

ARTIFACTS IN DIGITAL BREAST TOMOSYNTHESIS AND SYNTHESIZED 2D IMAGING

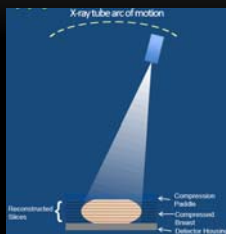
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INTRODUCTION COMMON ARTIFACTS IN DBT AND S2D

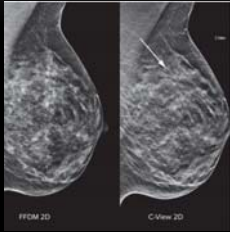
- Basic Tomosynthesis Imaging
- Synthesized 2D Imaging
- Common Artifacts
 - Out of Plane artifacts (Zipper, Stinkey)
 - Metallic or Halo Artifact
 - Skin Line Processing Error
 - Terracing artifact
 - Bright or Dark Pixel Artifact
 - Motion Artifacts
 - Disappearing or Unexpected Appearance of Calcifications
- Mitigation of Artifacts

VERY BASIC DBT PHYSICS



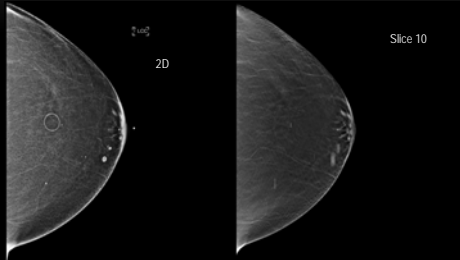
- Several projection images obtained
 - GE – 9 images in a 25 degree sweep
 - Hologic – 15 images in 15 degree sweep
 - Siemens – 25 images in 50 degree sweep?
- Processing algorithm used to reconstruct tomosynthesis slices
 - Filtered Back Projection (Hologic, Siemens, Fuji)
 - Iterative Reconstruction (General Electric, Siemens)

SYNTHESIZED 2D IMAGING

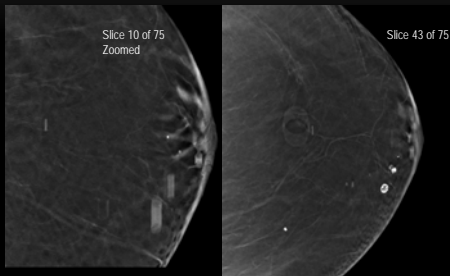


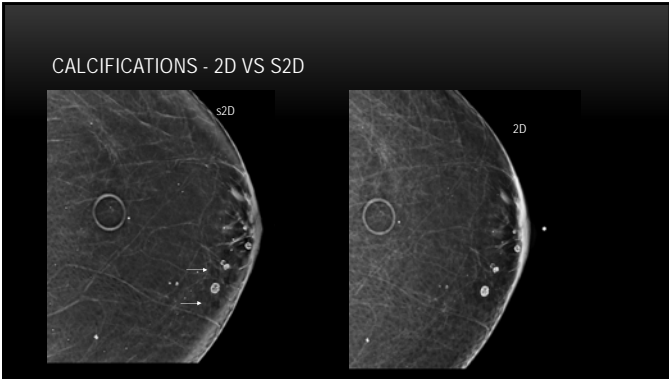
- Maximum intensity projection of the 3D image data set
- Some features are enhanced – lesion like features, calcifications
- Synthesized Mammographic 2D Imaging – Theory and Clinical Performance
 - Hologic White Paper: <http://www.hologic.com/images/C-View-White-Paper.pdf>

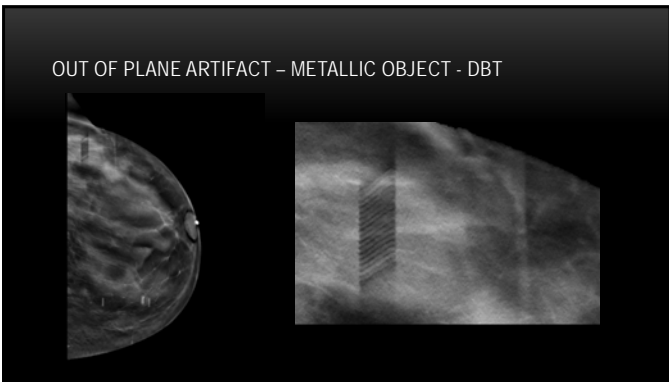
OUT OF PLANE ARTIFACTS - CALCIFICATIONS

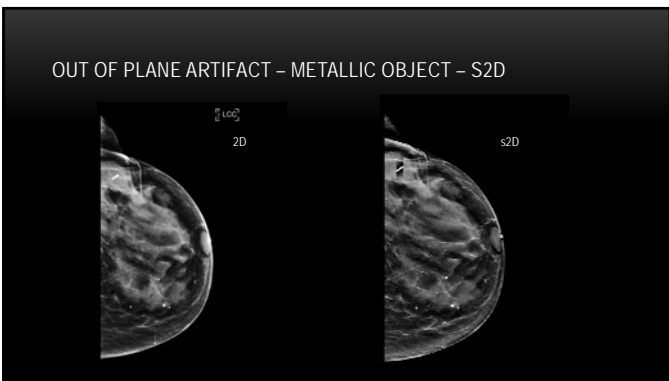


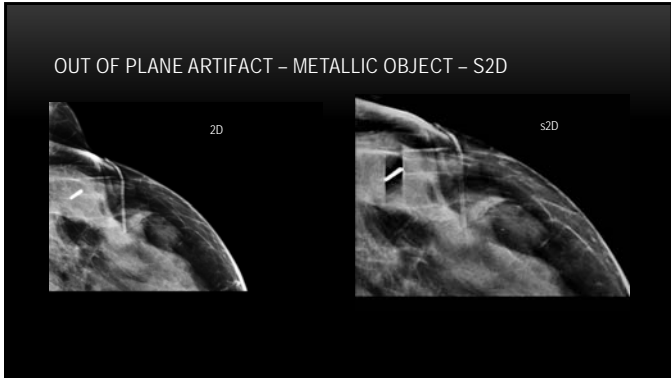
OUT OF PLANE ARTIFACTS - CALCIFICATIONS

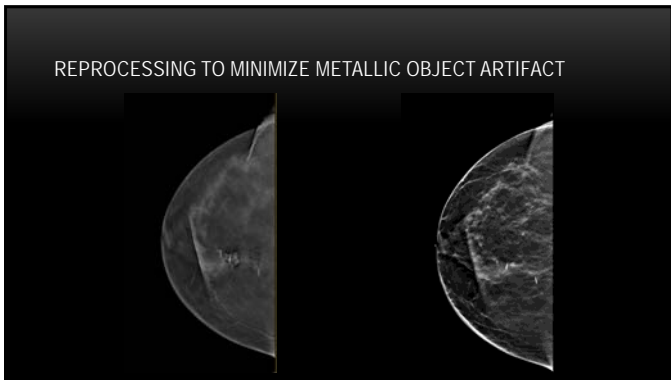


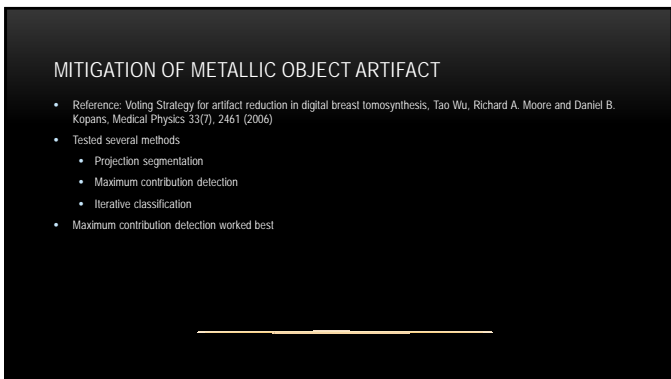


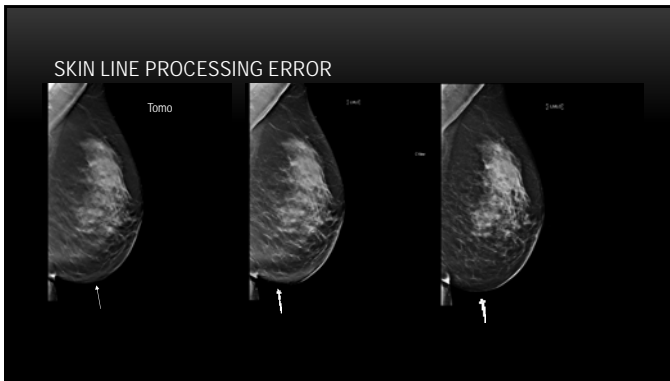


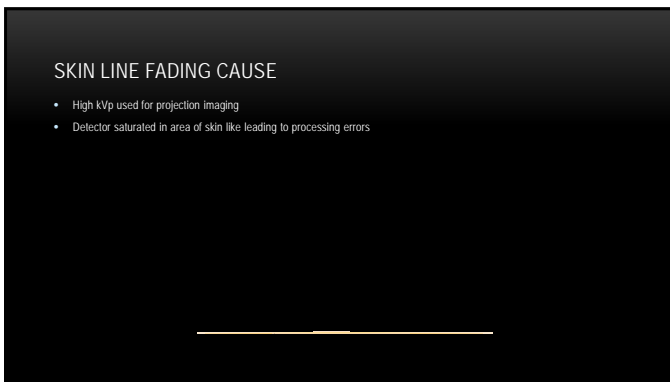


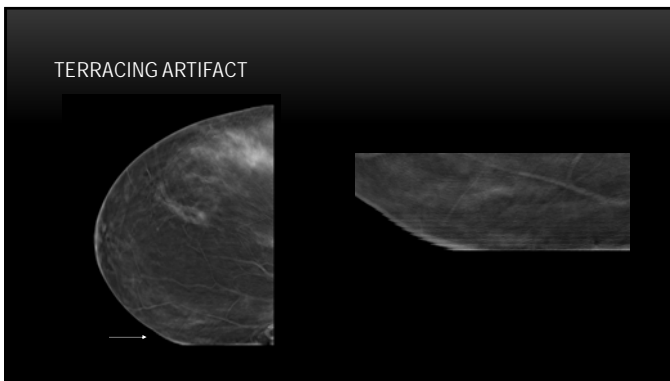










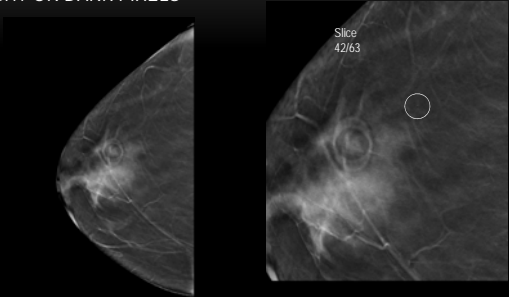


MITIGATION OF THE TERRACING ARTIFACT

- No known way to mitigate this artifact!



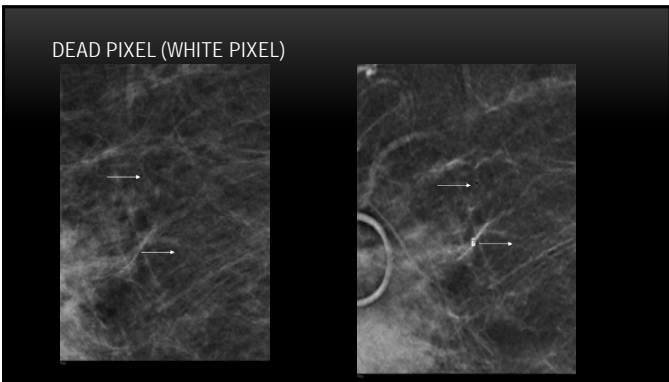
BRIGHT OR DARK PIXELS



BLACK HOLE

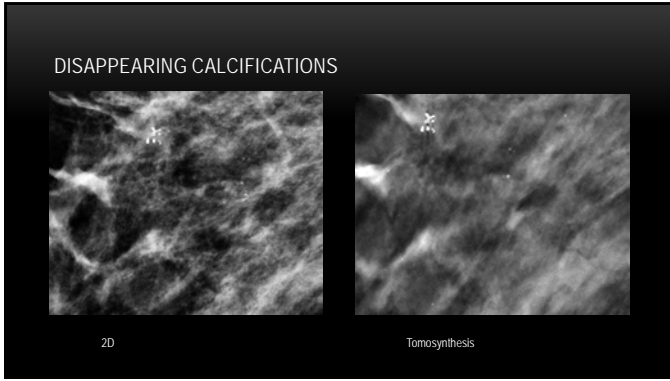


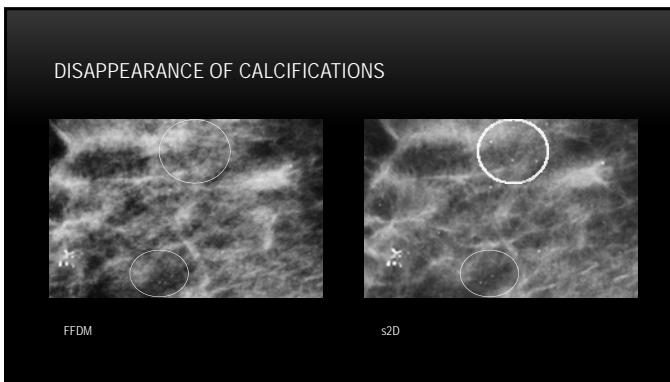




ELIMINATION OF THESE ARTIFACTS

- The dark pixel artifact was eliminated with a new gain and offset calibration
- White pixel artifact was found to be a dead detector element
 - The detector element was "mapped out" by the service engineer using a software tool provided by Hologic





DISAPPEARING CALCIFICATIONS

- Causes
 - Binning of detector elements during readout
 - Calcifications not all in same plane in tomosynthesis image stack
- Remediation
 - Using native resolution of detector
 - Increasing slab thickness when scanning through tomosynthesis images

