

AbstractID: 9109 Title: The effect of leaf transmission on IMRT QA in a MiniMLC linear accelerator

Purpose: Commissioning treatment planning systems for IMRT require more tests and verification of the beam model than those required for 3D conformal techniques. This study presents the dependence of IMRT QA pass/fail rate on the modeling of MLC leaf transmission in a MiniMLC linear accelerator. This particular modeling parameter doesn't affect the tests for 3D conformal situations per commissioning guideline. The results of both film QA and Mapcheck analysis will be presented. **Method and Materials:** Elekta Synergy S linac equipped with Beam Modulator collimating head was used (4mm leaves, no movable backup diaphragms) Beams were modeled in CMS XIO following the guidelines of TG53. IMRT plans were calculated for a phantom target (mock prostate) and the accuracy of the dose delivery was measured using both film and Mapcheck Gamma analysis. Then, the beam model in XIO planning system was replaced by the model with substantially lower MLC transmission factors, the plans were re-optimized, and re-delivered. **Results:** Original beam fitting (following linac commissioning) was internally verified by at least two independent measurements and checked against standard datasets (average passing rate of 97.8%). However, in our test plans, these fits showed relatively poor agreement between planned and delivered treatment as verified by both film and Mapcheck-based dosimetry. Average passing rate using film dosimetry was 88% and using Mapcheck it was 71%. After beam re-fitting using the decreased MLC Transmission factor, the agreement between planned and delivered dose increased to 98% and 87%, respectively. **Conclusion:** Commissioning of treatment planning systems for IMRT should include measurement verifications for IMRT plans of relatively complex modulation, in addition to standard tests from guidelines for 3D conformal planning.