

AbstractID: 13305 Title: dMLC Leaf Position Tests for Dynamic Arc Using Array Detector Devices

Purpose: For dynamic arc and intensity modulated arc therapies, new challenges have arisen in treatment commissioning and routine physics QA due to additional variation in gantry rotation. A specific dMLC test for leaf position accuracy in dynamic arc deliveries using commercial available 2D array devices was tried.

Materials and Methods: The method of the dMLC dynamic test was developed based on a Picket Fence type test which was originally designed for static gantry application. The new tests were performed either at a series of fixed gantry angles in the range of 360 degree or dynamically with a rotating gantry and a dynamical MLC delivery. A PTW Seven29 ion chamber array and a Sun Nuclear MapCheck diode array were employed as detection devices for the measurements.

Results: The results measured from both devices showed similar intensity distributions in dynamic Picked Fence patterns. The results were also consistent with our previous film dosimetry studies, which implicates that the leaf position accuracy could be degraded due to gantry dynamical rotation. The difference from the results of two different device measurements were compared with each other, and the pro and con for the measurements using these two devices were discussed.

Conclusion: Our tests could detect MLC leaf displacements at specific gantry angles and due to gantry rotation. The test could be implemented for a routine MLC QA for those dynamic arc therapies such as dynamic conformal arc and volumetric modulated arc therapies. While both PTW and Sun Nuclear array detectors could be easily used for a routine arc QA procedure, the PTW Seven29 ion chamber array provides a better resolution and much lesser dependence on the mechanical setup accuracy.

Conflict of Interest: Peer Koltermann is an employee of PTW