CT Scanner
CAF Central Analytical Facilities
STELLENBOSCH UNIVERSITY

CT NEWS

The Stellenbosch CT scanner facility newsletter
"more than just a scan"

May 2015

In This Issue

Recent interesting scans (clickable links)

Metrology of a medical implant
http://blogs.sun.ac.za/ctscanner/medical-implant/

3D printed logo
http://blogs.sun.ac.za/ctscanner/metrology-of-a-3d-printed-logo/

Previous newsletters with many more examples
http://blogs.sun.ac.za/ctscanner/introduction/

3D printing examples and services
http://blogs.sun.ac.za/idea2product

Dimensional Metrology of a medical implant

Custom medical implants can be made to suit an individual patient using additive manufacturing (3D printing) technology. However, these parts need stringent quality controls, which is provided by 3D X-ray inspection. Besides looking for potential defects, dimensional accuracy can be tested – much like a Coordinate Measurement Machine (CMM) – just faster and with a much higher density of surface points. The part was built by the Centre for Rapid Prototyping and Manufacturing at the Central University of Technology, South Africa.

More images and video here:
http://blogs.sun.ac.za/ctscanner/medical-implant/

Welcome

Welcome to our May newsletter. As always we want to share what we can do for you. As 20 May 2015 is World Metrology Day, this newsletter is focused on **metrology**.

X-ray microCT scanning provides the highest quality full 3D data available for dimensional measurement and validation (metrology) of your manufactured components. Our examples this month are a titanium medical implant and a plastic 3D printed promotional university logo.

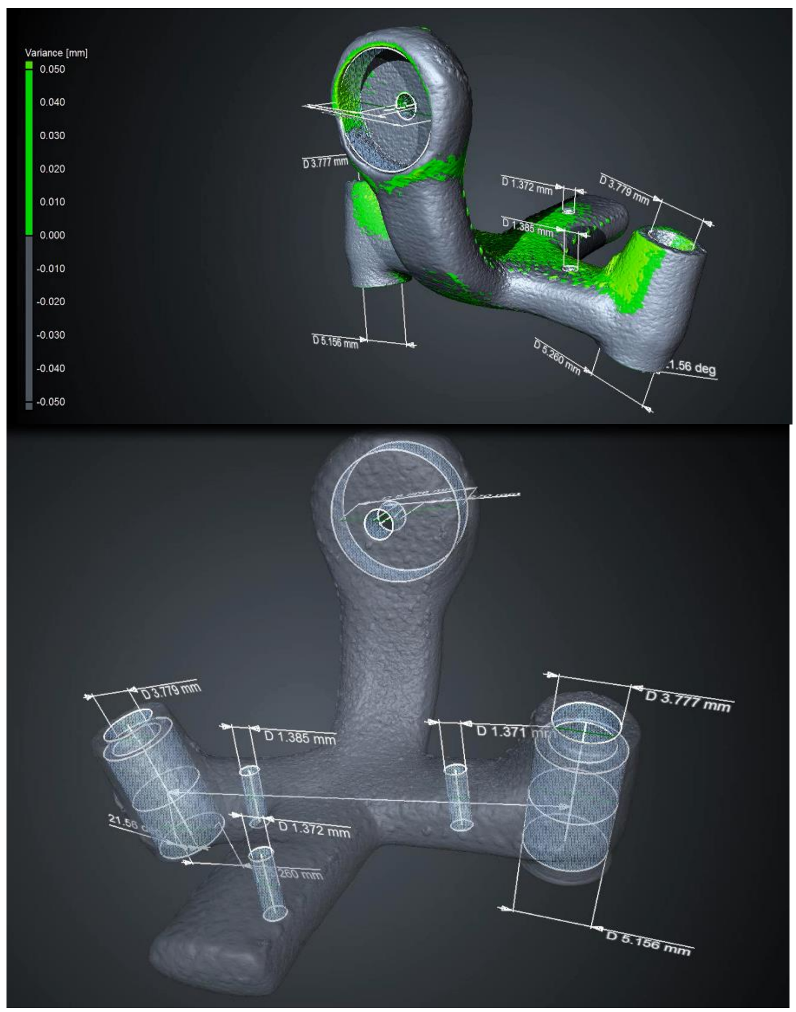


Figure 2: Additive manufactured titanium medical implant, click here for a great video on youtube:
https://www.youtube.com/watch?v=L7XQNzvts38

Metrology of 3D printed logo

A 3D printed Stellenbosch University logo was designed and manufactured at the Stellenbosch Idea2Product lab, a division of the CT Scanner Facility which is located at the university's Launchlab: http://blogs.sun.ac.za/idea2product

This logo which is roughly 30 x 30 x 14 mm is intended to be used for marketing purposes, but also provides a nice example for dimensional measurement using the metrology toolbox of VGStudioMax 2.2. Using sub-voxel accurate surface determinations and fitting functions, very accurate dimensional data can be provided.

A quick overview initially can be provided by a part-to-CAD comparison as shown in Figure 2 top-right. Then, using best-fit planes and dimensional analysis, distances and angles can be measured much like a coordinate measurement machine. The CAD file (STL format) of the surface can be generated for use on other engineering software as well.

A high resolution scan plus basic part-to-CAD comparison and dimensional analysis using these software tools totals 3 hours per sample. For large batches, faster scan times can be used at reduced quality, bringing the time per sample down to 1 hr for >10 samples. Costs are R1300 per hour for commercial clients.
http://blogs.sun.ac.za/ctscanner/metrology-of-a-3d-printed-logo/

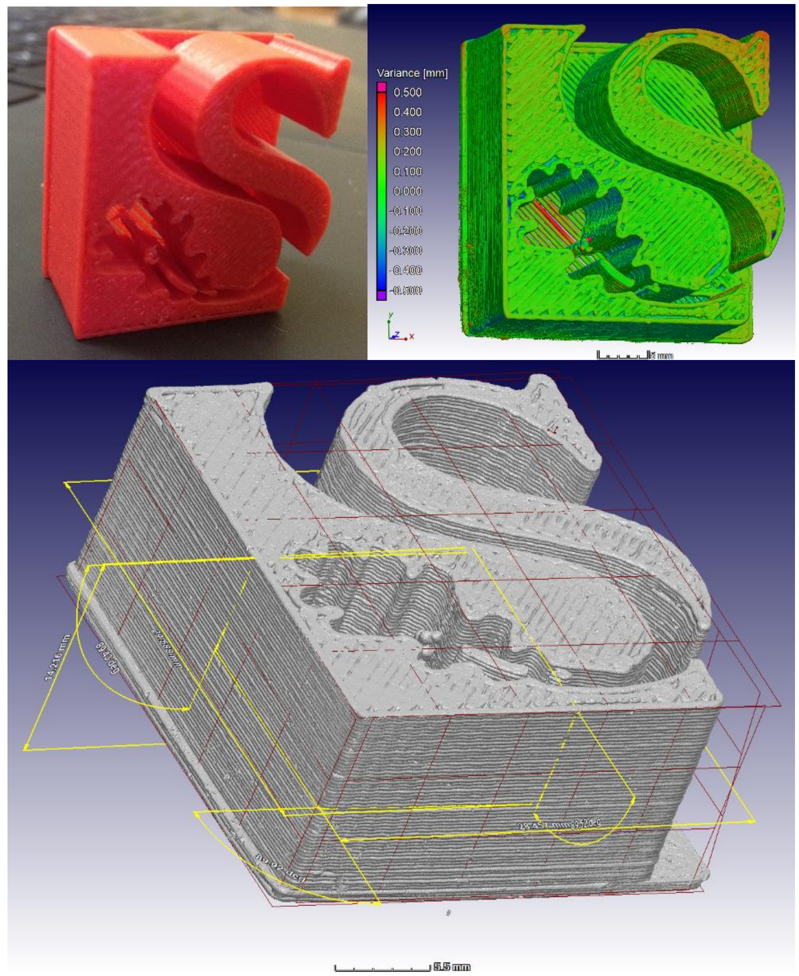


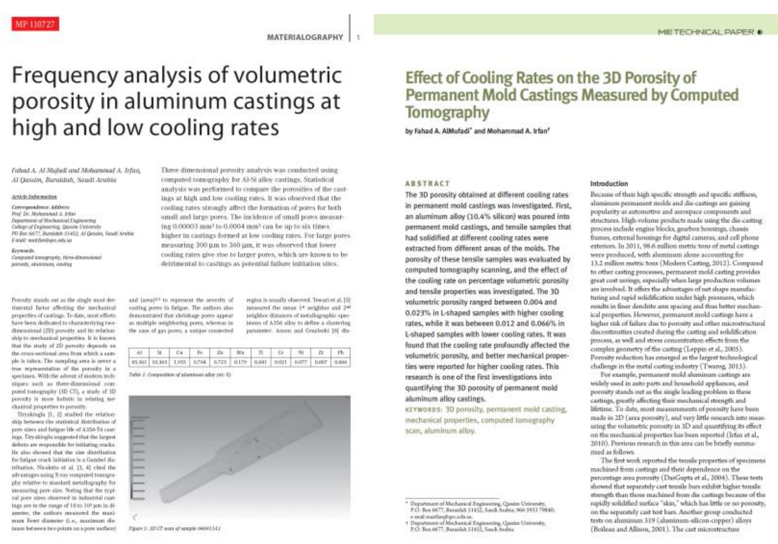
Figure 2: Nondestructive analysis of a 3D printed Stellenbosch University Logo, printed in the Stellenbosch Idea 2 Product Lab using an UP! Printer: Actual part (top left), CT surface data vs CAD file 3D deviation (top right) and metrology toolbox measurements of distances and angles (bottom).

International clients

Our international clients have started publishing some of their results from our facility. Prof Irfan from Qassim University in Saudi Arabia did some interesting work on 3D porosity analysis of light metal castings. Below is a link to one paper and the other requires login, or mail us for a copy.

http://www.hanser-elibrary.com/doi/abs/10.3139/120.110727

https://www.asnt.org/me


Frequency analysis of volumetric porosity in aluminum castings at high and low cooling rates

Effect of Cooling Rates on the 3D Porosity of Permanent Mold Castings Measured by Computed Tomography

Figure 3: Recent publication screenshots from one of our international clients

News & events

Our locally hosted national X-ray tomography conference is planned for September, please register now and submit your abstracts:

- **2nd national microCT conference IMGRAD** (imaging with radiation): 10-11 September, first announcement: http://blogs.sun.ac.za/ctscanner/imgrad2015/
  The first 10 abstracts submitted get free registration, so hurry.

  Abstract deadline 30 June

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Researchers: provide us your equipment to manage as part of our facility, in exchange for zero cost of usage, free maintenance and upgrades. This is a win win situation, where we use it to maintain our facility and enhance our materials analysis capabilities.

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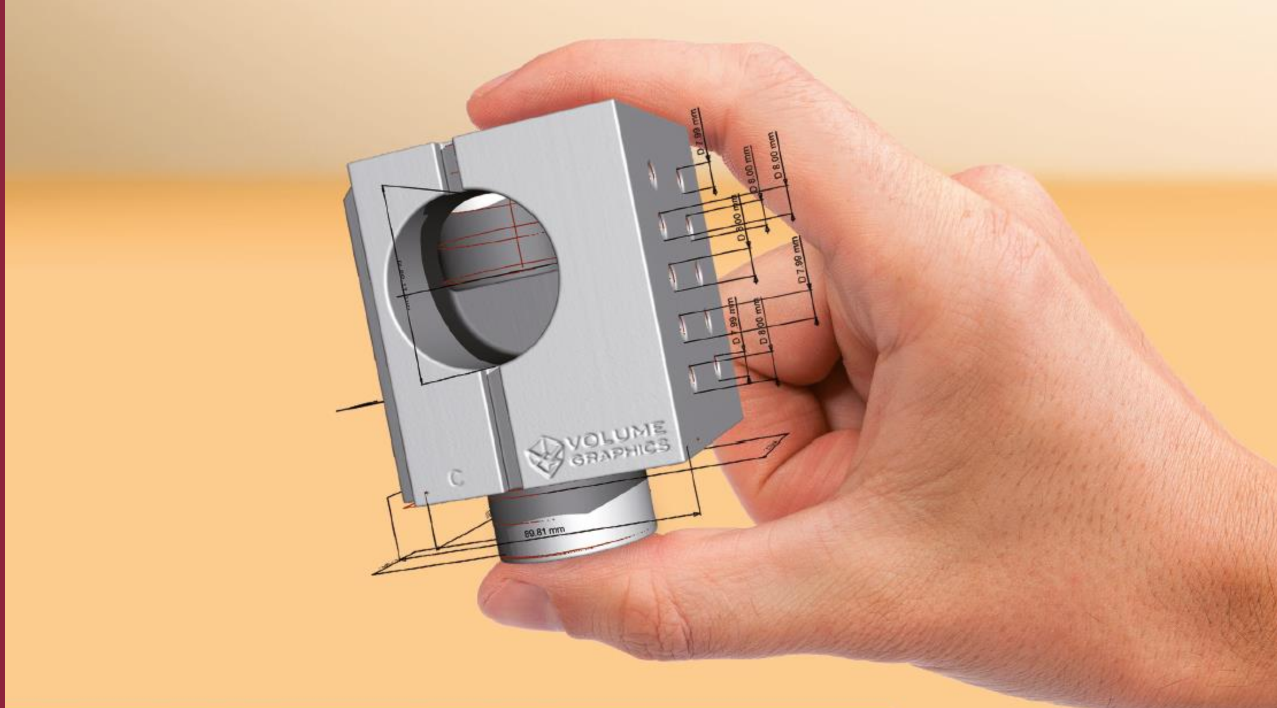
HONEY, I SHRUNK THE CT DATA!



MAXIMUM PRECISION, MINIMAL CT DATA SET SIZES

Measure on voxel data, point clouds, meshes, and CAD data with *VGMetrology*, Volume Graphics' new universal metrology solution. Our easy-to-use stand-alone application turns your computed tomography (CT) scanner into a comprehensive and precise metrology device.

VGMetrology gives you the most precise picture of all object surfaces you can get – and saves it in a new, very compact file format.

In contrast to tactile and optical methods, industrial CT scans all surfaces of an object, even if they are inside your part or difficult to capture. The metrology capabilities of Volume Graphics software are verified by the Physikalisch Technische Bundesanstalt (PTB), Germany's national metrology institute.

Working with a surface based on the original voxel data offers you both a subvoxel precision that is hard to match with mesh data and small, easy-to-handle files. Our new file format is efficient since it contains only the surface of the object. Its files are very precise and at the same time smaller than mesh files with standard precision.

You want to know more? Just contact us!

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