



Manufacturing Metrology Team – Instrument Data Sheet

Alicona G5 Infinite Focus



Purpose

- Optical 3D measurement of surface form and texture

Working principle

- The Alicona G5 is a focus variation measuring instrument. It vertically scans the object's surface and captures a stack of 2D microscope images. For each image, the sharpness of each pixel is calculated. Detection of the object's surface, for each pixel, is achieved by finding the corresponding z-location having the highest sharpness (equivalent to the best focus).

Advantages

- Wide applications: form and surface texture measurement
- Relatively fast measuring time
- Up to 5-axis measurement. Beneficial for complex geometries, e.g. micro-tool measurement
- True colour of measured object's surface



Limitations

- Difficult to measure very smooth surfaces with $Ra < 10$ nm
- Difficult to measure optical or transparent surfaces

Related research focus

- Calibration of the ISO metrological characteristics based on focus-variation principle
- Advanced methods of surface texture measurement and analysis
- Calibration of the instrument's transfer function to improve measurement capability and accuracy
- Performance verification of the instrument for geometrical metrology
- Automatic inspection strategy for freeform surface by 5-axis measurement
- Measurement uncertainty estimation

Instrument Specifications							
Objective details	Unit	2.5x	5x	10x	20x	50x	100x
Lateral sampling distance	μm	3.25	1.76	0.88	0.44	0.18	0.09
Min. lateral resolution	μm	58.71	23.48	11.74	8.8	6.4	4.4
Min. repeatability (Z)	μm	6.92	3.49	1.75	0.88	0.64	0.44
Best vertical resolution	nm	2300	410	100	80	20	10
Working distance	mm	8.8	23.5	17.5	13	10.1	3.5
Field of view (X)	μm	5716	2858	1429	715	286	143
Field of view (Y)	μm	4351	2176	1088	544	218	109
Max. measurement height	mm	8	22	16	12	9	3.2
Step height accuracy	%	-	0.05	0.05	0.05	0.05	0.05
Min. measurable roughness (Ra)	nm	7000	1200	300	150	60	30
Min. measurable roughness (Sa)	nm	3500	600	150	75	30	15



Measurement examples

<p>Freeform geometric measurement. Size of the sample is (55×55×13) mm.</p>	<p>Surface texture measurement of grit-blasting coated material.</p>	<p>Surface texture measurement of micro-tool flank surface for wear assessment.</p>
<p>Surface texture measurement of SLM manufactured metallic part.</p>	<p>Surface texture measurement of SLS manufactured nylon part.</p>	<p>Surface texture measurement of cold-sprayed coated material.</p>

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