

AbstractID: 4770 Title: Performance of the Philips Gemini GXL PET/CT Simulator

Purpose: To present results obtained during the acceptance of the Gemini GXL PET/CT Simulator system. **Method and Materials:** A flat radiotherapy tabletop is permanently installed on our system. CT Simulator acceptance was performed using the TG-66 Tables II and III as templates. Two 60-cm long CT Sim phantoms were used. The relative electron density (RED) to HU relationship was measured with the RMI 465 and Catphan 600 phantoms and analysed using the stoichiometric method of Schneider et al. HU uniformity was measured with a 20-cm water phantom and contrast-to-noise (CNR) performance measured with the Catphan. PET performance was measured using the NEMA 2-2001 standard at the factory before shipment and after installation. **Results:** Table sag was measured to be +/- 4 mm over a 1200 mm scan range with loads of 0 to 282 lbs. During longitudinal table displacements, a 2-3 mm shift occurs over a 300 mm range and makes it impractical to use the head-end of the table in some applications. The slice sensitivity profiles for the 0.75 and 1.5 mm nominal slice thickness were measured to be 1.1 and 1.8 mm. From the RMI 465 and Catphan measurements, a RED-HU relationship applicable to biological tissues at 120 and 140 kVp was developed. HU uniformity for water was measured to be +10 HU to -12 HU for clinical protocols. Image quality is evaluated by quantifying the CNR for a 15 mm object. PET peak true count rate and peak NEC rate performance measured at the factory and at installation are below manufacturer published specifications: (191, 182 vs 203 kcps) and (61, 56 vs 70 kcps). **Conclusion:** Future work will involve evaluating PET spatial resolution at 20 cm off-axis positions, quantifying the impact of table load on PET/CT fusion accuracy and developing tools to permit clinical PET/CT simulation.