M TWIST
Particle analysis	A comprehensive toolset for detecting and analyzing particles, pores, grains, islands, etc. on structured surfaces.	SENSOMAPV11 M PART
Scale-sensitive analysis	Multi-scale analysis based on length-scale or area-scale analyses (formerly in Sfrax software).	SENSOMAPV11 M SSFA
Shell extension	Freeform surface management, complex shape analysis, high-quality 3D visualization.	SENSOMAPV11 M SHELL
Shell topography	A metrological toolbox for shell data (freeform surfaces). Visualize surface curvature and deviation as colors in 3D view. Apply Gaussian-like filtering to calculate a smooth reference surface. It gives access to all features contained in the Shell Extension module.	SENSOMAPV11 M SHELLT
Shell CAD compare	Compare measured Shell (freeform surface) data with CAD models (nominal) or generated meshes. It includes manual or automatic alignment, fine-tuned fitting, and deviation visualization using color coding. This module gives access to all features contained in the Shell Extension and Shell Topography modules.	SENSOMAPV11 M SHELLC
Thickness	Global or zone-specific interactive thickness characterization based on a pair of surfaces or profiles.	SENSOMAPV11 M THSS

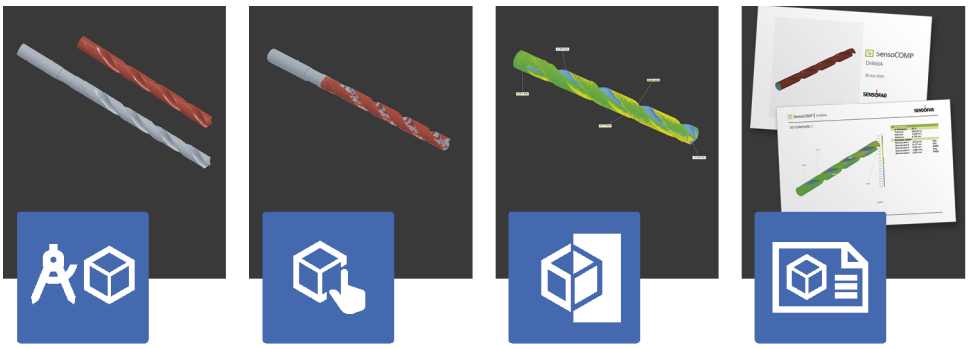
SensoCOMP

SensoCOMP is a 3D inspection software solution that integrates dimensional analysis with CAD comparison. Developed to support precise validation, it enables users to compare 3D measurements with cross-section tools and tolerance-based evaluations.



The software simplifies inspection tasks by organizing them into a clear four-step process:

- Import your data: Access CAD files, point clouds, mesh data, including Sensofar PLUX formats.
- Prepare your setup: Use automatic or manual tools to align CAD and measurement data, apply filters, and define regions of interest (ROIs) for inspection.
- Inspect your part: Assess complex geometries, apply dimensional analysis, extract section profiles, and interpret deviation maps.
- Export your results: Produce detailed reports and deviation visualizations, optimized for traceability and compliance.



Import your data
Load CAD models, point clouds, or mesh data, including native Sensofar's .plux files.

Prepare your setup
Align CAD and measurement data manually or automatically, apply filters, and define ROIs.

Inspect your part
Compare complex geometries, extract cross-sections, apply dimensional evaluations, and visualize deviations.

Export your results
Generate reports, and deviation maps — ready for documentation or traceability.

SensoCOMP is a powerful 3D inspection software that enables parts to be inspected quickly, accurately, and with confidence. It provides a streamlined set of tools developed specifically for dimensional inspection tasks:

- Format adaptability, including STEP, IGES, STL, PLY, and native PLUX files
- Setup with advanced tools, ensuring accuracy on high-resolution profiler data
- CAD comparison with precise deviation maps in 2D and 3D
- Dimensional analysis for extracting critical values: lengths, radii, angles, and distances

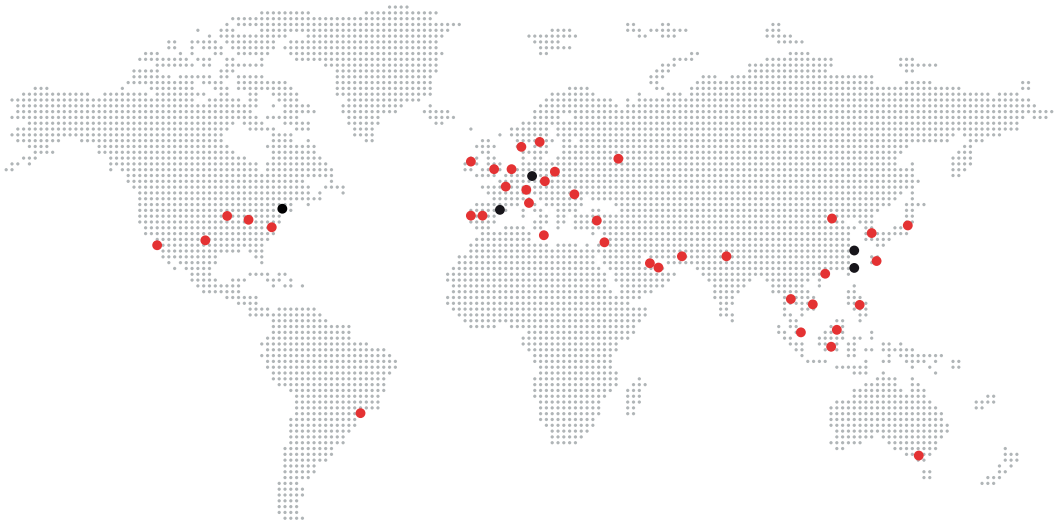
SensoCOMP is fully compatible with the S neox Five Axis and the entire Sensofar table-top portfolio.

PN SENOSOCOMP | SensoCOMP 3D inspection analysis software

SensoCOMP will be available under a single licence option.

SENSOFAR

METROLOGY



SENSOFAR is a leading-edge technology company that has the highest quality standards within the field of surface metrology

Sensofar provides high-accuracy optical profilers based on confocal, interferometry, and focus variation techniques, from standard setups for R&D and quality inspection laboratories to complete non-contact metrology solutions for in-line production processes. The Sensofar Group has its headquarters in Barcelona, a European technology and innovation hub. The Group is represented in over 30 countries through a global network of partners and has its own offices in Asia, Germany, and the United States.

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