AbstractID: 4651 Title: Acceptance Testing and Verification of Automatic Brightness Control Logic of A Fluoroscopic System

Purpose: To verify the functionality and operation of fluoroscopic automatic brightness control employed in a modern cardiovascular angiography system, equipped with flat panel detector, as part of an acceptance testing of a new installation, and to obtain the fluoroscopic "patient" entrance exposure (air kerma) for reference information**.**

Method and Materials: A Siemens AXIOM Artis angiography system was acceptance tested under a fixed geometric arrangement. The PMMA phantom was employed to simulate the patient thickness varying from 0.635 cm (¼" nominal) to 35.56 cm (14" nominal) in increments of 0.635 cm. The fluoroscopic imaging parameters; "kVp", "mA", "pulse width", "spectral shaping filter; copper filters", " half value layer; HVL", "patient air kerma; PAK", and "flat panel input air kerma; FPIAK" were recorded as the phantom thickness was increased. Upon completion of the data acquisition, the imaging parameters were plotted against the phantom thickness. The graphs were then analyzed, and compared with a typical preprogrammed fluoroscopy operation curve supplied by the manufacturer.

Results: The primary variable of this fluoroscopy system is the tube potential in conjunction with the spectral shaping filter selection. Depending on the Flat Panel Detector Signal (FPDS) level, the tube current and the pulse width are varied until the predefined FPDS level is achieved. The graphs show the operation logic indeed followed the preprogrammed logic and the PAK increased exponentially, ranging from 0.2 mGy/min to 100 mGy/min, while the FPIAK was maintained at a constant level of 0.7 to 0.8 μGy/sec.

Conclusion: Due to the extensive use of spectral shaping filters and the sophisticated fluoroscopic operation logic design, the fluoroscopic tube potential is kept at optimum levels to provide good image quality by ensure high image contrast and proper penetration for a wide range of patient (PMMA) thickness. The graphs confirmed and verified that the system "behaved" as designed.