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● Welcome

In this edition we describe the process from scanning, reconstructing, binarizing through meshing to 3D printing. The options and pitfalls for each step are highlighted.

● From scan to 3D print

It is not hard to see why 3D printing is a natural exponent to 3D imaging. In the latest decades 3D printing has become a mainstream technology. Its applications are numerous and include:

- Customization (e.g. implants [Bruker microCT User Meeting, 2010, Verschueren](#)).
- Research and educational purposes ([Bruker microCT User Meeting, 2014, Kleinteich](#))
- Rapid prototyping and production

Below we go over the key steps from scanning to printing, additional information can be found in the method note "[MN081 From scan to 3D print](#)".

- Scan and reconstruct (control program + NRecon)
These two steps in the process are well known to us all. The normal recommendations apply; here it can be of interest even more than usual not to go for the smallest pixel size but the optimal one for the sample. More pixels do not necessarily lead to better results, on the contrary, but will lead to larger datasets and models.

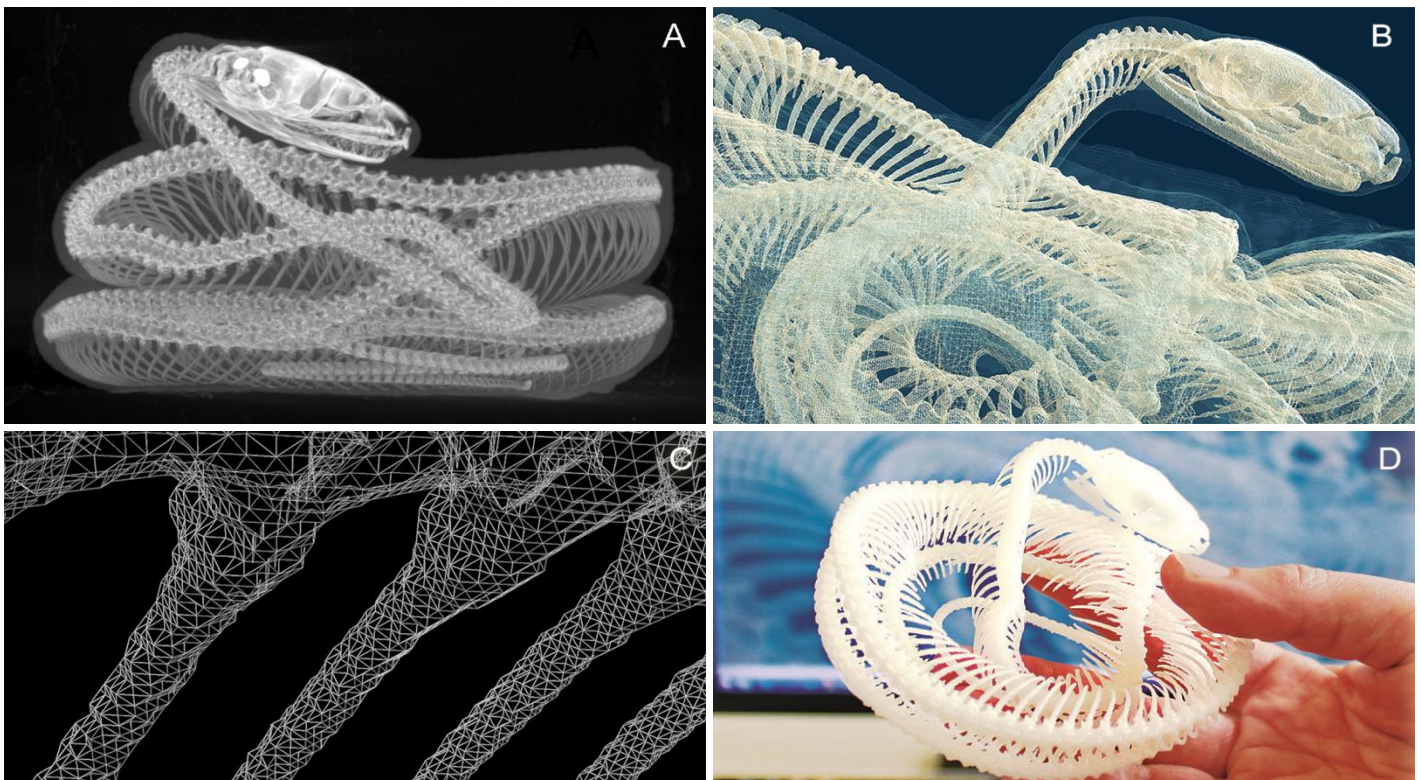


Figure: (A) maximum intensity projection of the reconstructed slices; (B) surface rendering of snake model using CTVol; (C) close-up (the ribs) of the previous, notice the triangular nature of the mesh; (D) 3D print made of the snake skeleton.

- Binarize (CTAn)

The first step of interest might be to resize the dataset if the resolution was above required for the part to be printed. Thresholding proceeds in the usual manner, the aid of image filters can help in facilitating this. Next a suitable ROI is defined. Finally it is advisable to remove potential noise from the image by means of despeckling and/or morphological operations. This can have a great influence on the size of the eventual 3D model.

- Meshing (CTAn).

Next a 3D model representing the surface of our binary object needs to be constructed. Typically it consists of polygonal elements (in our case triangles) of which the vertices and normals are saved.

CTAnalyser allows outputting in the commonly used .stl and .ply file types. Which file type is applicable will depend on the technology used in the printing step.

- Inspection (CTVol)

Prior to printing we inspect the generated mesh, to which end the surface rendering program CTVol is of interest. Especially be mindful that thin structures are preserved well. Some iteration of the binarization and meshing steps might be required.

- 3D printing

We import our model into the 3D printer software and rescale to the desired size. As a final step, depending on the type of printer, the parts can still need cleaning and/or finishing.

- Image of the Month

Three orthogonal reconstructed slices through a sample of Savonnières limestone (France). It is an oolitic limestone, showing the typical concentric carbonate rings that formed under marine conditions. Note the inserted scale bar and annotations made with the latest version of DataViewer. The sample was scanned using the SkyScan2211 at 60kVp and with 0.5mm Al filter.



- Bruker microCT News

- Updates for NRecon, CTVox and DataViewer are available from the website.
- In the news: The Jamestown Project - SkyScan1173 reveals mystery of the silver box: <http://bruker-microct.com/company/news.htm#youtube>
- On Aug. 27-28 the USA user meeting took place in Chicago attracting more than 40 persons. We would like to thank all attendees and especially the speakers for making these two days of talks and workshop a success!
- The [Bruker PCI user meeting](#) will take place in Ettlingen, Germany on Oct. 13-14.
- A user meeting in Russia will be organized by our local partner, Nienschanz-ScienTific, on Oct. 15-16 in Tyumen, Russia.

- Upcoming events

Bruker microCT will participate with an exhibit in the forthcoming conferences. Please click the link below for more information. We hope to see you there!

- [ASBMR](#) Oct. 09-12 Seattle, USA
- [BCEIA](#) Oct. 27-30 Beijing, China
- [MRS](#) Nov.29 - Dec.04 Boston, USA