Purpose: To establish an acceptable quality assurance (QA) criteria for IMRT patient specific QA. There are no established criteria regarding agreement between patient's planned dose distributions versus QA measurements.

Method and Materials: A series of MLC QA test patterns were run to detect/correct MLC leaf positional inaccuracies for a Varian 2100C and Elekta Synergy (both with 80 leaf MLC). MapCheck, a 2D diode array system, was used to determine optimal correctional parameter, Dosimetric Leaf Gap (DLG), used in the Varian Eclipse/Helios treatment planning system (TPS) (accounts for effect of MLC rounded-leaf end geometry). Patient's IMRT plan was checked by resetting all fields to a fixed gantry angle (beam down), delivering summed dose of each beam, measuring with MapCheck, then comparing with TPS calculated dose distribution. QA results for a total of 48 segmented MLC (SMLC) IMRT cases (37 prostate, 9 head and neck, 1 pelvis, and 1 brain) were reviewed.

Results: MLC position uncertainties were reduced from 0.3-0.4 mm to 0.1-0.2 mm by a careful calibration. An optimal DLG of 2 mm was determined for Elekta Synergy. Using criteria of $\pm$3% dose agreement or $\pm$3mm distance to agreement (DTA), measured absolute dose distributions agreed with planned dose distributions as follows: prostate: mean 98%, 2.3% S.D.; H&N: mean 89.1%, 8.4% S.D.; pelvis: mean 90.5%; brain: mean 91.1%; for the total 48 cases, mean 96%, S.D. 5.4%.

Conclusion: MLC positional accuracy and having optimal correctional parameter within the TPS are two key factors to ensure IMRT delivered dose in good agreement with calculated dose distribution. Using MapCheck as described, we have implemented the following pass/fail criteria for patient specific QA measurement results: 85% of points within $\pm$3% and $\pm$3 mm DTA in absolute dose. Our clinical experience shows that this is achievable even with the most complicated H&N cases.