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TITLE: COMPUTED RADIOGRAPHY FOR HIGH RESOLUTION IMAGING APPLICATIONS OF AIRCRAFT STRUCTURES

ABSTRACTS

Industrial radiography provides high throughput in non-destructive inspection particularly for aircraft structural components and therefore an important tool for aircraft maintenance. Film-based radiography requires consumables (films, toxic chemicals and proper disposal of chemical waste), darkroom facility and manual processing which is not only time consuming, but also requires more radiation exposure than digital systems. The industrial radiography community is making an intense effort to replace the conventional film technique with digital technologies such as digital radiography and computed radiography (CR). The CR technology uses a reusable phosphor imaging plate instead of a film, and therefore allows faster/easier digital image acquisition. Moreover, CR has advantage over conventional film as wider dynamic range, higher sensitive to radiation, requires lower radiation dose and shorter exposure times.

CR imaging performance for general applications such as water ingress, composite honeycomb structures, and foreign object damage in aircraft structures is similar to that of film radiography. However, CR imaging for high resolution requirement applications such detecting fatigue cracks or weld defects is much more challenging; making it difficult to match the detection limit obtain by film. Performance assessment of the CR technology is required to determine if it can effectively provide equal or better performance than the existing film-based technology for high resolution applications, and to provide satisfactory and repeatable inspection results.

This paper highlights the CR performance metrics, lessons learned and key issues faced while performing experimental validation of CR imaging for detecting fatigue cracks in aircraft structural components. CR system quality parameters such as spatial resolution, contrast sensitivity, contrast-to-noise ratio (CNR), signal-to-noise ratio (SNR), equivalent penetrantmter sensitivity (EPS) as well as other system hardware integrity features were evaluated as part of an assessment of CR suitability for aerospace applications.

KEYWORDS

Non Destructive Testing | Computed Radiography | Industrial Radiography | Inspection Qualification |