

AbstractID: 2886 Title: Quality Assurance for the Siemens Multileaf Collimator: A Procedural Review

Purpose: Many national and international commissions recommend quality control programs for radiotherapy including tolerances and frequency of the tests for treatment units. However, the quality assurance program (QA) for specific Multileaf Collimators is not available. In this paper, we discussed the quality assurance consideration for Siemens MLC and reviewed the QA procedures followed in our institution.

Methods and Materials: QA of the MLC for conformal radiotherapy needs to be redesigned to achieve the required accuracy for IMRT. In general, the MLCs require more stringent tolerances and more involved QA program. The goal of quality assurance can be summarized as follows.

- i) Calibration of Y-jaws to radiation
- ii) Optical and radiation field matching
- iii) MLC field size calibration
 - a) Mechanical calibration
 - b) Optical calibration
- iv) Leaf position accuracy and reproducibility
- v) Leakage radiation and transmission radiation between leaves and through leaves
- vi) Effect of gravity on leaf positions and leakage radiation
- vii) Jaw speed verification
- viii) Verification of functional and safety interlocks

Some tests are performed at cardinal gantry and collimator angles to verify the effect of gravity and friction on leaf positioning and reproducibility. Besides, the uses of multileaf calibration fixture tool for various procedures discussed.

Results: A summary of the tests, frequency and their tolerances are provided. However, this is different from the recommendation of AAPM TG40; the tolerances are set with the MLC configurations and limitations in mind.

Conclusion: A broad quality control program is necessary in particular for progress to continue along the route of conformal and intensity-modulated irradiation techniques. We believe that maintaining stringent tolerance limits are necessary and Siemens MLC fairly maintains such tolerances. In our institution, a comprehensive MLC QA requires about 35 minutes every month and it is a fraction of the time compared to the total machine down time.