TESCAN DynaTOM

The world's first dedicated dynamic micro-CT for your in situ experimental needs.

DynaTOM is the world's first and only laboratory micro-CT system dedicated for your most demanding time-lapse, in situ and dynamic experiments. Time-lapse imaging to non-destructively study the 4D evolution of materials and samples in their real-world environments has been a major motivation for X-ray tomography for decades. Where conventional micro-CT designs have fallen short, TESCAN has risen to meet this challenge with DynaTOM: a micro-CT imaging platform dedicated to enabling new science and applications through dynamic tomography.

In Situ Applications enabled through Dynamic CT:

- ✓ Multi-phase fluid flow in porous media
- ✓ Tensile failure studies of structural alloys and composite materials
- ✓ Crack propagation and fracture mechanics in engineered materials, geological samples and more
- ✓ Hydration studies in porous materials from geoscience to consumer products
- ✓ Crystal growth and mineralization in geo materials and construction materials
- ✓ Plant germination, growth and decay
- ✓ Freezing, melting and heating cycles in food science applications

Imaging of Delicate Samples:

Certain delicate or soft samples, or those embedded in liquid can benefit from DynaTOM's stationary-sample architecture, especially for high-throughput applications, where sample rotation can introduce unwanted sample-stability issues.

Gantry-based Design

DynaTOM's unique horizontal gantry-based hardware design, with a source and detector rotating around a stationary sample, enables continuous scanning without compromising in situ rig flexibility.

Continuous Scanning

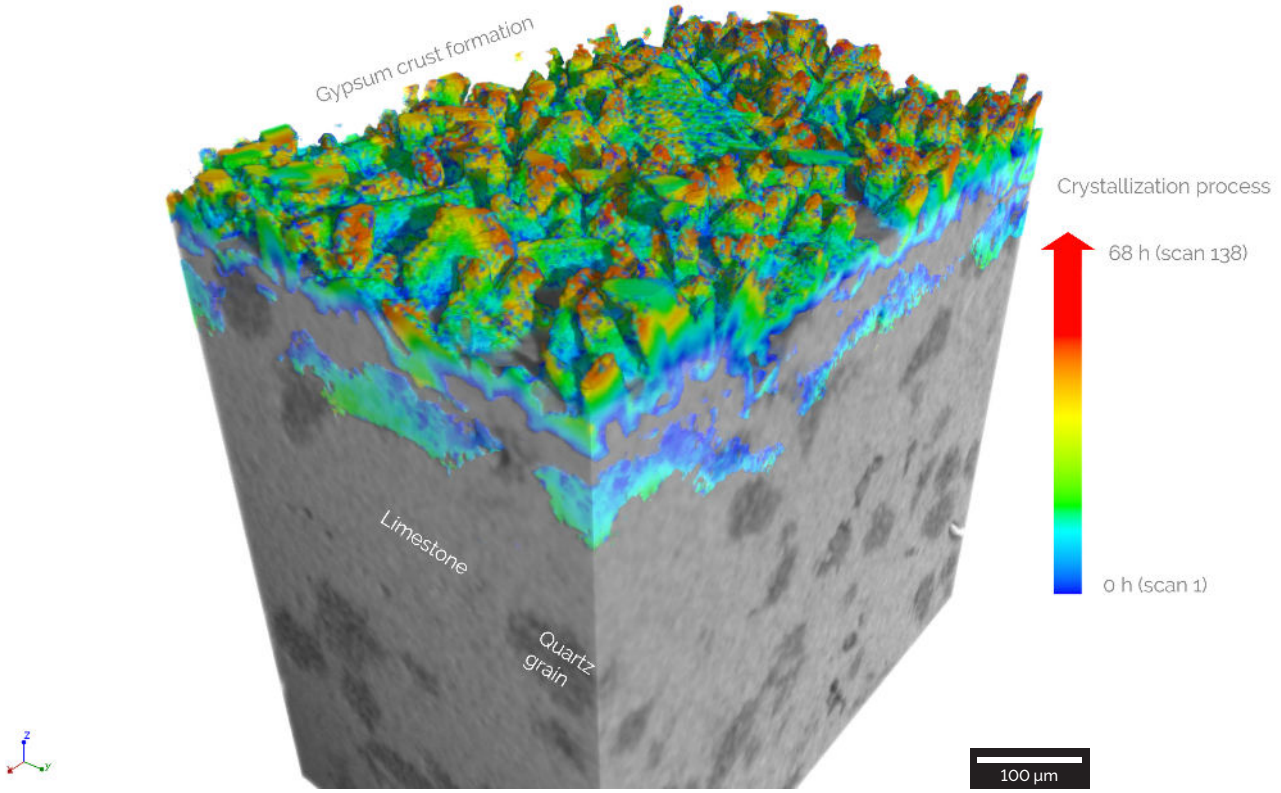
Observing dynamic events can be unpredictable and frustrating. DynaTOM's standard continuous scanning mode lets you capture all raw data without missing the most critical moment. Pinpoint critical moments and optimize reconstruction accordingly, using Acquila's time-lapse reconstruction protocols.

High Throughput

Optimized for throughput, it is capable of performing 360-degree scans faster than 10 seconds. Combined with TESCAN's pioneering software developments and 4D tools, DynaTOM is an essential tool for researchers wishing to exert maximum control and flexibility over complex dynamic experiments.

▲ **Fig. 1:** Delicate beer foam sample mounted inside the DynaTOM.

▲ **Fig. 2:** Evolution of beer foam structure during collapse, showing 3 segments in a continuously acquired dynamic CT series. Temporal resolution: 9 seconds per rotation.



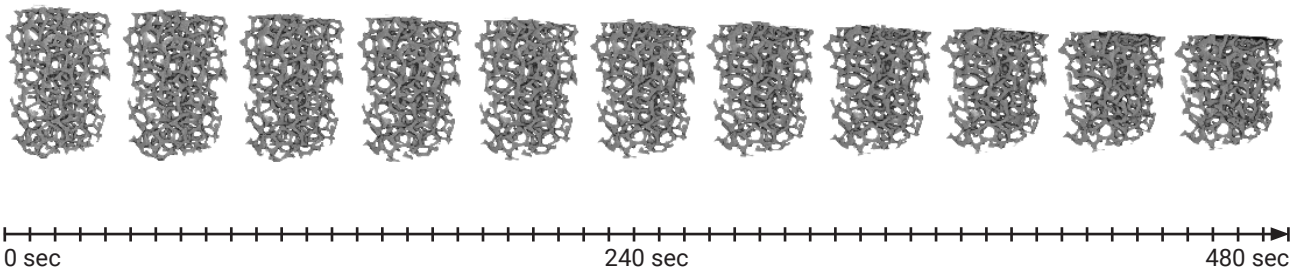
▲ **Fig. 3:** 3D render of 138 scans of a crystallizing gypsum crust on a sandy limestone. Color corresponds to the time evolution of the gypsum formation and sub-surface microporous layers.

Unique Software Tools for 4D

DynaTOM delivers a suite of dedicated software tools working in harmony with hardware, aimed to streamline the process of in situ rig integration, 4D acquisition, reconstruction, automatic event detection and dynamic visualization.

Dynamic Screening for Synchrotron Beamtime

Fast, continuous scanning is regularly employed at synchrotron research facilities around the world. However, most users waste critical beamtime struggling to orchestrate scanning and in situ testing at the same time. DynaTOM can be used as an indispensable test-bed for tuning the complexities of these experiments, maximizing your effectiveness and output at the synchrotron.

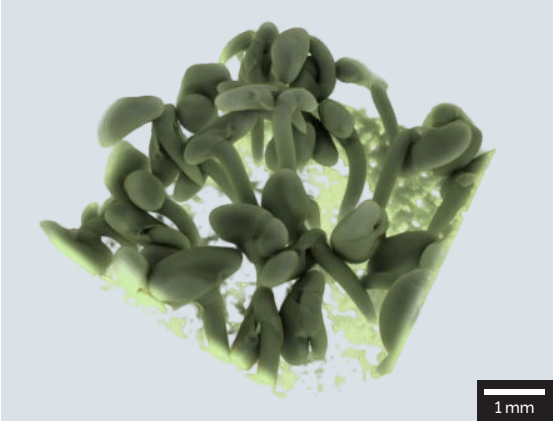


▲ **Fig. 4:** Dynamic compression series of a 12 mm aluminum foam, with 12 seconds temporal resolution, per rotation.

Acquila

Designed to maximize flexibility for research, Acquila is a modular software architecture for tomographic acquisition and 3D reconstruction.

It enables standard, automated and customized micro-CT workflows with seamless integration between acquisition, reconstruction and peripheral experimental equipment (in situ stages).

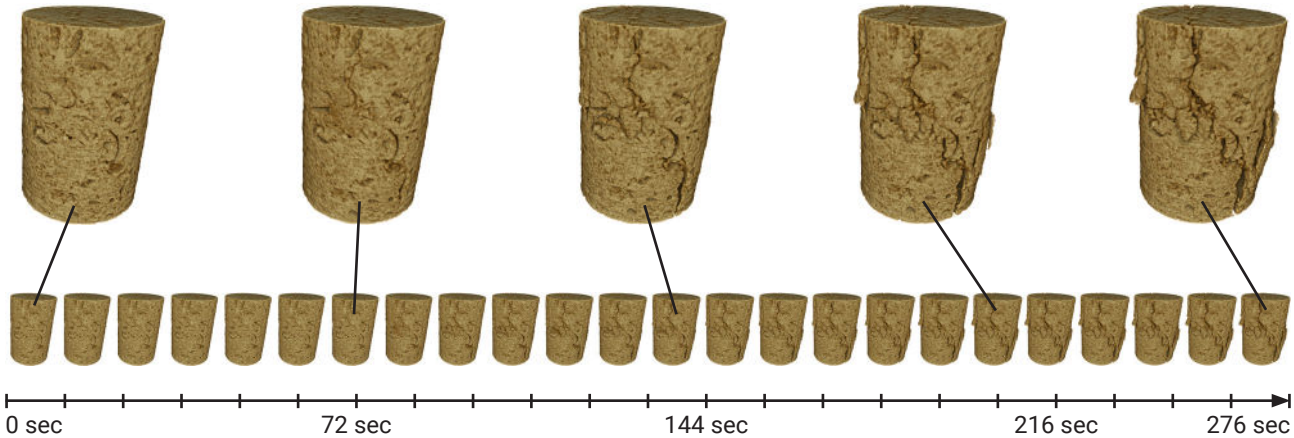


▲ **Fig. 5:** Germination of cress seeds observed in the DynaTOM

Key Specifications

Max. temporal resolution	<10 seconds for 360-degree acquisition
Max. spatial resolution (line-pair)[1]	3 µm or less
Geometry	Fixed sample (Gantry design)
X-ray source	40 – 130 kV / 39 W Type: Sealed / Reflection
X-ray detector	1900 × 1500 pixel; CMOS flat panel
Max. CT FOV (∅ x h)	200 mm × 480 mm
Max. sample weight	45 kg
Motorization	8 axes
System dimensions (approx.)	1.7 × 1.8 × 2.2 m (W x L x H)
System weight (approx.)	5200 kg

[1] Spatial resolution determined based on JIMA line pattern



▲ **Fig. 6:** Time-lapse series of dynamic compression of a 9 mm limestone plug, with 12 second temporal resolution, per rotation.

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