Using µXCT/XRM in-situ temperature controlled testing stages - CT160

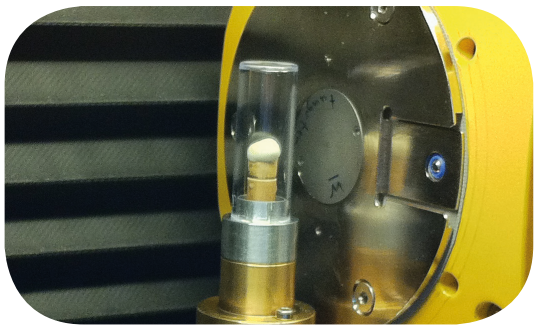
In-situ testing stages provide an immediate interpretation of how the properties of materials and composites change under different loading and temperature conditions. Deben have developed a range of tensile/compression and cooling sub-stages to work with the most common µXCT & XRM systems.

3D X-ray microscopy facilitates quantitative understanding of microstructure under both ambient and in situ environmental conditions. This enables imaging and tomography of microstructures as well as observation of micro and nano-structural evolution under a variety of conditions.

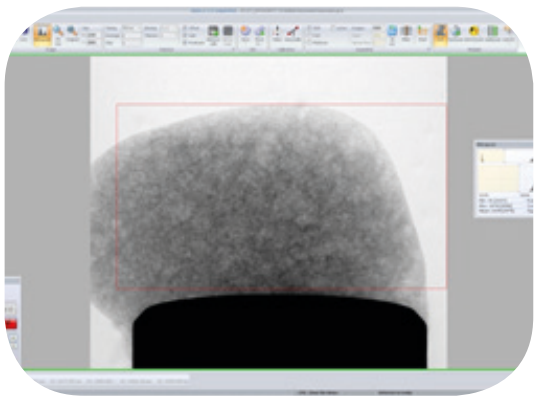
Deben Coolstage uses Peltier technology to heat and cool specimens. Used in an µXCT system samples may be imaged in a frozen condition through a dual window which prevents icing and allows samples to be rapidly cooled to -20°C or heated to +160°C. Samples are loaded into a variable height specimen holder set at the optimum height for X-Ray imaging. As with all Deben stages, mounting adaptors are available for most commercially available CT systems while cabling and piping allows for complete 360° rotation.

The Coolstage system is fully self-contained and comprises a thermally isolated specimen holder with a single stage Peltier device, dual temperature sensor, water chiller, power supply and keypad for digital temperature readout and control. It does not require an external water supply or chiller.

Many different materials may be studied using µXCT & XRM. These range from teeth and bones to complex advanced composites. Deben's stages may be found in laboratories worldwide. Here, we look at an application for the CT160 in-situ stage.



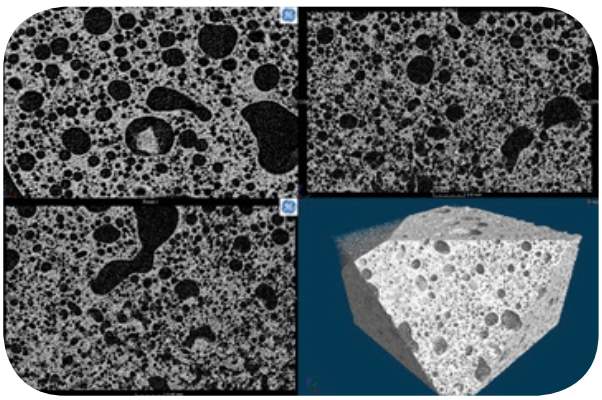
A sample of ice cream mounted in a µXCT system



Samples may be viewed in 2D

Ice cream:

While the consumer may think about flavour and texture when eating ice cream, the manufacturer is going to be considering another variable – AIR. The more air that may be incorporated into the product, without losing the texture demanded by the consumer, is the goal in manufacturing as this will help drive costs down. Putting this into a quantitative and measurable set of commodities, the manufacturer wants to be able to control the number, size and distribution of air voids throughout the finished product.



Processing of images to enable quantification of voids – includes 3D reconstruction

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