



# INSTRUMENT DATABASE

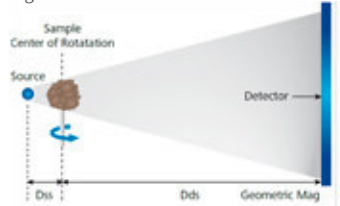
## Non-destructive 3D imaging and testing of materials

### II X-RAY COMPUTED TOMOGRAPHY (X-CT)

3 D X-ray micro-computed tomography (micro-CT) provides non-destructive access to the internal microstructure and composition of materials.

The sample, situated between x-ray source and detector, sequentially rotates in steps of less than 1°. During a full 360° rotation several hundred projection images are taken. After numerical back projection of the images, the volumetric data can be visualized and analysed using software tools such as Volume Graphics that provide access to any desired 3D view or 2D cross section of the sample. The magnification using conventional CTs depends on the source-sample-detector distance (Fig. 1).

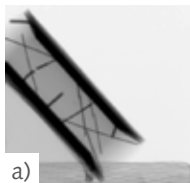
Fig. 1



Using conventional CTs depends on the source-sample-detector distance (Fig. 1).

Using X-CT it is possible to non-destructively:

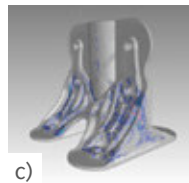
- investigate microstructural properties at multiple length scales;
- characterize and quantify pore structures and inclusions;
- investigate grain and fibre orientation;
- characterize and observe fracture mechanics;
- visualize biologic structures including cellular and subcellular features;
- investigate historic artefacts.



a)



b)



c)

Fig. 2: a) X-ray image of a compression- and impact-loaded pin-reinforced sandwich structure; b) 3D view of bi-component fibers ( $\varnothing$  200  $\mu$ m); c) short fibre injection moulded T-bracket, 3D view and color-coded pore analysis.

# II X-RAY CT: PHOENIX-XRAY VITOMEIX M

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## 01 II General Information

**Keywords:** X-ray computed tomography, tomography, non-destructive testing, in situ, X-CT, CT, NDT

**Categories:** Material Properties, Dimensional Properties, Surface / Interface Characterization

**Main Application:** 3D material characterisation, in situ experiments and non-destructive testing of metals, compound materials, and opto-electronic components

**Measured Quantities:** 3D-shape, defects, interfaces, volume

**Year of Fabrication:** 2014, funded by Wirtschaftsförderung Bremen WFB

**Manufacturer:** General electric (GE); Phoenix-xray vltomelx m; research edition

**Features:** special in situ equipment for time dependent 4D studies during heating, cooling, under tension or tensile compression.

## 02 II Specifications

- 180 kV / 15 W nano-focus x-ray tub  
Detail Detectability: down to 1  $\mu\text{m}$   
(object size 2 mm)
- 240 kV / 320 W micro-focus x-ray tube (up to 40 mm steel)  
Detail Detectability: down to 3  $\mu\text{m}$
- Max. Object Size (height x diameter)  
600 mm x 500 mm;
- Max. Object Weight 50 kg

## 03 II Contact:

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