

AbstractID: 6581 Title: Validating a Video-Based 3D Surface Imaging System and Its Use to Set-Up CBCT QA Device

Purpose: To validate resolution of a video-based 3-D surface imaging system before its clinical use and to test feasibility of using system in setting-up a cone beam CT (CBCT) QA device to accelerate the total QA process.

Method and Materials: A CBCT QA alignment tool called Ball-Bearing device (BBD) (Elekta Inc.) is designed to check the coincidence between the MV and kV beams' isocenters. The micro-stepping meter of the BBD allows precision adjustment to better than 0.01 mm in three directions. A foam phantom was added to the BBD in order to generate a large 3-D surface image which can be detected by a video-based 3-D surface imaging system (AlignRT system, VisionRT Ltd., London UK). The BBD-phantom has been imaged by the AlignRT system with changes in position (0.0 to 8.0 mm) in all three directions independently. The phantom shifts were determined by AlignRT and compared to the preset ones. After this validation test, AlignRT has been used in the initial set-up of the CBCT device in replacement of the iterative process required to set the BBD to the MV isocenter. By carefully setting-up the BBD using the iterative imaging method to place the ball-bearing to MV beam isocenter, a reference image of BBD-phantom was taken using AlignRT. Subsequently, AlignRT was used in BBD set-up; multiple tests have been performed and testing continues.

Results: AlignRT can detect 0.1 mm change in both lateral and longitudinal directions, 0.3 mm in vertical direction. AlignRT reduced set-up time for CBCT QA device by a factor of two compared to traditional iterative method.

Conclusions: AlignRT can detect fractional mm shifts in the BBD-phantom; vertical resolution is not as sensitive as horizontal. AlignRT can be used in setting-up the CBCT QA device (providing appropriate phantom added) and significantly reduces set-up time.