



InfiniteFocus G Series Application Note:

Full Report available at <https://bit.ly/2JdGSPj>

Application: Surface Roughness
Vs Surface texture measurement
comparison between sandblasted
and beadblasted surfaces.

Bruker alicona

Bruker Alicona is a leading global supplier of optical metrology solutions based on the principle of Focus Variation.

Focus Variation works on the basis of moving a focal plane over a surface and collecting robust 3D data which can then be used to measure geometric form and surface finish from a single optical sensor.

Measurement processes can be fully automated and provide GD&T measurement capabilities across all industrial & medical sectors.

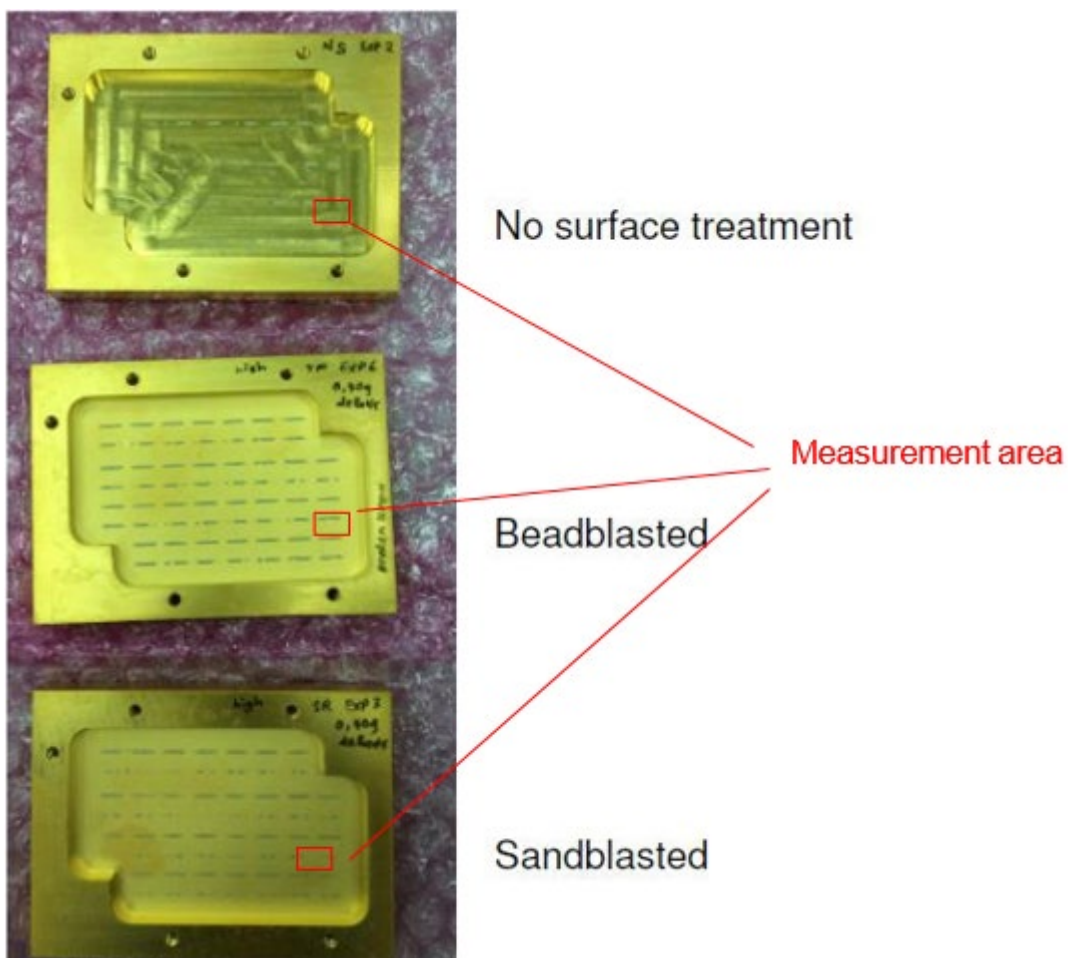
The systems are in use in Industry, Industrial Research, Universities and production facilities globally.

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Surface Treatment Measurement

In this measurement report summary, we describe the use of the Bruker Alicona InfiniteFocusG5 system to measure the effect on surfaces of different types of surface treatment. The components and the measurement positions are illustrated below.

The full measurement report available at <https://bit.ly/2JdGSPj>



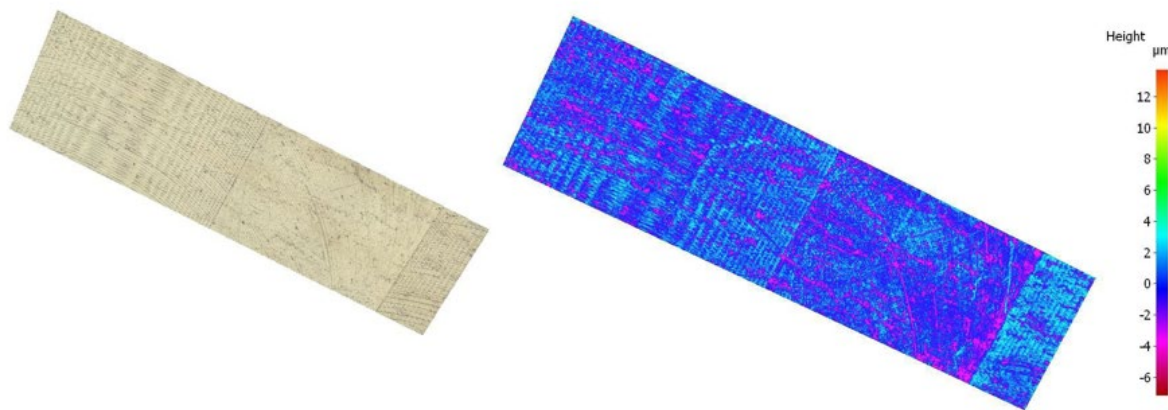
The measurement system used in this report is the InfiniteFocusG5.



InfiniteFocusG5

InfiniteFocus is a highly accurate and flexible optical 3D measurement system based on the Focus Variation technology. Using only one sensor, users verify dimensional accuracy surface finish of their components. By means of Vertical Focus Probing, an extension of Focus Variation vertical surfaces can be probed laterally. Components in high accuracy, with a high vertical resolution and in high repeatability. The robust measurement principle of Focus Variation in combination with a vibration-isolating hardware allows the systems to be used in a manufacturing environment. With an automation interface, InfiniteFocus can also be used for fully automatic measurements in production.

The sample to be measured is simply placed on the stage of the G5 instrument and a 3D model is created which is then displayed as a 3D model either in true colour or in pseudo colour related to height as shown below.

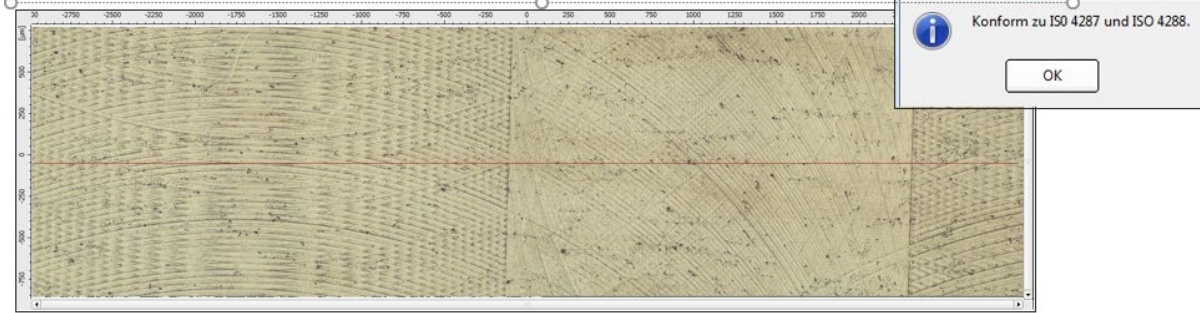


3D surface dataset, true color

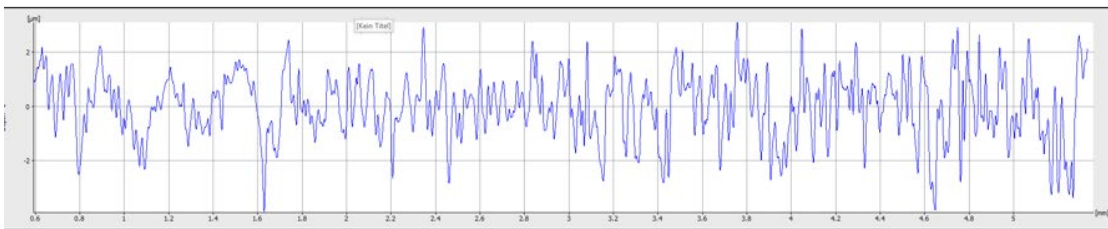
3D surface dataset, pseudo color

The 3D model is then used in the profile roughness module and a profile line is extracted and the values displayed as shown below.

Sample with no surface treatment ProfileRoughnessMeasurement



profile path, true color, profile width: 5µm



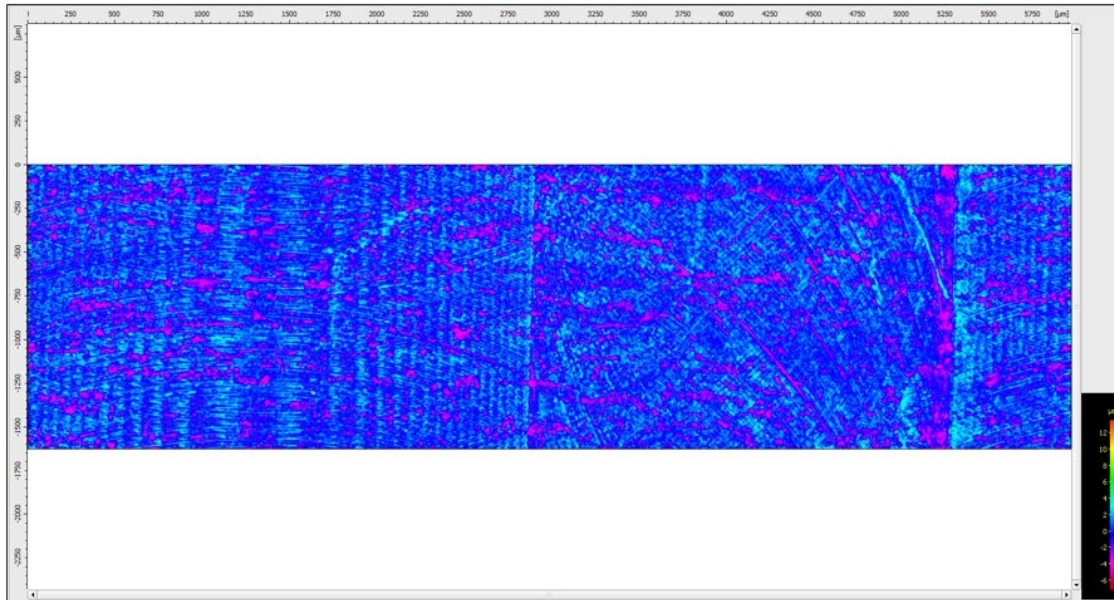
extracted profile (unequal axis scaling)

Name	Value	[u]	Description
Ra	1.00	µm	Average roughness of profile
Rq	1.31	µm	Root-Mean-Square roughness of profile
Rt	8.88	µm	Maximum peak to valley height of roughness profile
Rz	6.78	µm	Mean peak to valley height of roughness profile
Rmax	8.37	µm	Maximum peak to valley height of roughness profile within a sampling length
l	5.9	mm	Profile Length
Lc	800.00	µm	LambdaC: cut off wavelength

Using the same 3D model, a feature of optical metrology is that all information can be extracted without additional probing we then move to measure the surface texture data, as this is an area based measurement it is not required to extract a profile.

Sample – no surface treatment IF-SurfaceTextureMeasurement

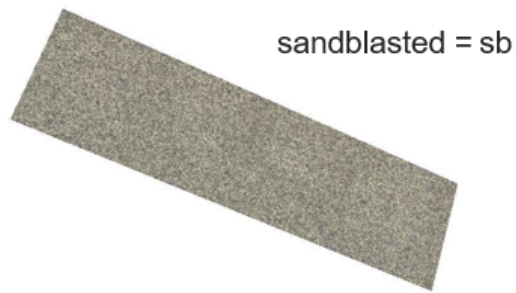
Filtered surface dataset, 10x Objective,
pseudo color, Lc=800µm



The surface texture data is then extracted and displayed as shown below

Name	Value	[u]	Description
Sa	1.07	µm	Average height of selected area
Sq	1.37	µm	Root-Mean-Square height of selected area
Sp	13.46	µm	Maximum peak height of selected area
Sv	7.07	µm	Maximum valley depth of selected area
Sz	20.54	µm	Maximum height of selected area
Lc	800	µm	LambdaC: cut off wavelength

Using the same process, it is possible now to compare the effects of the sand and bead blasting as shown below



Name	sb	bb	[u]	Description
Ra	1.22	0.37	µm	Average roughness of profile
Rq	1.53	0.48	µm	Root-Mean-Square roughness of profile
Rt	9.06	3.65	µm	Maximum peak to valley height of roughness profile
Rz	8.00	2.88	µm	Mean peak to valley height of roughness profile
Rmax	8.81	3.52	µm	Maximum peak to valley height of roughness profile within a sampling length
Sa	1.35	0.41	µm	Average height of selected area
Sq	1.70	0.53	µm	Root-Mean-Square height of selected area
Sp	10.60	4.99	µm	Maximum peak height of selected area
Sv	7.46	10.03	µm	Maximum valley depth of selected area
Sz	18.06	10.03	µm	Maximum height of selected area
Lc	800	800	µm	LambdaC: cut off wavelength

Summary

Using optical metrology allows a simple and easy to use method of surface measurement, by different techniques, of the effect of surface modification on surfaces. These methods provide the information necessary to assess if the surface has the correct functional requirements for its use.

This guarantees a robust and repeatable quality control in addition to an optimization of manufacturing processes. The Bruker Alicona measurement system also allows the measurement of profile and area-based roughness conforming to ISO 4287, 4288 and ISO 25178. User-friendly handling and easy automation using the measurement Inspect measurement module.

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