

AbstractID: 4950 Title: A Portable Test Platform for Image Acquisition and Calibration for Cone Beam Computed Tomography (CBCT) and Region of Interest CBCT (ROI-CBCT) on a Commercial X-ray C-arm System

Purpose: We have developed a unique portable test platform (PTP) which enables CBCT for specimens and phantoms on standard commercial clinical x-ray systems. This PTP can be used to acquire ROI-CBCT projection images, where a lower resolution, lower dose image peripheral to a high resolution ROI is acquired. This is achieved either by acquiring an image using an Image Intensifier (II) with an ROI filter in the x-ray beam or by combining images acquired separately with low and high resolution x-ray detectors.

Method and Materials: The CBCT images are acquired as the object rotates on the computer-controlled rotary table of the PTP. For ROI-CBCT, a micro-angiography (MA) detector or an ROI filter is mounted on the PTP. The PTP also provides for relative X, Y, Z adjustments. After coarse alignment adjustments of the PTP, fine translational and angular adjustments are made based on fluoroscopic imaging of a cylindrical calibration phantom.

Results: The PTP allows quick assembly of the parts required for CBCT or ROI-CBCT reconstruction, reduces initial setup time to < 45 min, and provides for setup reproducibility. The system can be aligned to within one pixel (43 micron for the MA detector), with angular alignments of pitch and roll of the object better than 0.7° and 0.1° respectively.

Conclusion: The PTP allows fast and reliable set-up and alignment of CBCT specimens, for standard and for ROI-CBCT applications. The PTP may enable wider use of CBCT and ROI-CBCT for specimens and phantoms without a costly dedicated system.

(Partial support from NIH Grants R01-NS43924, R01-EB02873, R01-HL52567, R01-EB02916, and Toshiba Medical Systems Corporation)