

BACKGROUND:

For patient comfort there is a requirement for a pad to lie below the patient’s head during CT imaging. One critical consideration in head pad design is the ability for the technologist to visualize the ears in order to properly landmark the patient.

Therefore, there is a strong desire to have a cutout of the head holder for the ears. Traditional designs for head pads have **sharp transitions** around the ear cutouts which lead to **image artifacts**.

METHODS:

1. A new head pad was developed with chamfered ear cutouts.
2. A water phantom was imaged with 10 new chamfered prototype pads.
3. An **artifact metric (AM)** was defined based on the ratio of the **image standard deviation (SD)** within artifact regions compared to a non artifact region.

RESULTS:

- The artifact metric provides the standard deviation contribution due to the head pad, normalized by the noise in the image.
- Traditional head pad AM=17.9%
- Chamfered head pad AM=3.0%



Chamfered ear cutouts, enable laser alignment to the ears without **image artifacts in reformat planes.**

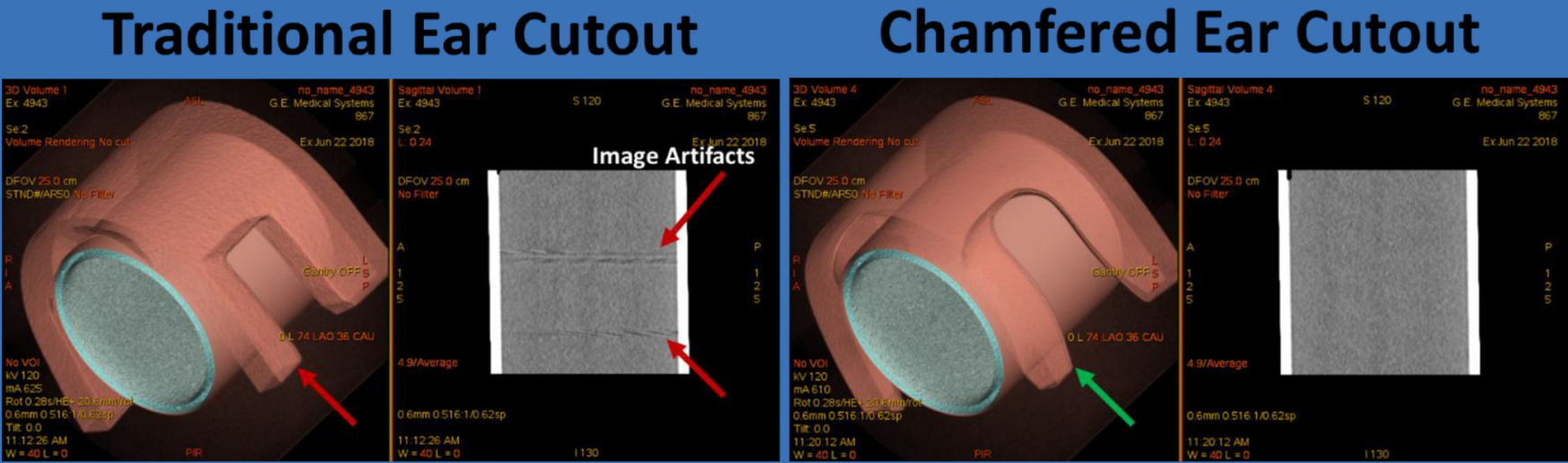


Figure 1.

$$\text{Artifact Metric (AM)} = \frac{|SD \text{ Ear cutout} - SD \text{ center}|}{|SD \text{ center}|}$$

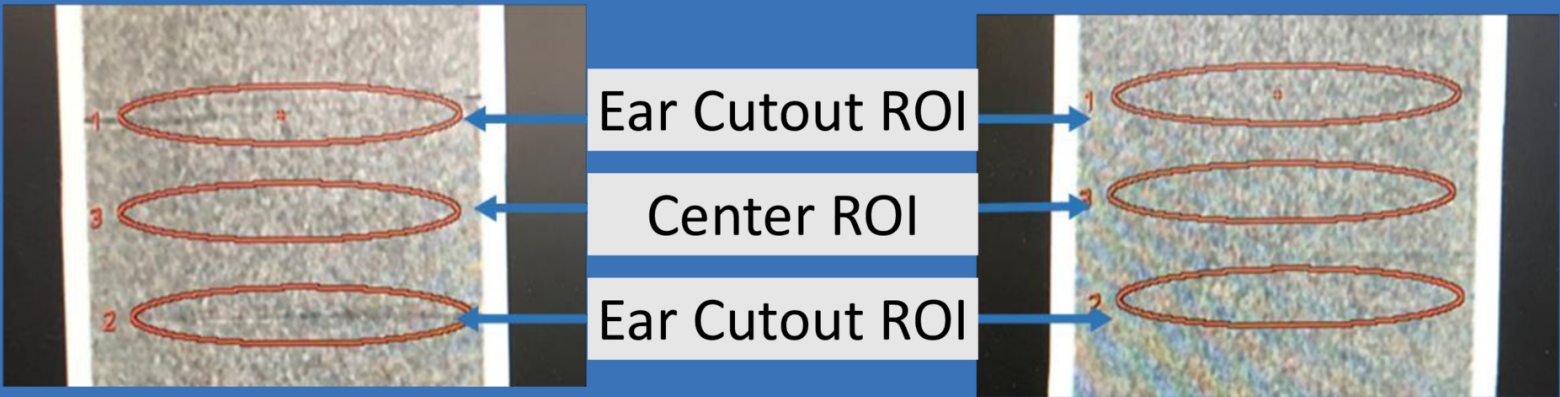


Figure 2.

AM=17.9%

AM=3.0%

EXTRA SPECIFICS IF YOU ARE INTERESTED

PARAMETERS:

A traditional head pad was scanned along with ten samples of the head pad with chamfered edges on a 12.5cm water phantom. The scans were taken on a Revolution CT scanner with the following protocol: kVp 120, mA 600, 0.28 sec, kernel STD#, DFOV 25cm, collimation 4cm, ASiR-V 50 and helical pitch 0.516.

FIGURE 1:

Sample images in volume rendering and coronal reformats are included below. The reformat images are useful to visualize the sharp transitions in the traditional design for the ear cutout and the smooth transition in material which is possible by chamfering the edges. While the coronal images demonstrate the image artifacts in a narrow window of 40HU with a level of 0 HU.

FIGURE 2:

These images show sample ROIs (Regions of interest) that are used to compute an artifact metric (AM) where the center ROI is used for normalization as it contains only noise and the other two ROIs contain both image noise and structured artifacts.

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