

AbstractID: 9514 Title: Use of a 'virtual cross-hair' to calibrate a kV imaging system for online radiographic set-up verification

An on-line kV imaging system is being implemented for the verification of patient set-up. The system consists of a 'kV-source/flat-panel' combination mounted on an Elekta linear accelerator drum with the imaging axis at right angles to the therapy axis. It is capable of diagnostic quality fluoroscopy and planar radiographs, and can be used to verify patient set-up utilizing bony landmarks and/or clips and markers (e.g. seeds). A key issue to resolve before the kV imager can be used to accurately verify the MV field set-up, is the registration between the kV and MV imaging axes. This registration is complicated because the two axes are 90 degree out of phase with respect to gantry rotation (i.e. the gantry must be rotated by 90 degrees to move the kV source to the position of the MV beam). The 90- degree phase lag heightens sensitivity of the system to subtle mechanical motions of the gantry, including corkscrew and gantry sags. We have developed a method to overcome this difficulty with a software implementation of a 'virtual' cross-hair that is burned in to the kV image and reflects the true position of the MV central axis. Accurate placement of the virtual cross-hair requires detailed knowledge of kV and MV source positions under gantry motion. Experimental methods to accurately determine the virtual cross-hair placement will be presented. Performance of the system is demonstrated by application to head and neck patient utilizing bony landmarks, and by continuous breast imaging using cavity clips. Supported by Elekta Oncology Systems.