

Strategies for Film Replacement in Radiography - a comparative study -

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Abstract:

The NDT community discusses about effective film replacement by Computed Radiography (CR) and the new Digital Detector Arrays (DDA), also known as flat panel detectors, since more than 10 years. Several standards were published by CEN, ASTM and ASME to support the application of phosphor imaging plates in lieu of X-ray film in the year 2005. One of the key concepts is the usage of signal/noise (SNR) measurements as equivalent to the optical density of film. The procedure will be demonstrated. The application of DDAs is not yet supported by any standard, but proposals are under discussion to guide the user for correct qualification and practice. The bad pixel problem will be addressed. Measurement methods were elaborated for parameters as basic spatial resolution, efficiency, specific material thickness range, contrast sensitivity and image lag.

A comparative study presents the results of film replacement by CR and DDAs for welds. New strategies for correct DDA calibration yield an extra ordinary increase of image quality. The contrast sensitivity was enhanced up to 10 times in relation to film radiography. This could not yet be achieved by any other technology. The digital radiographic technique is nowadays limited by the materials grain structure and not the detector contrast/noise distribution. Even restrictions in the spatial unsharpness provoked by the individual picture element size of the detector are compensated by the increased contrast sensitivity.

Keywords: radiography, film replacement, computed radiography, imaging plates, digital detector arrays, contrast sensitivity, SNR, standards