CAF Central Analytical Facilities
STELLENBOSCH UNIVERSITY

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CT Scanner Facility

MicroCT analysis applications series

Tech note 7

Surface roughness by microCT

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Introduction

MicroCT can be used for surface roughness, but this requires excellent scan quality and good voxel size. It works well for very rough surfaces as for additive manufactured parts, and provides two things of interest (1) line profile quantitative roughness profiles and values, and (2) surface colour maps for deviations from geometric surfaces (ie. Planes, cylinders, etc). Here we demonstrate both for a cylinder built in Ti6Al4V.

Results

First, a line profile in this case of 60 mm length was taken and its roughness values calculated from one profile as shown.

The mean roughness is 46 microns, and the voxel size is 35 microns. As you can see in the image, sub-voxel surface accuracy is possible (the white line is an interpolated surface).

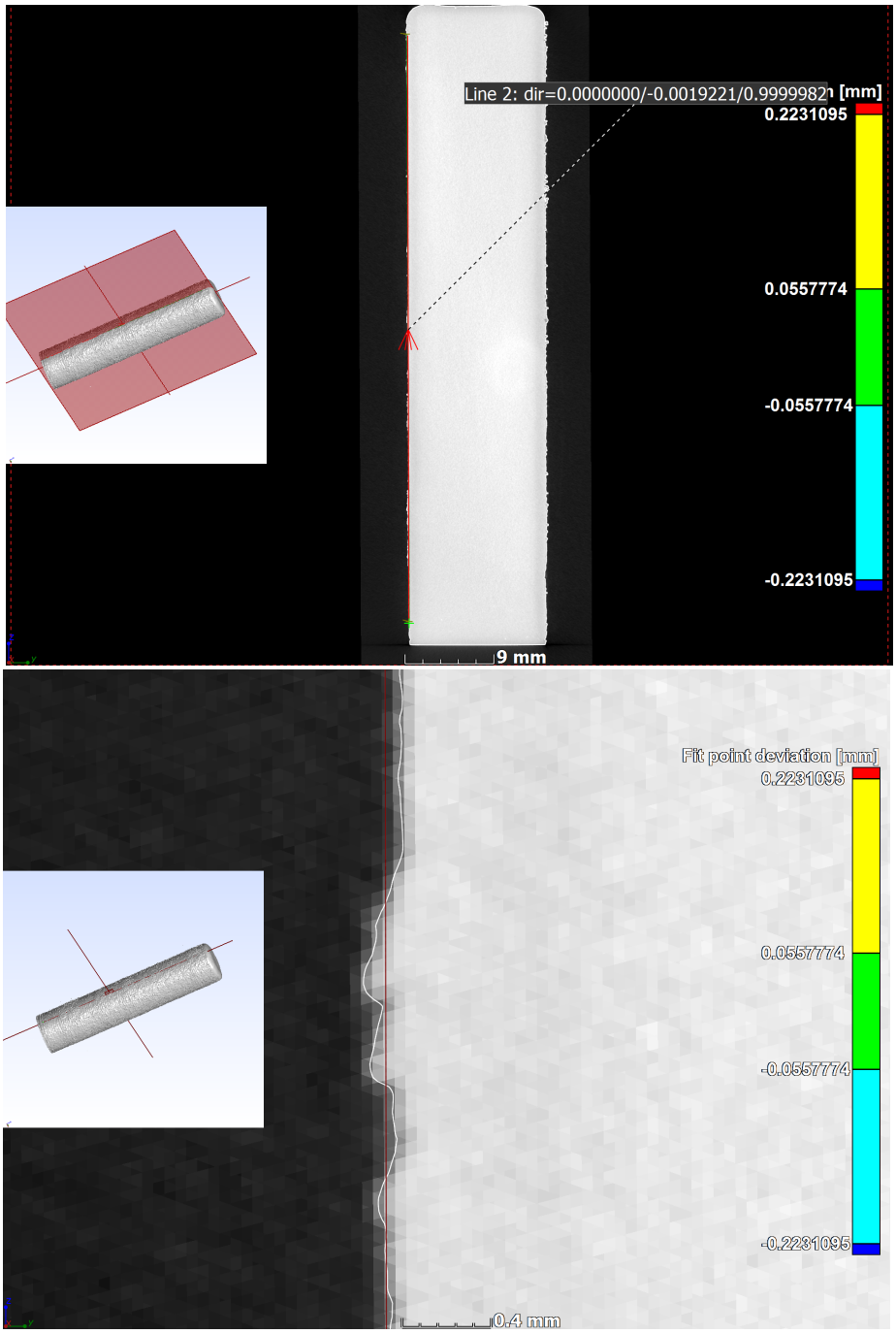
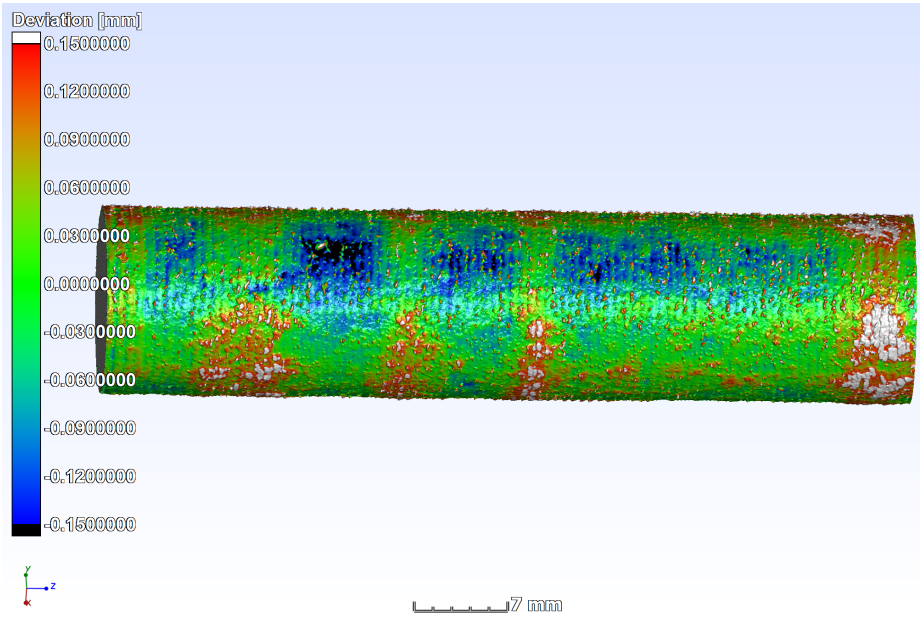


Figure 1: *Line profile surface roughness – in this case the R_z=0.178 mm, R_a=0.046 mm*



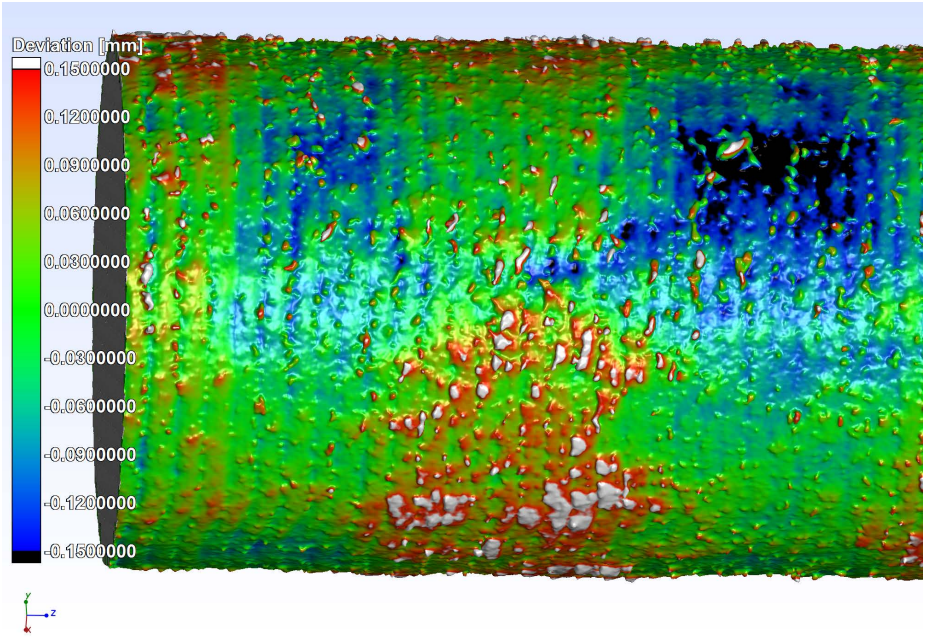


Figure 2: *Colour map of surface roughness (deviation from cylinder)*

Limitations?

Limitations on maximum X-ray penetration – typically samples should be smaller than 150 mm for light metals and 50 mm for steels and similar. This is a grey area depending on part complexity and total material to be penetrated. Total material penetration limits for plastics, wood: 200 mm, titanium alloys and lighter metals: 40 mm; steel: 10 mm.For surface roughness, only very rough surfaces can be measured > voxel size. Best scan quality and processing is required so right now this is a more expensive analysis.

How to go about it

Send your samples or bring it in. This is a non-routine analysis and depends on the sample and voxel size, and geometry required. Anything from US$ 300 – 1000 per sample. Full data can also be provided at additional cost with free viewer software. We use Volume Graphics VGStudioMax 3.0, and myVGL viewer.

SAMPLE SHIPPING AND FORMAL QUOTES

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For more info on image analysis check our youtube channel (click here)

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