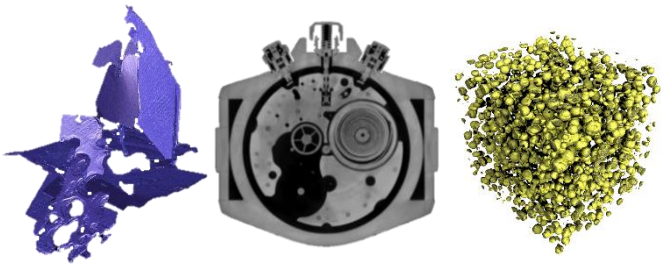
NOVITOM
Advanced Analytical and 3D-imaging Services

Synchrotron X-ray micro-Tomography (SR-µCT)

Data sheet

Type of samples : **nearly all kinds**
Max sample thickness: **50 cm**
Max sample height: **2.5 m**
Typical sample size: **< 10 cm x 10 cm x 10 cm**
Sample preparation: **none**
Pixel size: **0.15 µm → 50 µm**
Energy range: **20 keV → 300 keV**
Acquisition time: **1 s → 10 min per sample**
Available sample environment:

- **Mechanical testing : traction, bending, compression**
- **Temperature range : -100°C → 2000°C**
- **Specific environment : chemistry, hygrometry …**

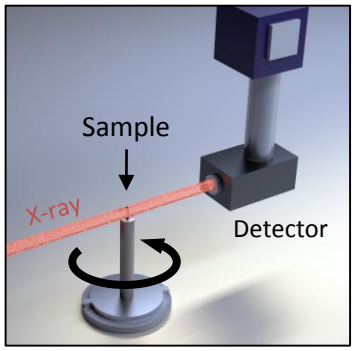


Why SR-µCT ?

SR-µCT is a non destructive technique suitable for any type of material and sample that allows for 3D characterization and advanced NDT in a large range of resolution.

Principle

The principle of microtomography is the same as the medical scanner but at much higher resolution. The sample is positioned between an X-ray source and a detector and about 2000 radiographs are acquired at various angles of rotation (see figure below). Mathematical algorithms are then used to reconstruct from the series of 2D projections a 3D image in which the gray levels are correlated to the local density of the sample.



3D characterization

- **Pores/particles/phases** (number, size, volume fraction, location, morphology …)
- **Fibres** (orientation, quantity, size, shape …)
- **Surface roughness** (visualization of the true surface, quantification against standards)
- **Microstructure evolution** (following of global or local parameters)

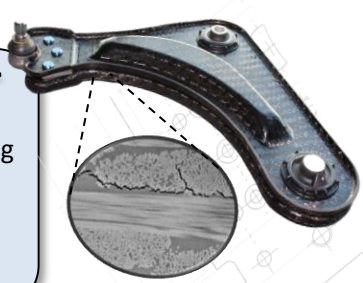
Main advantages

- **High resolution** : it is possible to perform a 3D scan at a pixel size of 0.15 µm in 10 min and go to even higher resolution with nano-tomography set-up
- **Phase contrast**: it enhances drastically image quality and allows for phase separation of materials of similar composition and/or density
- **High penetration power**: Tunable energies are available (from 20keV to 300keV) and makes it possible to go through 7 cm of steel to see defects inside with a voxel size of (50 µm)^3.
- **Fast acquisition** : The high brilliance of synchrotron beams allows fast acquisition. A 3D scan can be obtained in less than 1 s and live following of solicitations (mechanical, thermal …) is possible.

Novitom develops customized experimental devices adapted to 3D scans (see next photos of the Novitom 5k micro-press)

Advanced NDT

- Detection and imaging of **inhomogeneities, defects and cracks**
- **Reverse engineering**



Comparison with lab devices

- Higher contrast
- Higher magnification
- Higher screening capabilities
- Higher penetration power
- Live scanning available