Demonstration of An Innovative Dual-Resolution X-Ray Imaging Detector System Using a 3D-Printed Angiographic Phantom

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Session: Radiography and Fluoroscopy

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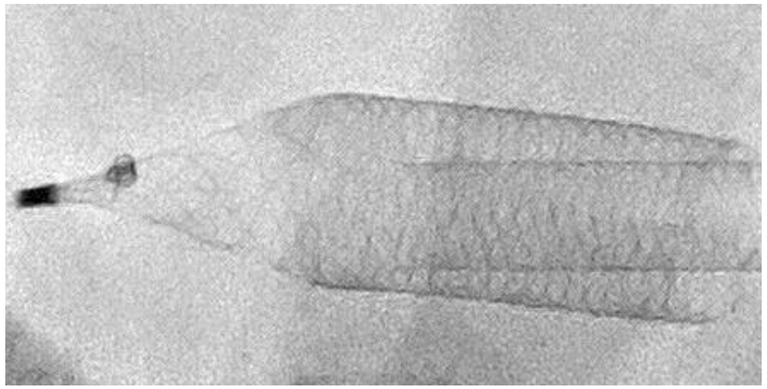
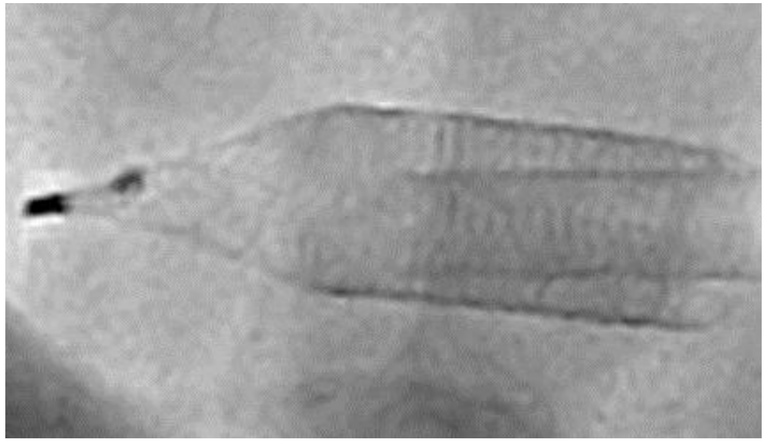
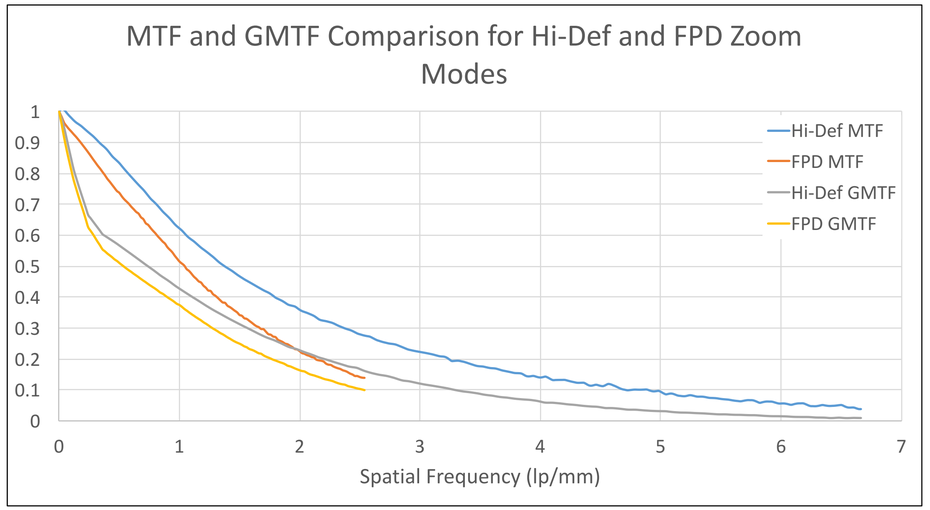
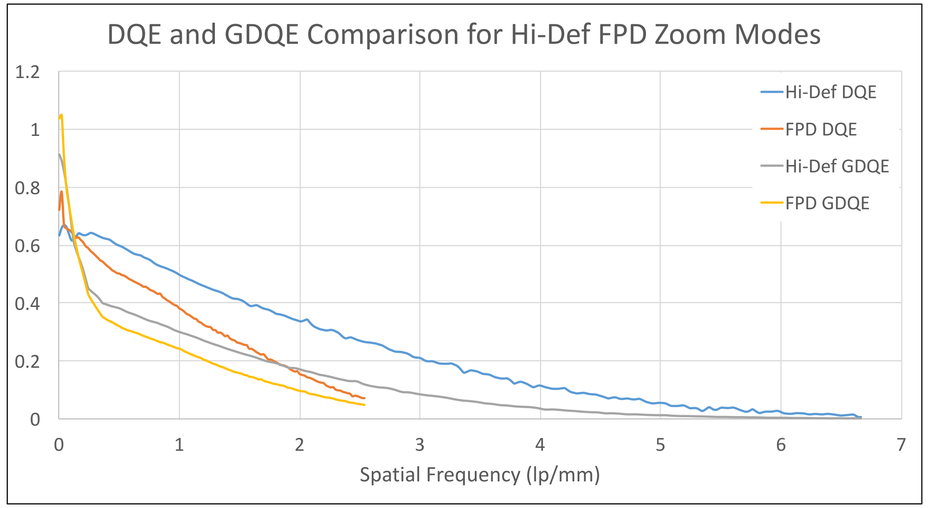




Deployed pipeline stent in a 3D printed angiographic phantom using Hi-Def (top) and standard FPD (bottom) zoom modes. Images have been cropped and resized to display same region





For GMTF and GDQE $\rho = 0.34, m = 1.2$ x

FPD:

- 196 µm pixel size
- FOVs = 12”, 10”, 8”, 6”

Hi-Def:

- 76 µm pixel size
- FOVs = 3.5”, 3”, 2.3”, 1.5”

$$GMTF(f,\rho,m) = \begin{Bmatrix} (1-\rho)MTF_F\left[(m-1)\frac{f}{m}\right] + \\ \rho MTF_S\left(\frac{f}{m}\right) \end{Bmatrix} MTF_D\left(\frac{f}{m}\right)$$

f is spatial frequency, ρ is scatter fraction, m is magnification, MTF_F is focal spot MTF, MTF_s is scatter MTF, MTF_D is detector MTF

$$GNNPS(f) = \frac{1}{m^2} NNPS_D\left(\frac{f}{m}\right)$$

$$GDQE = \frac{GMTF^2}{\Phi \cdot GNNPS}$$

Φ is photon flux