Purpose: In this study we will present results from the daily QA program used to monitor the tomotherapy machine over a period of eight months.

Methods: The daily QA uses the Rotational Therapy Phantom, Gammex 507 (RTP). The RTP system allows for checking the rotational output, energy, gantry speed, gantry position, MLC-Gantry position synchrony and beam profile constancies. All of these tests are done within one five-minute procedure to check these metrics on the tomotherapy machine. The measurements are done using two ion chambers connected to the TomoElectrometer in rate collection mode. Daily QA data is analyzed using the Rotational Therapy Phantom Software (RTPS) to compare the constancy of these metrics relative to a standard set.
The Daily QA protocol runs a dynamic MLC, five-identical-rotation procedure with a period of 40 seconds per rotation.

Results: Measurements are taken using the TomoElectrometer with a sample time of 200ms, because the procedure utilizes dynamic MLC and rotational gantry, the procedure allows the software to detect variations in the output rate, energy constancies, gantry speed, position and MLC/Gantry position synchrony at the same rate.
This work will present examples of these variations including evidence on gantry position/MLC asynchrony of up to 2 seconds. This corresponds to 18 degrees or 2.55 projections.

Conclusions: Using the RTPS for daily QA on tomotherapy system shows that the system can run with up to 2 seconds (18 degrees) asynchrony between the MLC and the gantry position. This 18 degree discrepancy between the plan and the actual delivery could result in significant clinical outcome for a wide range of treatment sites, such as prostate, H&N, Lung and Brain treatments.
Work is currently being done to expand the application of the RTPS to be applicable on the Varian and Elekta rotational therapy modalities.