



# InfiniteFocus SL Application Note

Full Report Available at <https://bit.ly/3fvEmPz>

## Cardiac Components

## 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.

[www.alicon.com](http://www.alicon.com)

## Introduction

In this issue, we summarise a report on the measurement of cardiac components using the Bruker Alicona InfiniteFocusSL measurement system. This is part of a solution for diagnosis and treatment of atrial fibrillation via an ablation system. The full measurement report is available at <https://bit.ly/3fvEmPz>.

## Measurement Task



On this sample, there are 4 main requirements:

- *Surface Roughness* – Surface finish is a critical requirement
- *Edge Radii* along the length – current methods are destructive
- *Edge Radii* on the 3 central holes – in use, these 3 holes have a string passed through them; sharp edges could cut the string
- All measurements must be non-contact

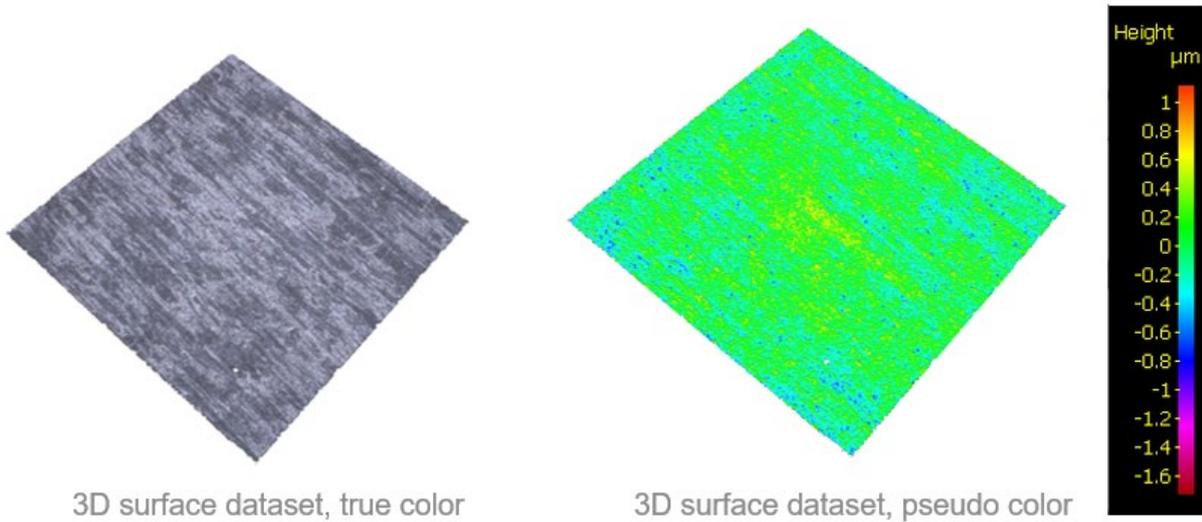
## Sample Set up for Measurement



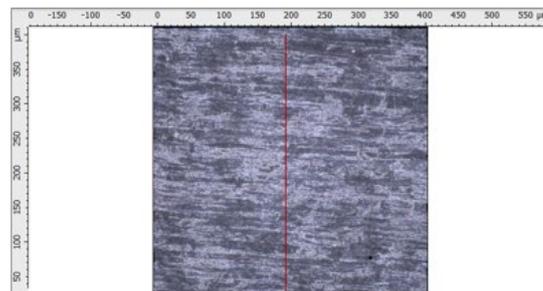
As the requirement is for a non-contact measurement, the optical metrology solution is ideal. In use, the sample to be measured is simply placed, with gloved hands, onto a measurement platform.

## Surface Roughness Measurement

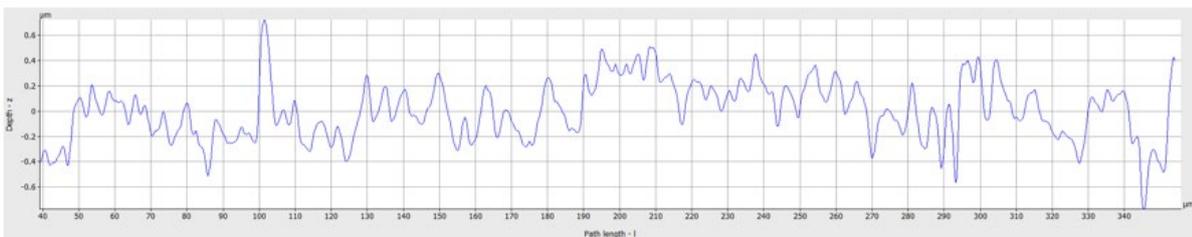
The surface to be measured is scanned and a dataset obtained; this can be displayed in true color or in pseudo color as a height map. Note a height range of  $2.6\mu\text{m}$ .



A profile line is extracted, the roughness values determined, and the values automatically presented. Surface texture data is also available from the same dataset.



Profile width: 0.002 mm



## Surface Roughness Values

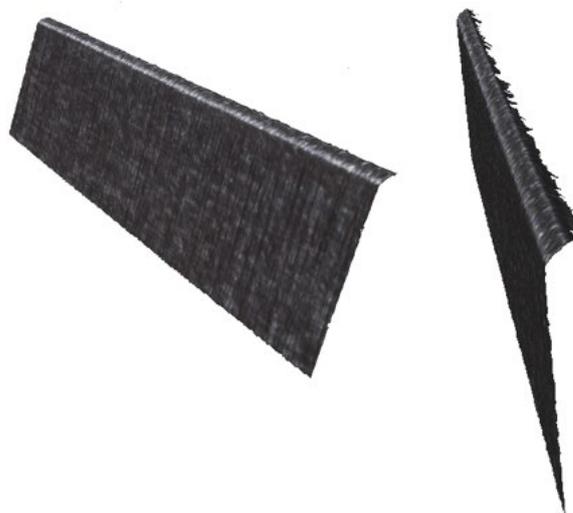
Profile Roughness Measurement results:

Name	Value	Unit	Description
Ra	0.167	µm	Average roughness of profile
Rq	0.202	µm	Root-Mean-Square roughness of profile
Rt	1.133	µm	Maximum peak to valley height of roughness profile
Rz	0.828	µm	Mean peak to valley height of roughness profile
Rmax	1.133	µm	Maximum peak to valley height of roughness profile within a sampling length
Rp	0.703	µm	Maximum peak height of roughness profile
Rv	0.431	µm	Maximum valley height of roughness profile
Rc	0.580	µm	Mean height of profile irregularities of roughness profile
Rsm	15.89	µm	Mean spacing of profile irregularities of roughness profile
Rsk	0.508		Skewness of roughness profile
Rku	2.782		Kurtosis of roughness profile
Rdq	0.135		Root-Mean-Square slope of roughness profile
Rt/Rz	1.369		Extreme Scratch/Peak value of roughness profile, ( $\geq 1$ ), higher values

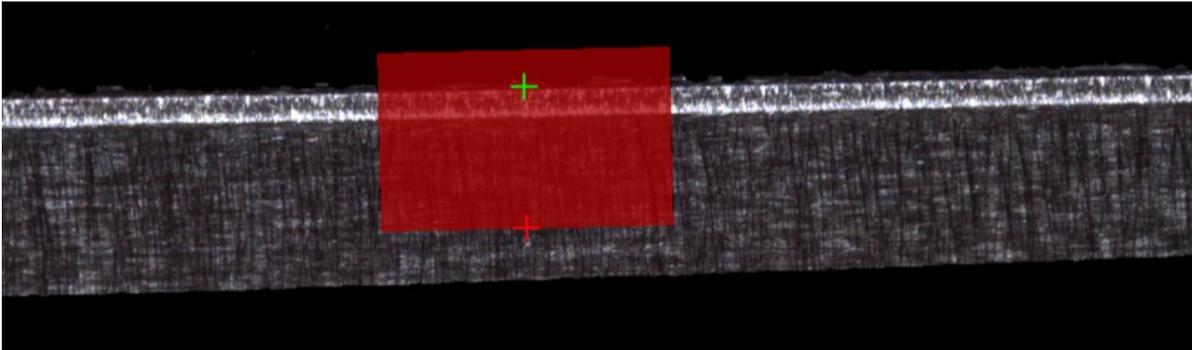
## Edge Radii

A 3D data set is taken of the edge to be measured and displayed in natural color at 5 points along the edge.

3D datasets of Sample A, Edge 1



A profile line is drawn at 90 degrees to the edge and widened to 0,5mm to create an average measurement.



Profile width: 0.500 mm

A profile is then extracted, and a circle is fitted to the edge to provide a true radius measurement.

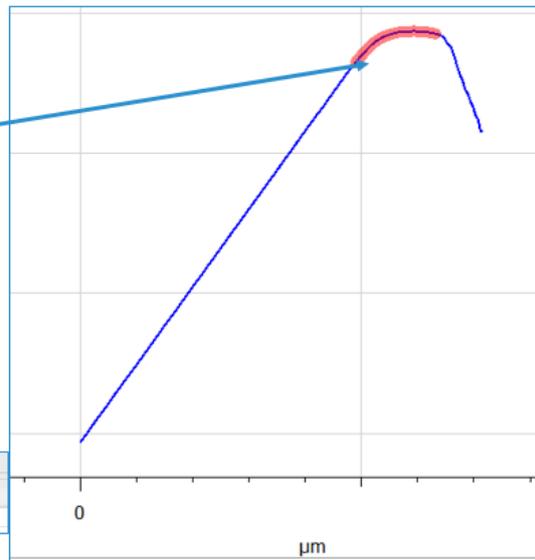


A circle is fitted to the edge using "Best Fit" measurement mode to obtain radius.

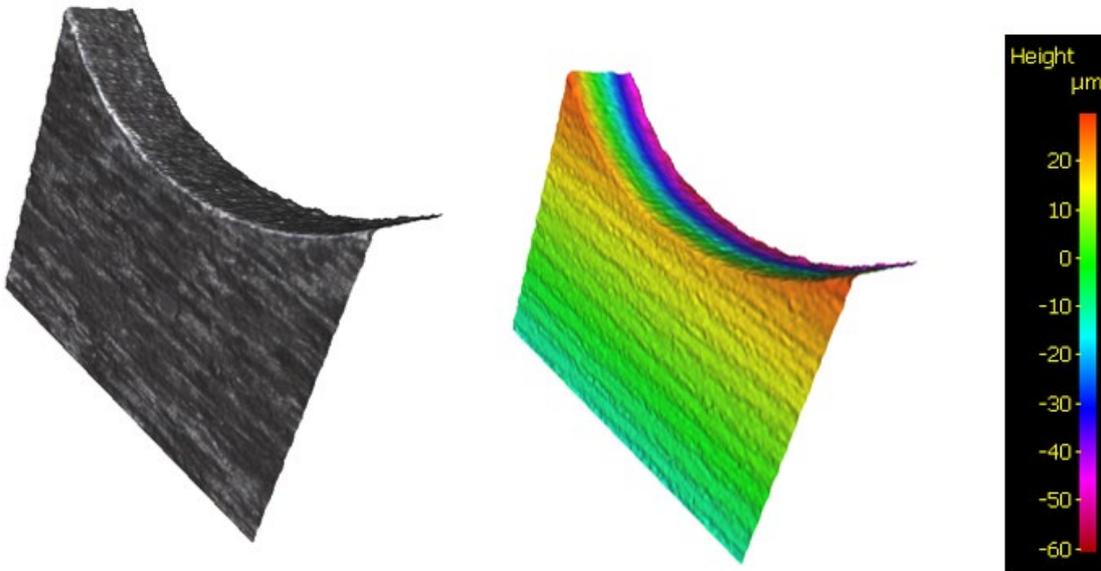
NOTE: The radius depends on the points/region selected for circle fit (highlighted in red).

Name	Value	[u]
Edge Radius	47.122	μm

Circle	Radius / μm	C.x / μm	C.y / cm	mean Deviation / nm	min. Deviation / nm	max. Deviation / nm	Circumference / μm	Area / μm <sup>2</sup>
Circle 1	47.122	236.609	1.224	231.736	-421.928	580.509	296.077	6975.871



## Hole Edge Measurement

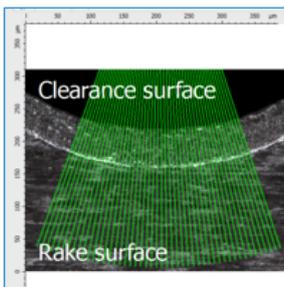


3D surface dataset, true color

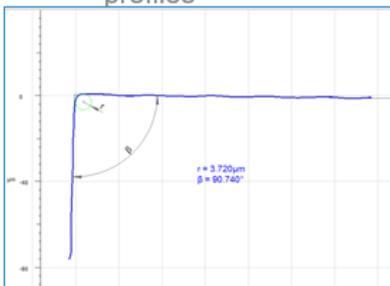
3D surface dataset, pseudo color

The edge to be measured is scanned and a dataset obtained; this can be displayed in true color or in pseudo color as a height map.

Using an edge measurement module, the radius along the edge of the hole can be measured and displayed.



Overview of 1300 profiles



Name	Value	Unit	Description
$r$	3.720	$\mu\text{m}$	Mean radius of mean edge
$\beta$	90.740	$^\circ$	Chip angle
$S_\alpha$	6.695	mm	Dist. apex to end of clearance roundness (former: a)
$S_\gamma$	2.537	mm	Dist. apex to end of chipping roundness (former: b)
K	0.379		Symmetry of cutting edge
$\Delta r$	1.500	mm	Min. dist. of edge to apex (former: S)
W	3.048	mm	Edge width
$E_{c\alpha}$	0.038	mm	Form deviation of circle (RMS)
Form	Waterfall	mm	Estimated Curvature

## Summary

The InfiniteFocusSL can measure edges, surface roughness, and geometric form and is ideal for this application as it meets all 4 criteria for this task.

- 1) Surface Roughness-Surface finish is a critical requirement
- 2) Edge Radii along the length-current methods are destructive
- 3) Edge Radii on the 3 central holes-In use these 3 holes have string passed through them, sharp edges could cut the string.
- 4) All measurements must be non-contact

The rapid measurement times, ease of use and high-resolution results make the instrument the ideal solution for the measurement task.

The full measurement report is available at <https://bit.ly/3fvEmPz>.