

Probability of detection - Comparative study of computed and film radiography for high-energy applications

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Suitability of computed radiography with Ir-192, Co-60 and up to 9 MEV x-rays for weld inspections is of importance to many heavy engineering and aerospace industries. CR is preferred because of lesser exposure and processing time as compared to film based radiography and also digital images offers other advantages such as image enhancements, quantitative measurements and easier archival. This paper describes systemic experimental approaches and image quality metrics to compare imaging performance of CR with film-based radiography. Experiments were designed using six-sigma methodology to validate performance of CR for steel thickness up to 160 mm with Ir-192, Co-60 and x-ray energies varying from 100 KV up to 9 MeV. Weld specimens with defects such as lack of fusion, penetration, cracks, concavity, and porosities were studied for evaluating radiographic sensitivity and imaging performance of the system. Attempts were also made to quantify probability of detection using specimens with artificial and natural defects for various experimental conditions and were compared with film based systems.

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