Objective: To design a cost-effective phantom for commissioning tests and patient-specific quality assurance in VMAT technique.

Methods: The phantom is made of PMMA with a physical density of 1.18 gm/cc. It consists of 20 numbers of 20cm diameter discs connected together in a horizontal stack, making a cylinder of length 20cm. The centers of the discs are drilled with a 2.1cm hole which accommodates a chamber sleeve of near 2.1cm diameter, which is made of Delrin with a physical density of 1.414gm/cc. The cylindrical geometry of the phantom is ideal for rotational therapy QA like VMAT or Rapid arc. The entire phantom is self-supporting and hence no supporting bar or holders are in the path of beam geometry. The chamber sleeve itself acts as the supporting rod for these discs and it can be inserted into the disc assembly from a distance of -9cm to +10cm from the origin and hence any axial point from -9cm to +10cm with respect to isocenter can be used for point dose measurement. The other side of the chamber sleeve is filled by spacer rod for sustaining the discs in place. The films can be inserted, transversely in any XZ plane from -9cm to +10cm from the origin between the discs next to the chamber center.

Results: Simultaneous irradiation for the chamber and the film is done for VMAT plans without collapsing the gantry angles to nominal angle of zero. Evaluated the results using RIT film analysis software for gamma index of 3%, 3mm. Good agreement is found with more than 95% of pixels passing 3% 3mm criteria. The point dose verification showed less than 3% variation with TPS planned dose.

Conclusions: Most of the commercial QA systems need gantry to be collapsed to zero degree to perform QA for modern RT techniques. Especially for techniques like VMAT, collapsing gantry to zero will fail to validate the influence of gantry speed on dose delivery.