AbstractID: 7554 Title: Efficient and Automated MLC QA at variable gantry angles for IMRT QA

PURPOSE:

The success of an IMRT program depends upon the accuracy of the Multi-leaf Collimator's (MLC). The usual QA and calibration of MLC's are carried out at a gantry angle of 0°. We have developed a tool, which efficiently and accurately, measures the MLC offsets from desired position at different gantry angles.

MATERIALS/METHODS:

Data was acquired on a Siemens Oncor linear accelerator, which was equipped with an EPID for a period of 6 weeks. The geometric corrections are applied to the images at the imaging workstation. The EPID was exposed to 5 strips of width equal to 2cm. Data was obtained at various gantry angles. The data was compared with the template and later evaluated with software developed in Matlab 7.1. We compared the results from two edge detection algorithms, 'Sobel' and 'Canny'. Data was obtained to verify the accuracy of the auto initialization process.

RESULTS:

Time require to obtain and analyze MLC strip data at gantry angles of 0°, 90°, 180°, 270° was 12 minutes. It was observed that the overall effect gantry angle on error distribution is not significant, i.e. it's within ± 2mm. Effect of leaf position on error distribution, Pre and post AI, and weekly drifts were evaluated. It was observed that the percentage of leaves with a cumulative error less than 1mm at gantry angle of 0 and 180 was 80 %, while that for gantry angle of 90 and 270 was 72%.

CONCLUSION:

The tool helps the physicist and service engineer regarding the frequency and magnitude of AI/Calibration required. Currently the service engineer enters the leaf offsets manually to correct the encoder, which is stored in an EPROM. We plan to enter the offsets directly from software presented here to the EPROM via the controller card.