

Bruker microCT
 Kartuizersweg 3B
 B-2550 Kontich, Belgium
 Tel: +32 (0)3 877 5705
 Fax: +32 (0)3 877 5769
applications.BmCT@bruker.com
www.bruker-microCT.com

In this issue:

- [Spatial resolution testing of microCT](#)
- [Bruker microCT news](#)
- [Upcoming events](#)
- [Image of the month](#)

● **Welcome**

Welcome to the last newsletter of 2016. This month's edition delves deeper in ways of determining the spatial resolution of microCT systems in 2D and 3D. As of next year microCT content will be integrated in the Bruker AXS FIRST newsletter. By this way we hope to inform you about interesting developments in our group over a wider range of technologies.

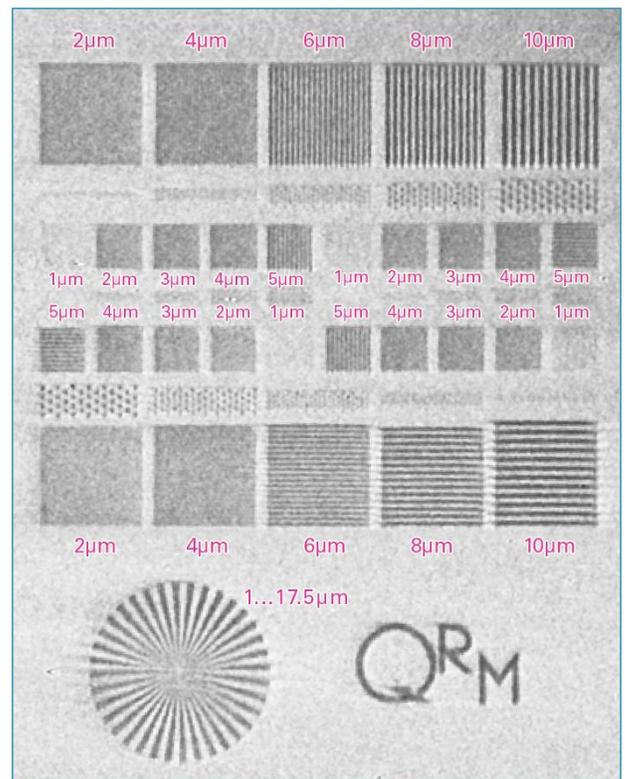
● **Spatial resolution testing of microCT**

Numerous methods to assess the performance of microCT systems have been proposed over the years. Typically, the limiting factor at high resolution are the focal spot dimensions. This is why many tests rely on determining the spot size from 2D projection images only. The true spatial resolution in 3D however depends on many more factors, not in the least the mechanical accuracy of the system. The required temporal stability makes for a much more demanding situation than for relatively short duration 2D tests. Finally, the processing and reconstruction algorithms also have a significant influence on the achievable spatial resolution in 3D.

▪ **Spatial resolution in 3D**

A good tool for the assessment of the 3D spatial resolution is the Micro-CT Bar Pattern NANO Phantom available from [QRM GmbH](#). The phantom contains two silicon chips placed in orthogonal positions, enclosing several resolution test patterns from 1 to 10 μm . In '[MN099 3D spatial resolution using QRM phantom](#)' the use of the phantom is exemplified for the SkyScan 1272 desk-top high-resolution micro-CT.

Alternatively, ASTM E 1695-95 contains a test method based on a scan of a uniform cylindrical test object (e.g. an aluminium pin). The 3D spatial resolution is quantified by means of the modulation transfer function. Additionally, instructions for determination of the contrast sensitivity are given. A handy tool for these calculations can be downloaded from our [website](#).

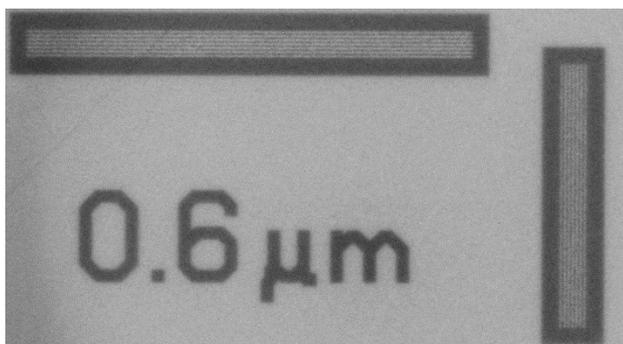


Reconstructed slice from a scan of the Bar Pattern NANO Phantom available from QRM GmbH performed with the SkyScan 1276 high-resolution in-vivo micro-CT at an image pixel size of 2.8 μm .

▪ **Spatial resolution in 2D**

Careful evaluation of the transmission profile through a test object, such as a ball or crossed wires from W alloy or Pt, allows determining the edge unsharpness. From this the spot size can be calculated as described in EN 12543-5:1999 or alternatively ASTM

E 2903-13 for spot sizes of 5 μm to 300 μm . For higher resolution systems the focal spot size can be calculated by analysing the modulation transfer function MTF determined from line or star patterns. The [JIMA](#) resolution charts RT RC-04 and RT RC-02B contain line patterns in the range 0.1 – 10 μm and 0.4 – 15 μm respectively.



Projection image of MicroChart JIMA RT RC-02B acquired with the SkyScan 2211 multi-scale X-ray nanoCT .

● Bruker microCT news

- In 2017, the content of the Bruker microCT Academy newsletter will be integrated in the Bruker newsletter and presented on a bi-monthly basis from February onwards. Your subscription will be transferred automatically. To support you even more, we will also organize live software demonstration webinars starting from March. You will find more information in the next newsletter! We wish you all happy holidays and hope you will join us again in 2017!
- Bruker microCT installed the first micro-CT system into a high-load Instron® testing machine at Gdansk University of Technology. The Instron® load frame can apply up to 50 kN to an object during compression or tensile tests. The micro-CT system integrated in the Instron® machine allows 3D imaging of the internal microstructure with spatial resolution of 15-40 μm while applying force. More information can be found on the [website](#).

● 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!

2016:

- [Zoology](#) Dec. 16 – 17 Antwerp, Belgium

2017:

- [iCT](#) Feb. 07 – 09 Leuven, Belgium
- [ORS](#) Mar. 19 – 22 San Diego, USA
- [IADR](#) Mar. 22 – 25 San Francisco, USA
- [AACR](#) Apr. 01 – 05 Washington DC, USA
- [EMIM](#) Apr. 05 – 07 Cologne, Germany
- [Interpore](#) May 08 – 11 Rotterdam, The Netherlands
- [ECTS](#) May 13 – 16 Salzburg, Austria

● Image of the month

3D Volume rendered image of a medieval human skull from Thuringia, scanned in the SkyScan 2211 nano-CT at 50 μm image pixel size. We kindly thank the Friedrich-Schiller University Jena for providing the sample.

