

AbstractID: 2628 Title: Fluoroscopy Acceptance Testing: Technical Considerations for Image Quality and Dose

Modern fluoroscopy imaging equipment, especially that which is intended for vascular and cardiac imaging, are "Systems" operating under microprocessor control. They are designed to simultaneously monitor the beam attenuation, the detector exposure rate, and the contrast-to-noise ratio and automatically make adjustments to many parameters controlling x-ray production, beam filtration, video electronics, digital image processing, and image presentation. In the days of invariant beam filtration, anti-isowatt fluoroscopic power curves, fixed optical apertures, single pre-set image intensifier input exposure rate, and pre-defined image display parameters it was relatively straight-forward to use simple attenuating materials and test patterns to simulate patient attenuation or to evaluate image quality. Today it is not that simple and a system can perform quite differently (in terms of both image quality and dose) when evaluated using inanimate test objects as compared to when the system is imaging patient anatomy.

When attempting to evaluate the performance of a modern fluoroscopic imaging system, the first challenge is to gain an understanding of how the system is designed, to determine which system variables are dynamically controlled, and to identify the trigger points for these variables. The second and greater challenge is to determine an objective test methodology that would accurately and reproducibly create machine settings that are the same as those produced during patient procedures. This presentation will systematically describe the functions of the major system components including automatic exposure rate control, variable pulse-rate fluoroscopy and associated kV-mA power curves, spectral beam filtration, spatial beam shaping, and other factors that affect the ability of the imaging system to deliver optimum diagnostic images at moderate patient dose. It will also show how the design of a fluoroscopic imaging system impacts the functional performance, the image quality, and the patient dose. Specific acceptance testing methodology will be covered in another presentation.

Educational Objectives:

1. Provide an understanding of modern fluoroscopic imaging system component design and functionality
2. Show how limitations in the design and functionality of the operator interface can have an adverse impact on functional performance, image quality and patient dose