

DOSE OUTPUT VARIATIONS OF CALIBRATED ELECTRON BEAMS WHEN X-RAY
COLLIMATORS DEVIATE IN X-Y SETTINGS.

The absolute dose calibration of an electron beam assumes that the accelerator's x-ray collimators upstream of the cone are set at a fixed X-Y offset setting. We measured and show that the X-Y collimator offset deviations, however small, affect the electron absolute dose calibration enormously. Beam outputs were measured on a Siemens Linac by altering the X-Y offsets in x-ray collimators from the nominal value in increments of 1cm. Three cone sizes were measured: the 5, 10 and 15 cm cones. The offsets were varied starting at the size of the cone up to the maximum possible offset.

As shown in the data, the electron cone outputs varied significantly depending on the amount in X-Y offsets of the collimators, the cone size and beam energy, with the effect being more pronounced for the smaller cones and the lower energies. For the lowest possible offset on the 5-cm cone, the output dropped from 1cGy/MU to 0.25 cGy/MU for the 6MeV beam, and to 0.64 cGy/MU for the 18MeV beam. A differential analysis of the data shows that around the nominal X_0 - Y_0 positions, a change of 1 cm in settings induced a calibration shifts as high as $\pm 6\%$ in the 5cm diameter cone. For the largest cone measured, the above deviations in output sensitivity were also appreciable although not as large.