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Measurement of Focal Spot Sizes of X-Ray Radiographic Units by Digitisation of Slit Image and Generation of MTF

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Abstract

The focal spot size of Radiographic Unit has an influence on the resolution of a system and hence influences the Modular Transfer Function (MTF) of the system. MTF has been used for estimation of focal spots of radiographic units. Although a focal spot pinhole radiogram is the popular method for determination of focal spot size of conventional radiographic unit, it is not suitable for measurement of focal spot size of microfocus radiographic units. This limitation comes from the requirement of the pinhole size, which should be an order of magnitude lower than the expected focal spot size. The requirement of pinhole size makes it difficult for focal spot measurement of mini-focus units by pinhole method. Vernier slits are radiographed at low KV for two different focal spot sizes (mini and conventional) of two X-ray radiographic units at AFFF. The slit images were digitised using high resolution scanner and the standard optical density curve. The digitised images were spatially calibrated. The line profile generated across the slit gives line spread function, which represents the radiation intensity distribution in the image of a relatively infinitely narrow and long slit. MTF curves are drawn by Fast Fourier Transformation (FFT) of LSF and for the derivatives of Edge Spread Function. The results were compared with Resolution (Star) Pattern Method. This paper highlights the use of MTF generated from the digitised image stored in computer for measurement of markedly varying focal spot sizes of the radiographic units, in the absence of a suitable pinhole camera. Standardisation of the MTF method will make it possible to determine focal spots of industrial radiographic units.