

DETECTING BENDING MAGNET DRIFTS ON ELECTRON BEAMS WITH A COMMERCIALY AVAILABLE ENERGY-MONITOR

Electron beam quality assurance for radiotherapy requires a routine procedure for monitoring the stability of the energy. Subtle changes in the electron beam energy characteristics equivalent to 2 mm or less in the electron beam depth parameters may be produced by small drifts in the electron beam bending magnet assembly, and current guidelines recommend a technique which can detect this shift. A commercially available electron beam energy-monitor which uses a linear array of ionization chambers is available for routine electron beam quality assurance. The ability of this device to detect small changes in electron beam energy due to bending magnet drift is evaluated.

High energy electron beams are the most problematic for detecting energy changes when using this device, since the slope of the depth dose curve is shallow, and the relative change in integrated charge is smallest. Hence, high energy electron beams with small energy changes were produced by varying the bending magnet voltage for a nominal 22 MeV electron beam from a CL 2300 C/D linac. In this manner a family of electron beams was produced with nominal energies ranging from 19.5 to 22.5 MeV, and the sensitivity of the energy-monitor was evaluated.

The device produces a 3% change in signal for a shift of 2 mm in the electron beam depth characteristics showing that the energy-monitor is suitable for detecting energy shifts due to bending magnet drift even for high energy electron beams.