Purpose: To report on EBT2 film based patient specific QA scheme for evaluation of the in-house volumetric modulated arc therapy (VMAT) planning algorithm applied to the new rotational delivery technique.

Methods: Planning CT images of selected prostate patients were transferred to the in-house developed treatment planning (TP) system. Deliverable VMAT plans were optimized by a dose-volume-histogram based objective function and a conjugate gradient search. Two approaches of VMAT patient specific QA using EBT2 films at 100 cm SAD with 15MV photons on Varian Trilogy™ were developed: 1) through a phantom mounted on an isocentric mounting fixture, and 2) through a rectangular phantom (25x25x20 cm³) positioned on the treatment couch. Calibration films were irradiated at d_{max} (3 cm) for doses up to 10 Gy. All films were scanned using an Epson 10000XL flatbed scanner with 72 dpi (0.035 mm) pixel resolution. Pixel values were converted to doses using the established calibration curve. The 2D dose distributions were generated from the film data analysis. In-house software was utilized to compare the measured doses from films with the associated TP data for each methodology.

Results and Discussion: Both testing techniques reported less than 2% discrepancy of the absolute doses at the isocenter. First approach showed better passing rates than the second method. In both cases that the measured planar dose distributions achieved more than 90% passing rates with a set of 3% /3 mm dose and DTA criteria. EBT2 film dosimetry in phantom was in good agreement with TP results, and all film results in our study have created an acceptable passing rate with fine spatial resolution compared to other detector-arrays QA methods.

Conclusions: The patient specific EBT2 film QA for VMAT prostate patients showed extremely satisfactory results. EBT2 film analysis with either setup approach here was useful for VMAT patient QA.