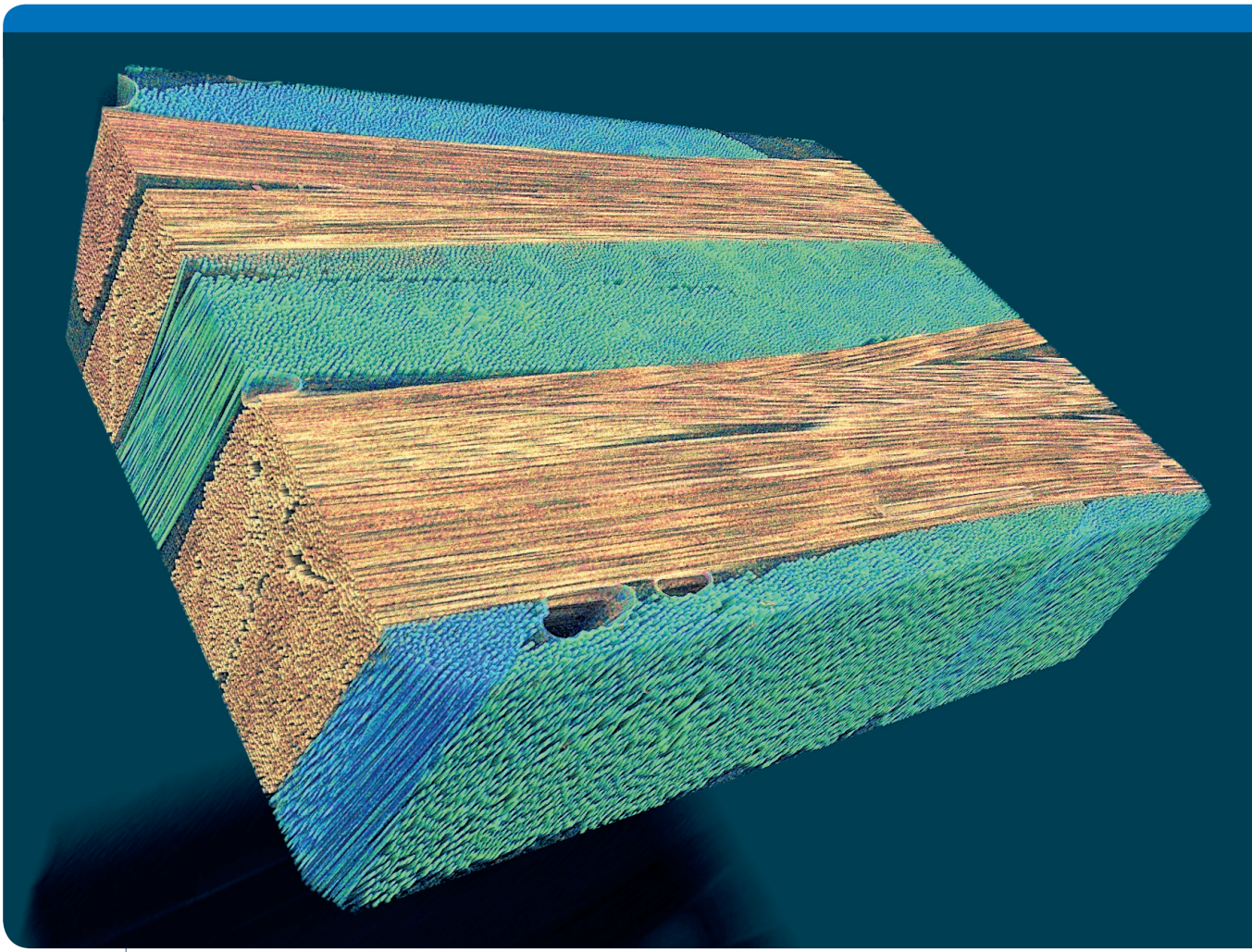


Imaging and Analysis of Fiber Composites

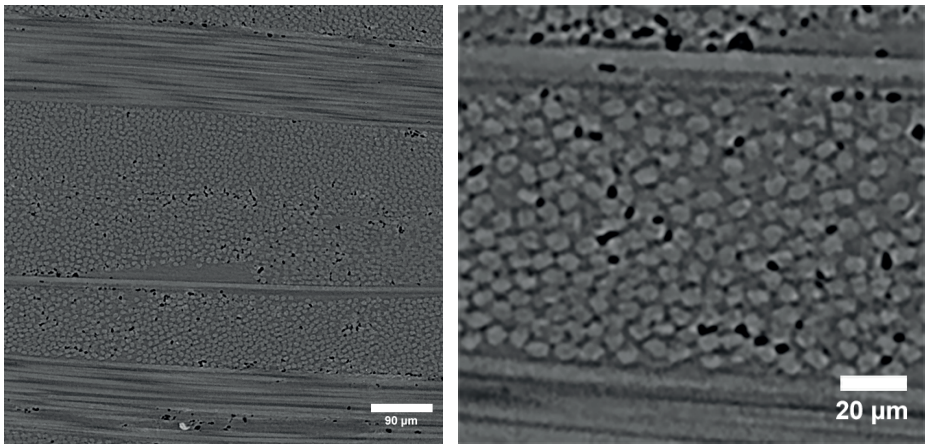
- High-resolution Micro-CT

Microtomography

Innovation with Integrity

High resolution and large field of view

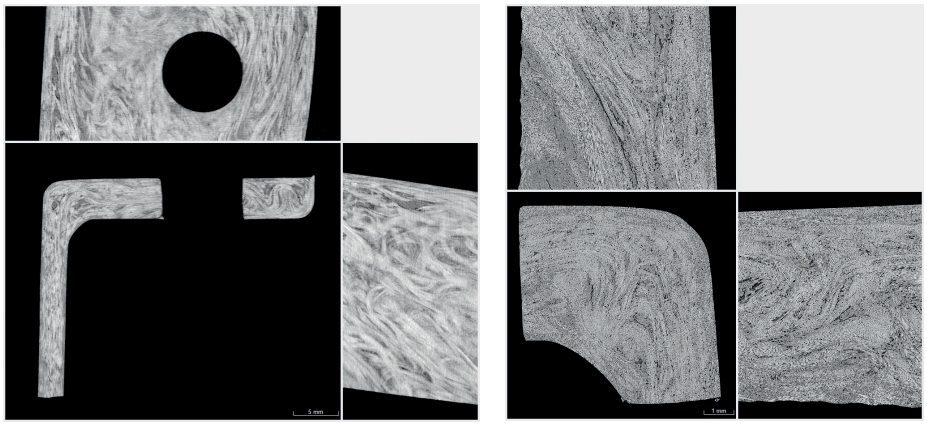
SKYSCAN systems allow scanning samples over a decimeter in diameter and with true spatial resolution below 500 nm. Large format cameras, up to 16 megapixel, ensure high resolution even for big samples.



Slice through a Carbon Fiber Reinforced Plastic (CFRP) sample from a nano-CT scan at 350 nm image pixel size.

Multiscale imaging and analysis

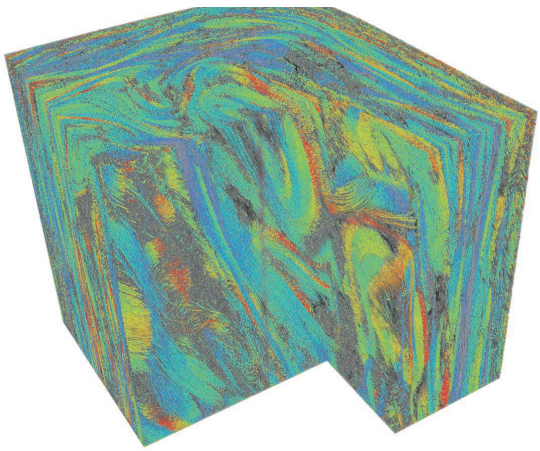
Inherently X-ray micro-tomography is a non-destructive technique, where the sample size can be strongly correlated to the achievable image quality. Combining scan data acquired at different resolutions allows linking sample characteristics across multiple length scales.



Glass Fiber Reinforced Plastic (GFRP) sample scanned with the SKYSCAN 1272 at 21 µm (left) and sub-sample at 2 µm image pixel size (right).

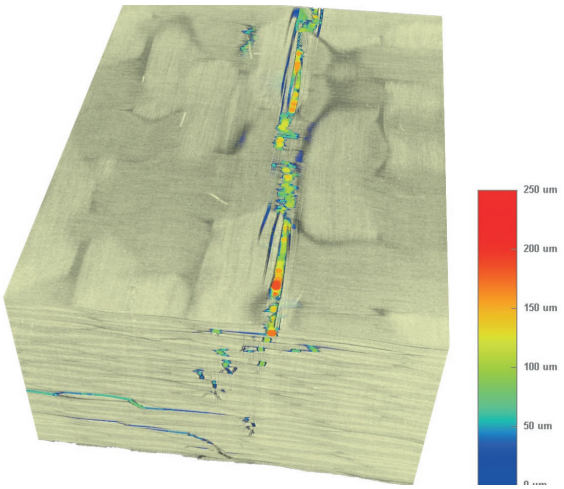
Fiber analysis and orientation

CTAnalyser allows multiple ways of characterizing fibrous structures, both globally as for each individual fiber. For key characteristics, such as size, orientation and major diameter, color coded images can be generated.



Volume rendering of a GFRP sample scanned with the SKYSCAN 1272 at 2 µm image pixel size. The fibers are color coded by local orientation.

Front page: Volume rendering image of a CFRP sample, color coded by local orientation. Scanned at 600 nm image pixel size using the SKYSCAN 2214.



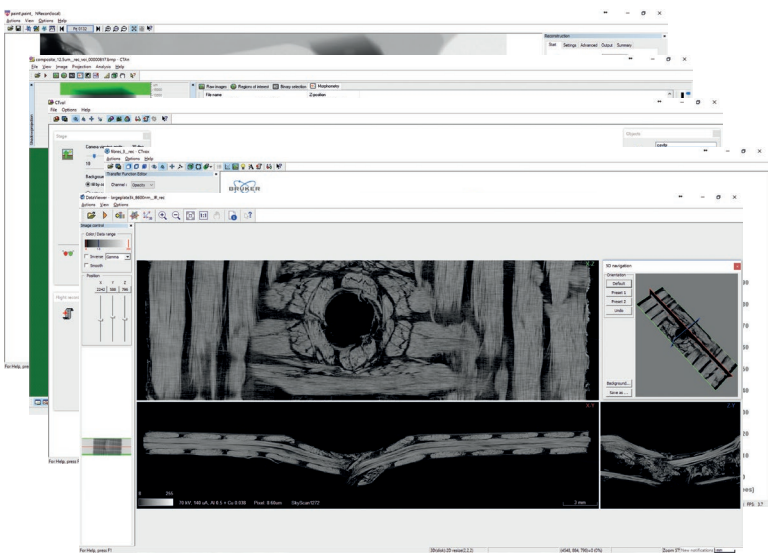
Volume rendering image of a CFRP sample after flexural strength test scanned at 8.25 µm image pixel size. The porosity is color coded by local thickness.

Damage characterization

X-ray micro-CT is an invaluable tool for assessing damage and failure mechanisms in composite materials. Cracking and delamination can be directly observed and quantified on multiple scales. Failure of components can be visualized down to the level of individual fiber breakage.

In-situ and dynamic experiments

SKYSCAN systems are compatible with in-situ material testing system for compression, tension, heating and cooling. The standard supplied software package allows registration of datasets from different time-points in an automatic way. Dynamic processes, such as crack propagation, can be followed in 3D.



SKYSCAN software suite

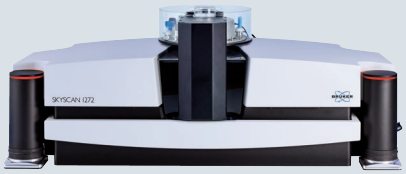
With every system a fully in-house developed software suite is provided, covering every aspect from acquisition, over reconstruction to analysis and visualization. Meshes can be generated for use in modelling, CAD compare or 3D printing. Non-proprietary formats are used allowing maximal compatibility with third-party software.

Specifications

SKYSCAN 2214 – Multi-scale X-ray nano-CT

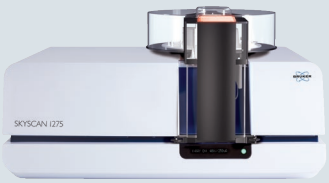
- Up to 3 CCD cameras (large format, mid format and hi-res) and one 6 Mpx flat panel detector
- Down to 60 nm pixel size – better than 500 nm spatial resolution
- 160 kV peak accelerating voltage – 13 W power on target
- Up to 140 mm scanning diameter and 130 mm scanning length
- Licensed exact spiral reconstruction
- InstaRecon® – the world's fastest reconstruction algorithm

SKYSCAN 1272 – High-resolution desktop micro-CT



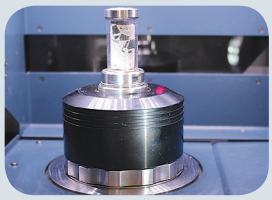
- 11 or 16 Mpx large area CCD camera
- Down to 0.35 µm pixel size
- Up to 200 Mpx in every slice
- InstaRecon© – the world's fastest reconstruction algorithm
- 16 position sample changer

SKYSCAN 1275 – Fast, automated desktop micro-CT



- Down to 4 µm pixel size
- Automated operation with Push-Button-CT™
- 96 mm (diameter) x 200 mm (height) sample size
- Licensed exact spiral reconstruction
- 16 position sample changer

In-situ testing stages



- Compression up to 4400 N
- Tensile up to 440 N
- Cooling down to 40 °C below ambient
- Heating up to 85 °C

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