

AbstractID: 7445 Title: Validation of the mechanical systems for a Tomotherapy Hi-Art unit.

Purpose: To validate the accuracy of the table and gantry motion of the Tomotherapy Hi-Art system and to measure the range of table deflection and to assess the impact on dose delivery.

Method and Materials: The Tomotherapy Hi-Art system delivers radiation dose to a target using a helical tomotherapy delivery. Because of this fact, the mechanical accuracy of the table speed and gantry rotation speed, which determine the pitch of the delivery, are extremely important. The amount of table sag relative to the treatment plan is also critical. Table speed and gantry speed were measured by attaching a marker with three reflective spheres to both the table top and gantry structure. The position of the markers was monitored with a Polaris infra-red camera system. Measurements were taken for 4 treatments of varying pitch.

The table top sag for 0, 150, and 300 pounds weight was measured both at the end of the table and at the isocenter for different table positions. The impact of this on a delivered plan was checked by measuring a plan using film dosimetry with 0, 150, and 300 pounds of added weight.

Results: Table speed was verified to be accurate within 0.5%. The average gantry rotation period was found to be within 0.02 seconds of the planned value. The maximum sag at the end of the table ranged from 1.25 to 3.35 cm. The sag at isocenter ranged from 0.5 to 1.4 cm. The results translate to a maximum deflection angle of 1.1 degrees. The resulting films showed a maximum shift in isodose curves of 1 mm in the vertical direction.

Conclusion: The mechanical systems on the Tomotherapy unit are capable of producing the planned pitch values with high accuracy. The table deflection while substantial does not significantly affect the accuracy of the delivery.