

AbstractID: 5650 Title: Automatic machine commissioning for a helical tomotherapy machine

Purpose: Develop and validate a new automated procedure to fully commission a helical tomotherapy machine with minimal human intervention and in a very short period of time. Compare the results of a commissioning using data based on water tank measurements and not using water tank measurements.

Method and Materials: The process was performed in 5 HiArt helical tomotherapy machines. All of the machines were set to match a gold standard machine based on PDD, field sizes, output and output factors, and leaf characteristics. In a first pass, measurements were performed using water phantom for all of the commissioning measurements. After that, the same machine was verified using a new procedure (twinning) to generate a new gold standard under different measurement conditions. To determine data analogous to PDD an aluminum step wedge was used. The step wedge was mounted on the couch and was automatically moved in and out of the beam (as many times as needed) to determine energy through attenuation measurements. In order to determine the profiles a 2D arm was mounted on the machine to determine profiles in air. Also output and output factors were determined under the same conditions twinning. After that all the machines were detuned from the gold standard and then were set back to the gold standard using the twinning procedure and verified with the water tank.

Results and Conclusions: It was possible to match machines to a reference gold standard either using water tank measurements or the twinning process. The later was less error prone and was 7 times faster than using water tank. Also, can be implemented almost without human intervention.