Purpose:The purpose of this study was to evaluate the angular dependence of the MatriXX Evolution and establish its correction method to improve the dose verification accuracy of IMRT and VAMT.

Methods:The CT study was performed by inserting the MatriXX into the MULTICube, which was exported to iPlan. The regions of interest that correspond to the size and locations of the MatriXX detectors were configured in CT images. The angular dependence for the MatriXX detectors was measured with gantry angles 0°–180° at a field size of 30cm×10cm for 6 and 10MV photons. The correction factor (CF) was calculated as the ratio of the MatriXX dose to the Monte Carlo (MC) calculated dose for central detectors and detectors of every line, and was normalized at the gantry angle 0°.To verify two correction methods (central and entire correction), the MatriXX detectors was irradiated with gantry angles 0°–180° at different field sizes for 6 and 10MV photons. The results were compared with MC calculations by gamma index with 2% and 2mm using the OmniPro I'mRT. Absolute doses for central and off-axis locations were measured with a PTW31010 chamber inserted into the MULTICube, and were compared with the MatriXX doses.

Results:The angular dependence of the MatriXX detectors reached up to 14% and 11% for 6 and 10MV photons, respectively. The difference in CF between central and off-axis detectors was up to 7% and 5% for 6 and 10MV photons, respectively. The entire corrected MatriXX doses agreed within 1.5% with those of a PTW31010 chamber for central and off-axis regions. The passing rate for gantry angle 90° shows a significant deviation between central and entire correction methods.

Conclusions:The dose verification accuracy of the MatriXX Evolution improved gamma index up to 10% by the use of the entire correction method that includes off-axis detectors