

Technical Details

At Fraunhofer ITWM, a system for 3D computed tomography using X-rays is available. It is suitable for non-destructive analysis of various materials such as foams, fibrous materials, polymer composites, metals, ceramics or concrete. The device is composed of the following components:

- X-ray tube Feinfocus FXE 225 (max acceleration voltage 225 kV, max power ~20 W)
- PerkinElmer flat bed detector with 2048 × 2048 pixels for high-energy scans of strongly absorbing materials (applicable from 100 kV to 225 kV acceleration voltage)
- Thales flat bed detector with 3072 × 3072 pixels for low energies for weakly absorbing materials (applicable from 40 kV to 160 kV)

The highest nominal resolution of the CT system is 0.8 μm, the lowest about 100 μm. The resolution that can be reached in reality depends on sample size and material to be scanned.

Sample Geometries

Maximal sample size: cylinder of diameter 100 mm, height 100 mm, higher samples can be scanned as stack. Sample sizes depend on desired nominal resolution as well as the detector used.

Thales detector:

- nominal resolution in $\mu\text{m} \times 10^3 \times 2$ = edge length of the square base area or
- nominal resolution in $\mu\text{m} \times 10^3 \times 2.5$ = diameter of the base area of the cylindrical sample

PerkinElmer detector:

- nominal resolution in $\mu\text{m} \times 10^3$ = edge length of the square base area or
- nominal resolution in $\mu\text{m} \times 10^3 \times 1.5$ = diameter of the base area of the cylindrical sample

Example: Nominal resolution of 1 μm requires 2 mm edge length of the square base area or 2.5 mm diameter of the base area of the cylindrical sample if the Thales detector is used.

Contact

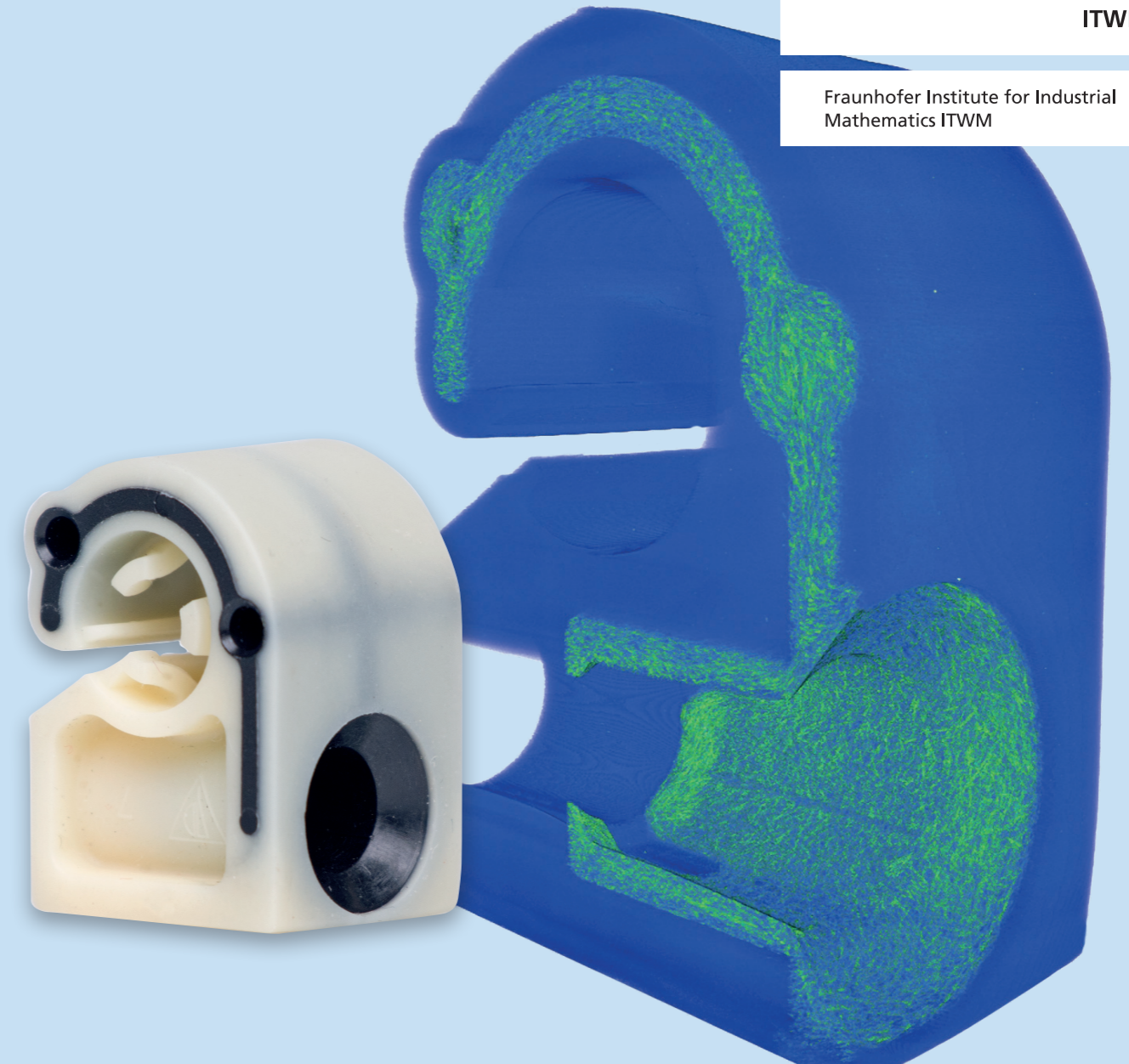
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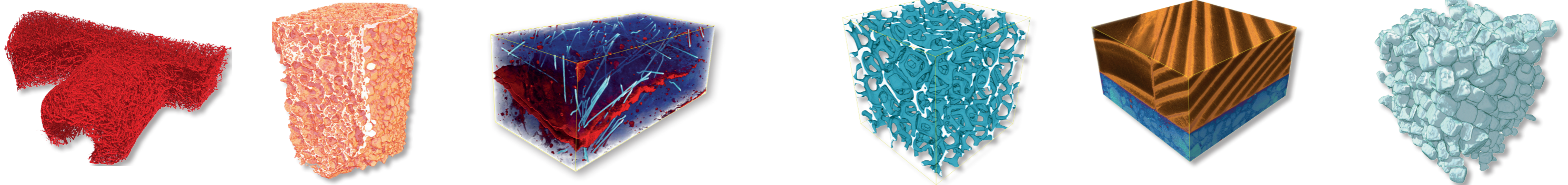


For more information please go to www.mavi-3d.de/en



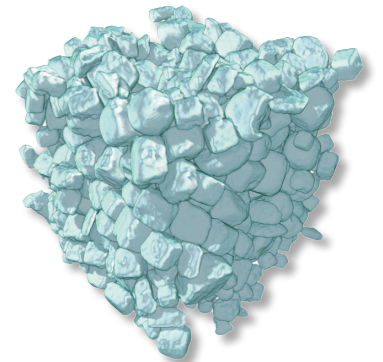
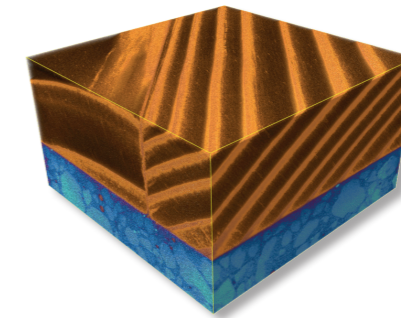
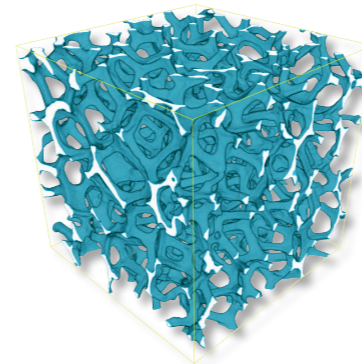
3D-Microtomography Analysis of Microstructures

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Material type*	Standard analysis	Optional**	
all materials	<ul style="list-style-type: none"> porosity or volume density specific surface area or interfacial area anisotropy structure shape index 	<ul style="list-style-type: none"> local pore sizes, local material thickness surface meshing, input for CAD homogeneity analysis connectivity analysis 	
Additional features for some common material classes	cellular media	<ul style="list-style-type: none"> pore or cell reconstruction distributions of pore/cell characteristics: volume, shape, surface area 	<ul style="list-style-type: none"> number of neighbors per cell strut or wall thickness distribution
	porous fiber structures	<ul style="list-style-type: none"> specific fiber length and thickness global and local fiber orientation analysis 2nd order orientation tensors 	<ul style="list-style-type: none"> fiber thickness distribution cloudiness
	fiber composites	<ul style="list-style-type: none"> global and local fiber orientation analysis 2nd order orientation tensors 	<ul style="list-style-type: none"> global and local fiber volume fraction layer thickness
	powder, granulate, sintered materials	<ul style="list-style-type: none"> particle separation distributions of particle characteristics: volume, shape, surface area kissing number 	<ul style="list-style-type: none"> neighbor analysis length, width, thickness maximal and minimal Feret diameter
	composites	<ul style="list-style-type: none"> specific interfacial area 	<ul style="list-style-type: none"> correlation analysis

*Further materials and characteristics on request **Additional charges apply – please contact us!



Pricing

The following prices are valid for repeated scans of the same sample or of very similar samples or materials within the same work package.

Scans	Simple	Complex material
first	2.250 €	2.750 €
further	900 €	1050 €

From left to right: glass fiber reinforced composite part, biscuit, concrete, metal foam, wood polymer composite, salt.

Title: Brake pipe clip.

All images taken using ITWM's CT device. All visualizations obtained using MAVI.

A material is complex, if it needs particularly high resolution, if it absorbs X-rays very weakly, or if its micro-structure makes scan or analysis difficult (e. g. multi-phase). We let you know whether your material is complex right at your initial request.

Scope of delivery

- analysis report including explanation of analysis methods in PDF format
- tomographic reconstructions
- visualizations

Optional:

- movies
- local analysis results as csv file
- stl-data sets in case the add-on "meshing" was chosen
- on-site presentation and elucidation of the report
- We will retain a backup copy of your data for six months.

Time of delivery

Standard service: You will get an estimation of service time immediately after order receipt. We will inform you about any possible delays.

Fast-track service (surcharge 100%): We begin processing your data on the day of order receipt. The precise processing time will depend on the number of specimens and the material's difficulty. Availability on request.

Please feel free to contact us for further tasks like in-situ experiments, other sample geometries, and other resolutions.