

AbstractID: 3469 Title: Dosimetric Effect of Jaws for Small MLC Fields in 6 and 15 MV Photon Beam

Purpose: This study measures how the relative position of the jaws above the MLC could affect the dose characteristics of a small field. The study focused on the variations in the percentage depth dose (PDD), beam profile and output of the small field when the jaw-ends were moved away from the leaf-ends, that is, when the leaf leakage/transmission and jaw scattering were changed.

Method and Materials: A big scanning water tank system (RFA 300, Scanditronix Medical AB) generally used in the commissioning was used to measure the beam characteristics. A photon diode (Scanditronix Medical AB, PDF-3G) was used to measure both the PDD and beam profile for both 6 and 15 MV photon beam. To measure the output, a micro-ionization chamber (Scanditronix Medical AB, RK8304) was used.

Results: It is found that moving the jaw to different positions away from the leaf-ends will increase the output and penumbra width for the small fields. Such increase is particularly more significant when the field size is small ($0.5 \times 0.5 \text{ cm}^2$), and when the jaw-end is at about 1 to 2 cm from the leaf-end, when the degree of increase changes quickly.

Conclusion: Measurement is important in Intensity Modulated Radiotherapy because the jaw cannot cover all the leaf-ends in a segment of irregular field completely. This results in additional dose contributed by (1) the end surface of the jaw, (2) the leaf-end and (3) the inter- and intra-leaf leakage/transmissions during the dosimetric measurement. In addition, most of the conventional treatment planning systems ignore these effects in the dose calculation. It is suggested that similar measurements will be carried out in the IMRT commissioning to provide information to physicists in reviewing the treatment planning system's accuracy with regard to the leaf leakage/transmission and the jaw effects.