

Purpose: To report on the evaluation and commissioning of the Diamond (K&S Associates Inc., Nashville, TN) monitor unit (MU) calculation software.

Method and Materials: Based on clinical dose-response studies, the ICRU states that dosimetry systems must be capable of delivering dose to an accuracy of 5%. The accurate determination of dose per MU to a point within the patient is an essential part of this process. Good clinical practice dictates that MU obtained from the treatment planning system (TPS) be checked using an independent system. Diamond is a windows-based computer program for computing beam on time for radiation treatments. The software is used for quality assurance purposes to confirm MU produced by our TPS, Pinnacle³ (Philips Medical Systems, Andover, MA).

To ensure that the Diamond MU calculation algorithms are correctly implemented in our clinic, the algorithms were verified by comparing point of interest dose values calculated by Diamond, with dose values calculated using the Pinnacle³ TPS, and in-house developed photon and electron MU calculation software. The in-house software, which has been used in our clinic for several years, has been extensively tested against measured data. The tests cover a variety of square, rectangular, and blocked fields at several depths. Standard electron and photon energies for both Varian and Siemens linacs were tested as part of the commissioning process. These comparisons were implemented in a variety of clinically relevant test cases.

Results:

Results indicate that Diamond calculated MU values are within 2% of the in-house developed MU calculation algorithms for electron and photons. Only a few calculations showed disparities of greater than 1%.

Conclusions:

Based on our testing and analysis of calculation methods, we are satisfied with the Diamond MU calculation software. We are currently in the process of evaluating the intensity modulated radiation therapy module of this software.