MICROCAM™-3D/4D Interferometer

Specifications

NOVACAM™ MICROCAM™ series of interferometers are the core components of NOVACAM 3D metrology systems. The interferometer provides light source to the system optical sensor probe(s) and carries out the optical and electronic processing of the measurements.

Interferometer functional specifications

Interferometer model	MICROCAM-3D		MICROCAM-4D
Technology	Low-coherence interferometry		
Light wavelength	1,310 nm, infrared		
Light bandwidth	Broadband light		
Pointer for alignment purposes	In-probe red laser @ 650 nm		
Instrument safety[1]	Class 1M laser product < 20 mW of infrared, < 5 mW of in-probe laser pointer		
Non-contact measurements			
Depth of field	depends on selected probe parameters		
Scanning depth range options[2]	3.5 mm (0.138 in.)	7 mm (0.275 in.)	5 mm (0.197 in.)
Acquisition (A-scan) rate	2.1 kHz	1.05 kHz	100 kHz
Axial (Z-axis) resolution[3]	< 0.5 µm (19.69 µin.)		
Light spot size[3] **(Lateral (X-Y-axis) resolution)**	2.2 - 146 µm (86.6 – 5,748 µin.), depends on selected probe parameters		
Roughness measurement (Ra) range	Ra ≥ 0.4 µm (16 µin.) with most probes Ra ≥ 0.05 µm (2.0 µin.) with selected probes		Ra ≥ 0.8 µm (31.5 µin.) with most probes
Standoff distance	1 - 100 mm (0.118 - 3.93 in.) for standard probes, up to 1 m (3.28 feet) for non-standard probes		
Interferometer repeatability[4]	< 1 µm (39.4 µin.)		
Diameter measurement repeatability (1σ)	0.5 - 1 µm (20 - 39.4 µin.), depending on the configuration		1 - 3 µm (39.4 - 118 µin.), depending on the configuration
Max angle between the probe beam and the surface	≤ 45˚on machined surface ≤ 4˚ on specular surface (glass, mirror, etc.)		≤ 70˚ on machined surface ≤ 15˚ on specular surface (glass, mirror, etc.)
Thickness measurements			
Thickness measurement range (optical in air)	10 µm - 3.5 mm 394 µin. - 0.138 in.	10 µm - 7 mm 394 µin. - 0.275 in.	20 µm - 5 mm 787 µin. - 0.197 in.
Typical materials measured for thickness	glass, polymers, multi-layer films, coatings, plastics, silicone, liquids, specular or non-specular		
Sample reflectivity	0.1 - 100 %		

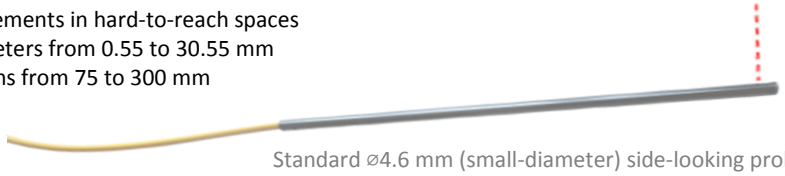
[1] Class 1M laser product: Visible and invisible laser radiation. Do not stare into beam or view directly with optical instruments.
[2] To further increase maximum scanning depth, a mechanical displacement axis is available.
[3] Light spot size and axial resolution are independent of each other.
[4] The stated repeatability pertains to a non-scanning system. The repeatability value of the motion mechanism is usually bigger; this can be effectively addressed by the use of a glass reference plate.

Interferometer hardware specifications

Interferometer model	MICROCAM-3D	MICROCAM-4D
Size of interferometer enclosure box (depth x width x height)	4U[1] 19 inch rackable enclosure 445 x 445 x 178 mm/ (17.5 x 17.5 x 7 in.)	
Weight	17 to 20 kg (37.5 to 44 lb)	8.6 kg (19lb)
Maximum fiber length to sensor probe	Up to 1 km (3,280 feet)	Up to 10 m (32.8 feet), longer available as option
Power requirements	AC 110V - 240V single phase; 2A for 110 V and 1A for 220 V; 50 Hz/60 Hz	
Operating temperature range	15 - 30ºC (59 - 86ºF)	
Operating relative humidity	6 - 95% relative, noncondensing	
Data output	USB	

[1] Height of 1U = 44 mm (1.75 in.)

Accessories - Optical probes

Type of probe[1,2]	NOVACAM 3D metrology systems that use this type of probe
Forward-looking probes - Probe diameters from 0.55 mm to 30.5 mm - Standoff from 0.5 mm to 140 mm  Standard (⌀17.8 mm) forward-looking probe	- OPTICAL 3D PROFILOMETER™ system
Side-looking probes - For measurements in hard-to-reach spaces - Probe diameters from 0.55 to 30.55 mm - Probe lengths from 75 to 300 mm  Standard ⌀4.6 mm (small-diameter) side-looking probe	- OPTICAL 3D PROFILOMETER™ system - TUBEINSPECT™ system
Rotational scanner (RS) probes - For measurements in hard-to-reach spaces (bores, tubes, etc.) - 3 models: RS0, RS1, RS2 - Probe diameters from 0.55 mm to 17.8 mm - Up to 30 rotations/second (1,800 RPM)  Rotational scanner RS2 with 4.6 mm diameter probe	- BOREINSPECT™ system - RIVETINSPECT™ system
Galvo scanner (GS) probes - For efficient area or strip scanning in a raster pattern - Field of view from 5x5 mm to 90x90 mm - Standoff distance from 7.5 mm to 215 mm  Galvo scanner GS2	- SURFACEINSPECT™ system - EDGEINSPECT™ system - RIVETINSPECT™ system

[1] All probes are fiber based, meaning they can operate several meters away from the interferometer

[2] This table lists standard probe models. Custom probes can be designed and built to suit specific applications. This includes:

- Forward-looking and side-looking probes with non-standard diameters (e.g., ø8.8 mm) and lengths
- Side-looking and rotational probes with non-standard light beam angles
- Custom probes for extreme temperatures, high pressures, radioactive environments, or other hostile environments
- Galvo scanning probes with non-standard FOVs

Option - optical switching hardware

With the addition of an optical switch to the MICROCAM interferometer, multiple optical probes may be multiplexed to one interferometer. With this configuration, one probe may scan at a time.

Optical switch enclosure options

Optical switch	Enclosure size
1 x 2 optical switch for probe multiplexing[1]	Internal to interferometer
1 x 4 optical switch for probe multiplexing[1]	
> 4 inputs	Additional enclosure required

[1] Millisecond switches

More information

For more information on the MICROCAM-3D/4D interferometer, please contact Novacam.

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