

Specifications for a Table-top X-ray Microtomography Unit

The x-ray computed microtomography unit, hereafter called the XCMT unit, must scan an object and output a computer file, in a standard format, which contains three dimensional absorption contrast information concerning the object's internal microstructure.

The following minimum requirements are necessary.

Materials: Scannable objects may be made from metals, plastics, ceramics, glasses, organic materials, geologic materials, or combinations thereof.

Maximum Scannable Object Size: must be at least 35 mm

Maximum Object weight:

Stage Rotation and Positioning:

X-ray Source: air-cooled, sealed micro-focus x-ray tube, 100 kiloVolts (kV) acceleration voltage, >10,000 hour lifetime.

X-ray Spot Size: < 5 microns at 4W, 20-100 kV, 0-250 microAmps

Object Magnification: XCMT will be equipped with adjustable source to camera distance which provides selectable magnifications

X-ray Detector: 4000 x 2300 pixel, 12 bit digital CCD camera

X-ray Filtering: capability of having up to three interchangeable x-ray filters for beam-hardening compensation and multi-energy scanning

Effective Pixel Size at Max. Magnification: minimum 0.8 microns

Low Contrast Resolution: minimum 5 microns

Computer: minimum dual processor workstation with hard drive storage, DVD writer, monitor, mouse, keyboard, capable of image capture, with all required software necessary for volume reconstruction and volume rendering

Reconstruction Algorithms: Both back-projection for fan-beam, and cone-beam algorithms must be provided. Correction for beam hardening must be available. Network volume reconstruction must be available.

Radiation Safety: <1 micro Sievert/hour at any point on the instrument surface

Electrical Utilities: 100-130 V AC, 4 A

Size & Weight: the XCMT unit should be smaller than 1.5 x 0.7 x 0.4 meters and weigh less than 250 kg.