



G Series

Application Note

Full Report available at <https://bit.ly/3r4Ne4a>

Application:

Measurement of Valves and Valve Seats



Bruker aliconna

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.aliconna.com

Introduction

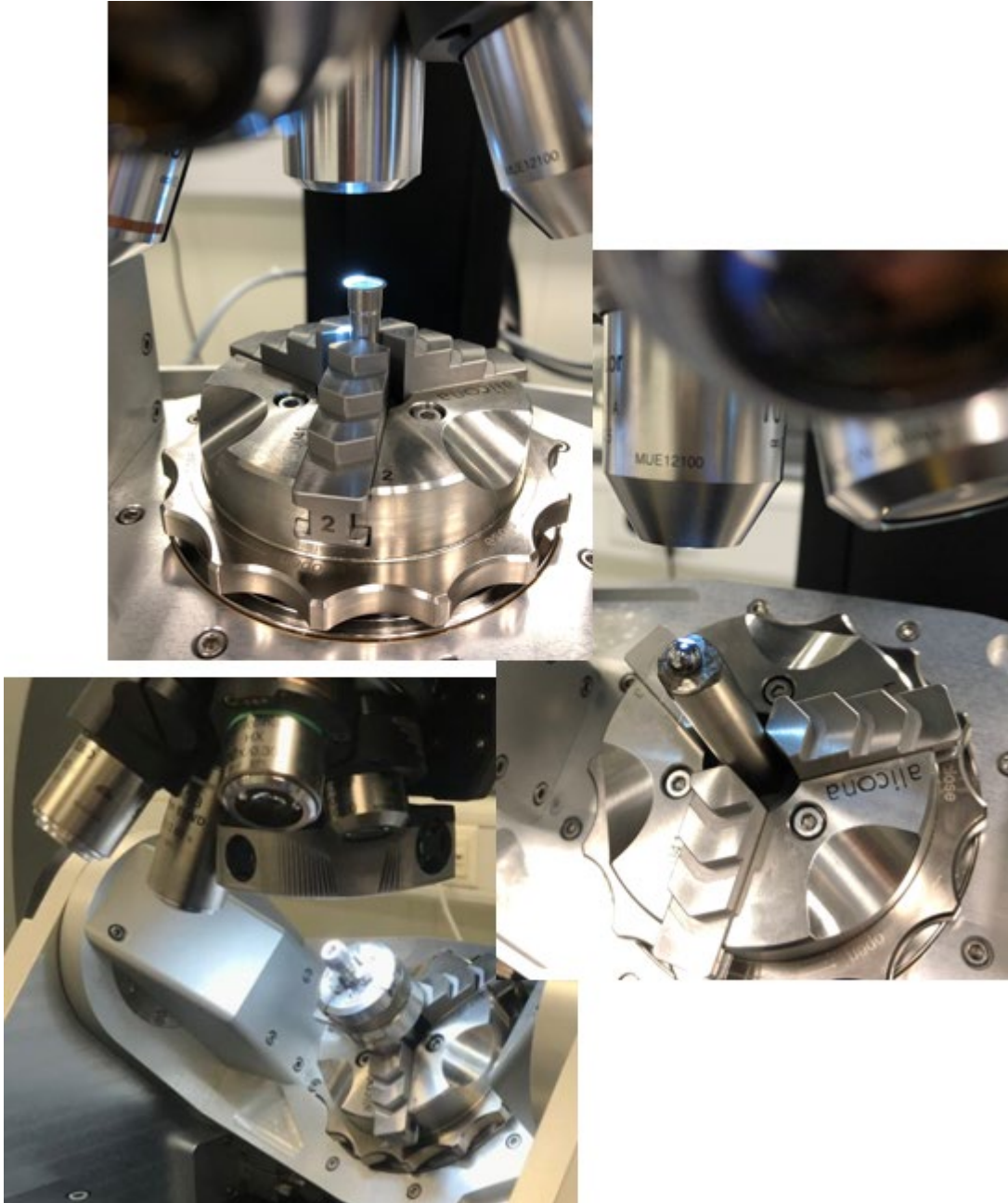
In this measurement report summary, we describe the use of Optical Metrology to measure the difference between two parts, this can either be a good or bad part comparison or a part comparison against a CAD file.

The full measurement report available at <https://bit.ly/3r4Ne4a>

The metrology system used for this task is the InfiniteFocusG5 plus system fitted with an Advanced real3D rotation device, shown below.

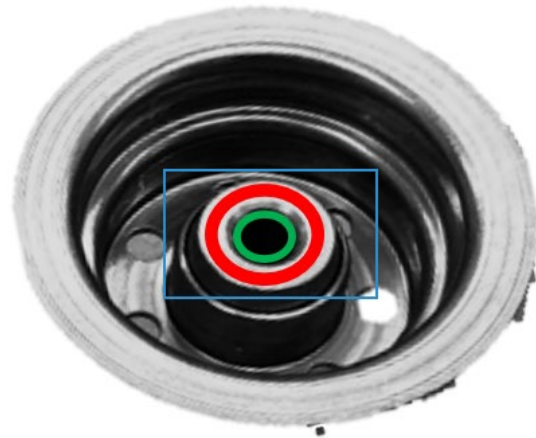


In use the parts to be measured are located in a 3-jaw mounting chuck, the illustration below shows both the valve and the valve seat mounted ready for measurement.



The first task on the 2 valves shown below is

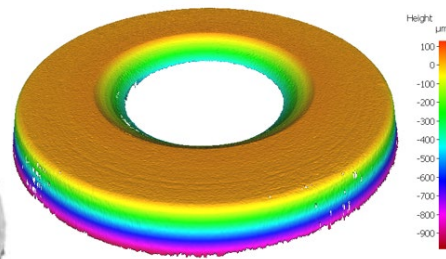
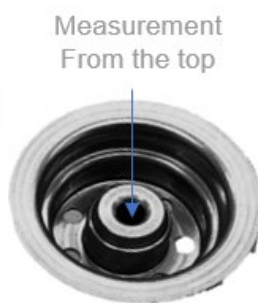
- The measurement of the cone seats inside the blue rectangle
 - Surface comparison of the area of parts 1 & 2 shown in Red
 - Surface comparison to valve geometry (plane) for each valve in the red area
 - Comparison of valve 1 & 2 – inner cone (green measurement area)
- Comparison of opening angles (cones)
- Surface comparison of geometry (cone) for each part



The valve is then scanned, and a 3D model is created and displayed in either true colour or in pseudo colour related to height as shown below.



3D surface dataset, true color

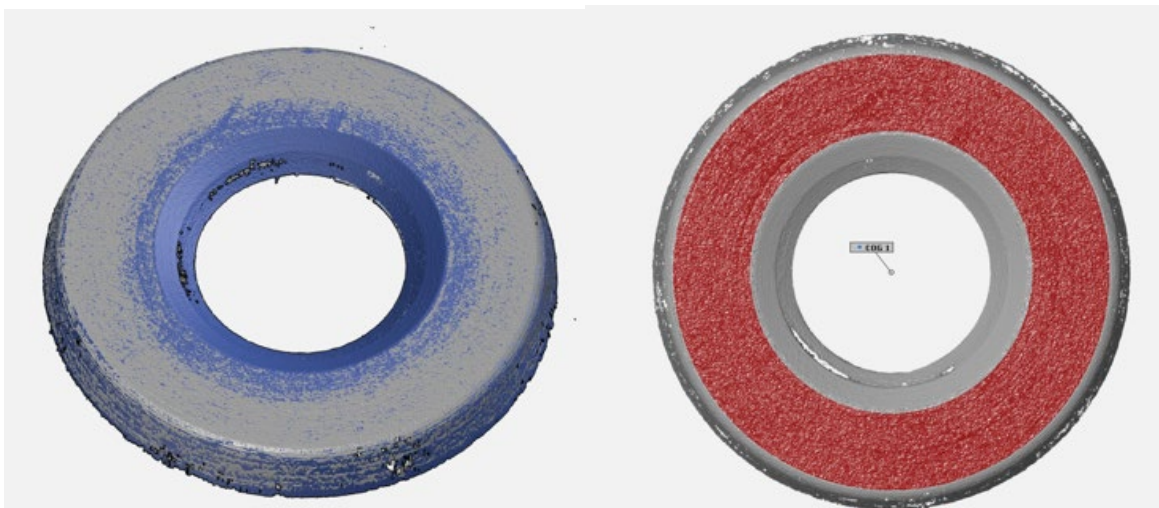


3D surface dataset, pseudo color

When scanned it is possible to identify and measure surface defects that maybe present.



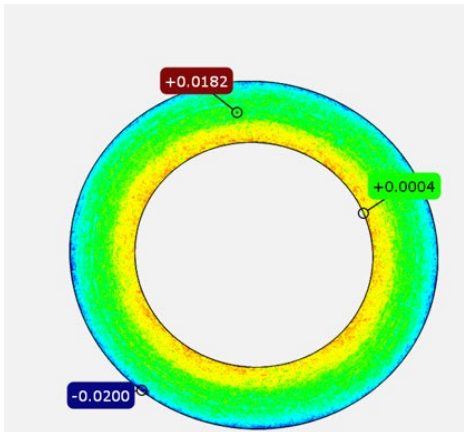
It is then possible to align the 2 3D scans for surface comparison.



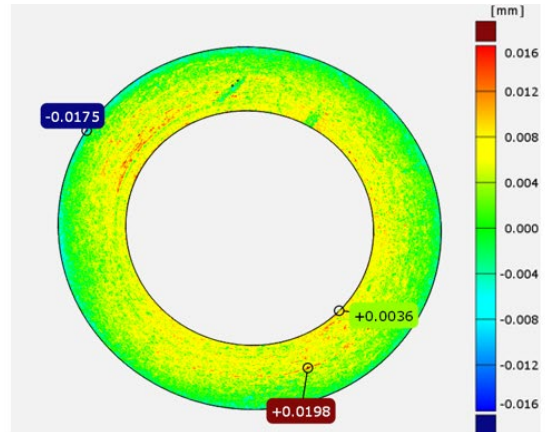
Aligned datasets valve
1_blue valve 2_grey

Selected area for surface comparison

Using Alicona Inspect software it is now possible to identify, and measure surface defects as illustrated below.

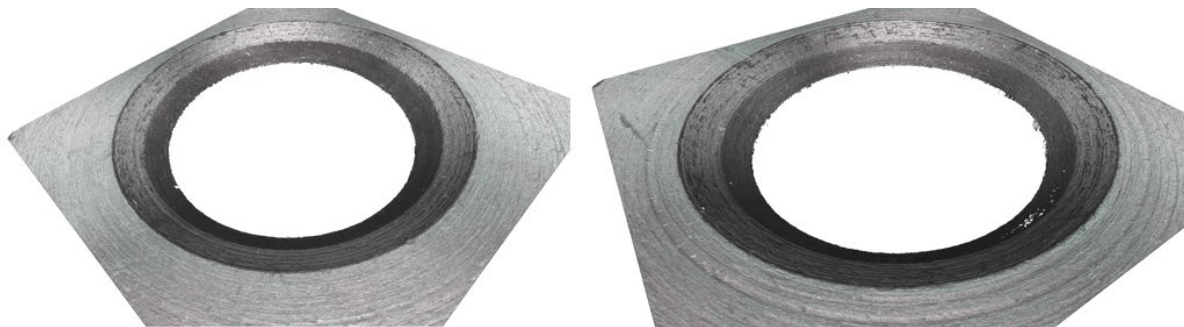


Valve 1 – visualization of deviations in pseudo color with deviation labels (mean/max/min)

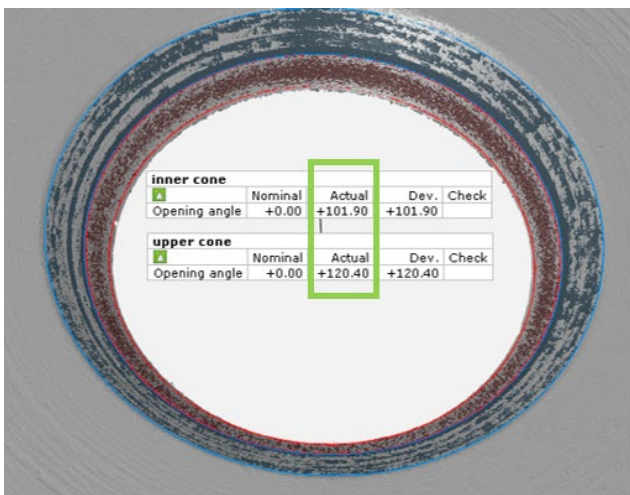


Valve 2 – visualization of deviations in pseudo color with deviation labels (mean/max/min)

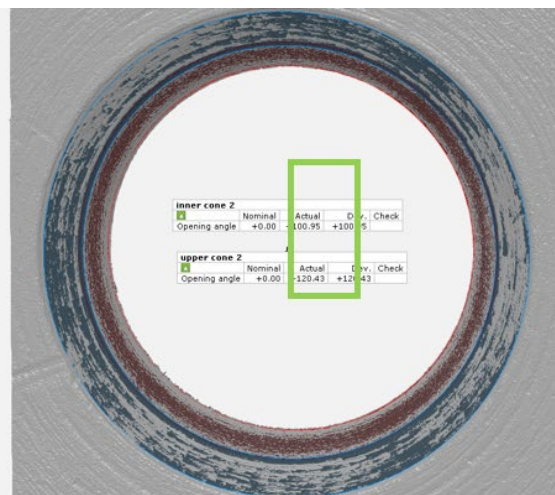
For cone measurement a scan is made of the 2 cones



Using cone fitting software, it is then possible to measure the opening angles of both cones on both valves

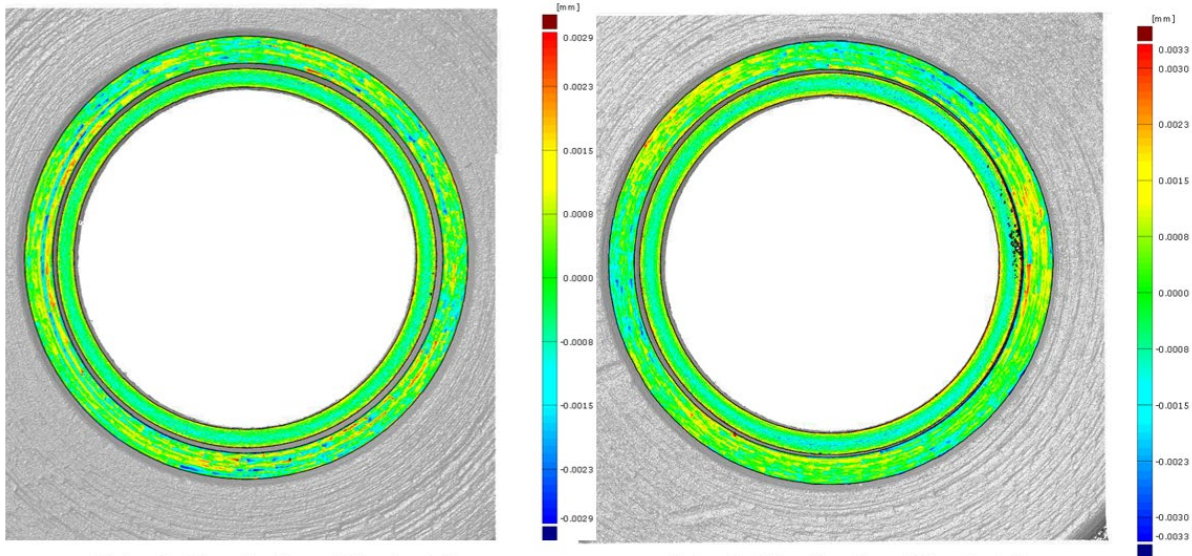


Valve 1 – opening angle inner cone (area in red) and upper cone (are in blue)



Valve 2 – opening angle inner cone (area in red) and upper cone (are in blue)

And display and measure the differences between the two valves.



Valve 1- Visualization of the deviation (upper and inner cone) in pseudo color

Valve 2- Visualization of the deviation (upper and inner cone) in pseudo color

Summary:

The InfiniteFocusG5 plus used for this report 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.

By using the InfiniteFocusG5 plus the parts are measurable with different evaluation strategies:

- » Geometry and GD&T measurement (roundness) according to technical specifications
- » Surface comparison of two measured parts
- » Inspection of surface deviation to nominal geometries
- » Additional to the shown evaluations, roughness measurements according ISO 4277/4288 (profile based) as well as ISO 25178-2 (surface texture) can be carried out.
- » By using the Software Add-on AutomationManager an automation and therefore minimizing the user influence is possible.