Frequency Peak Energy around 2500 Hz

$$insertion\ depth = -7.7 \ln \left(\frac{peak\ energy}{1532} \right)$$

Legend:
- Sample 1
- Sample 2
- Sample 3
- Sample 4
- Sample 5
- $y = 1532 * e^{-0.13*x}$

Axis labels: Peak Energy [-] vs Insertion Depth [mm]

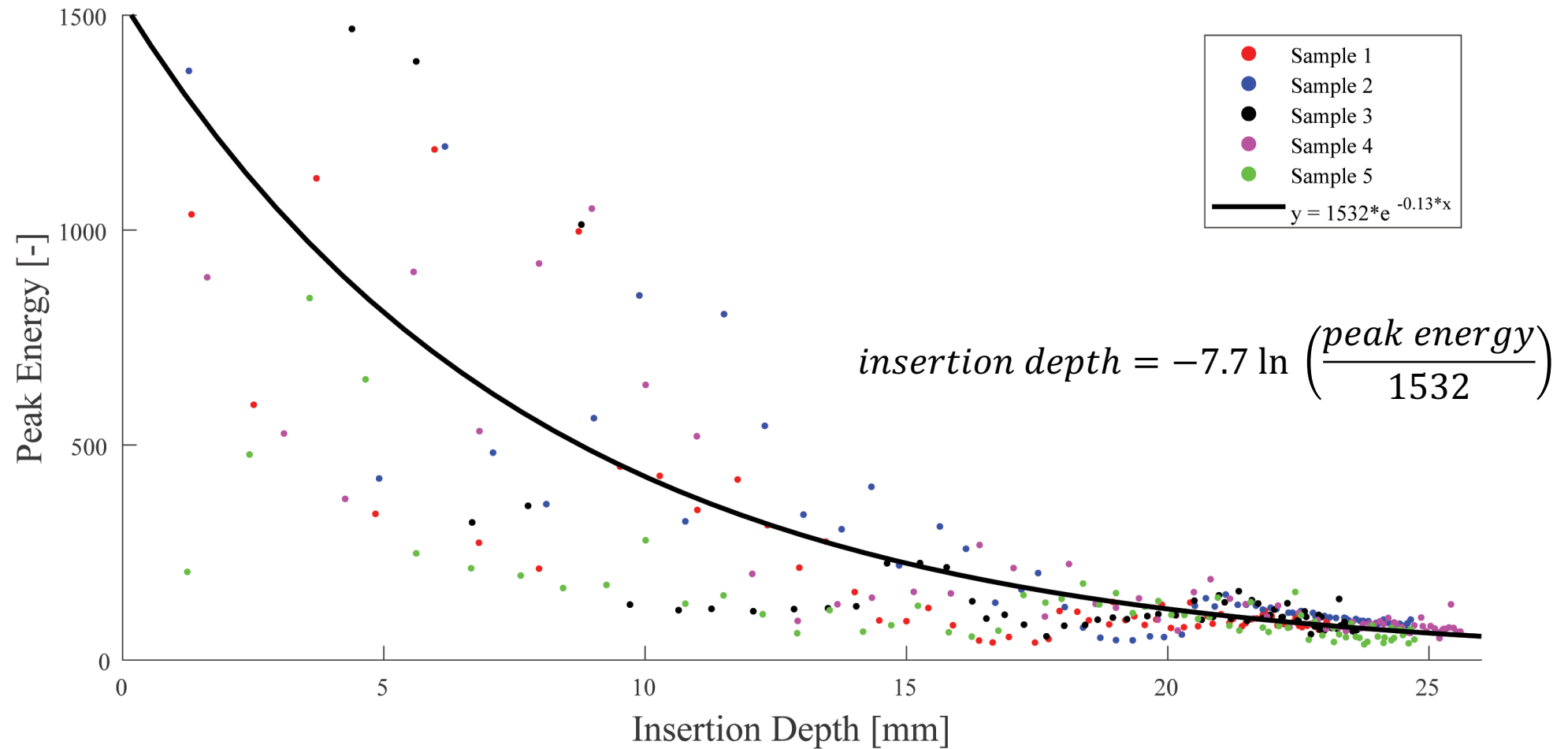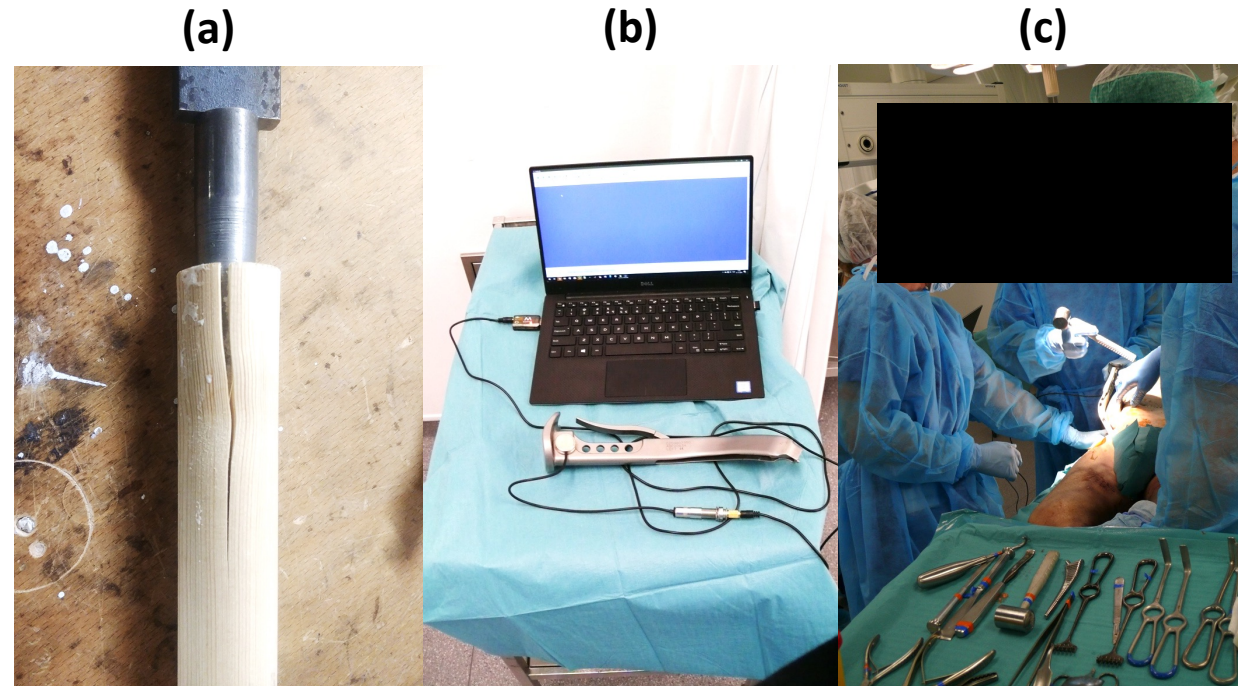**Supplementary Figure 1.** Convergence of peak energies (2nd peak) as the broach is inserted further into the bone. This graph is similar to Figure 2 but peak energy vs. insertion depth is shown instead of vs. hammer blow #.

Supplementary Figure 2. (a) Fracture caused by over-insertion of the broach. **(b)** The contact microphone attached to the Depuy Synthes Corail broach handle for the cadaver pilot study. **(c)** The experiment measuring the hammering impact during the cadaver pilot trial.
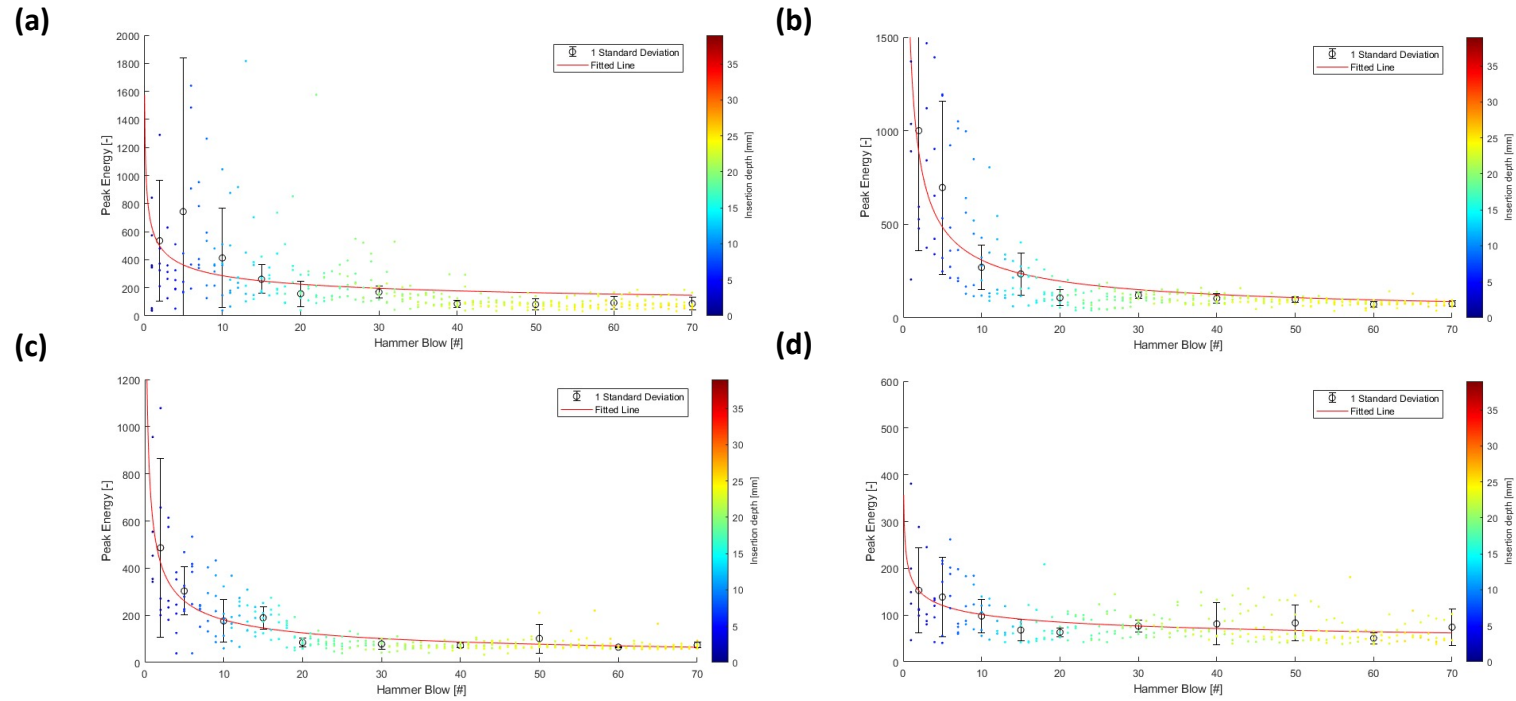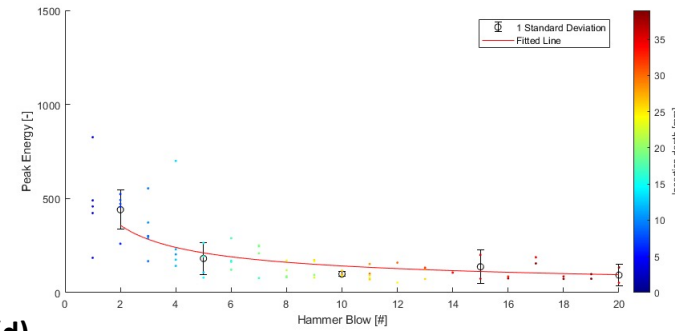
Supplementary figure 3. The same graph as Figure 4, with hammer blow on the x-axis. (a-d) are isolated peak energies of the larger broach condition for the four main peaks at 1400 Hz, 2400 Hz, 3140 Hz and 4660 Hz respectively.
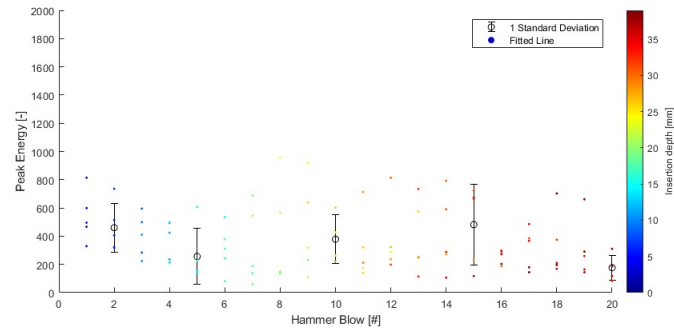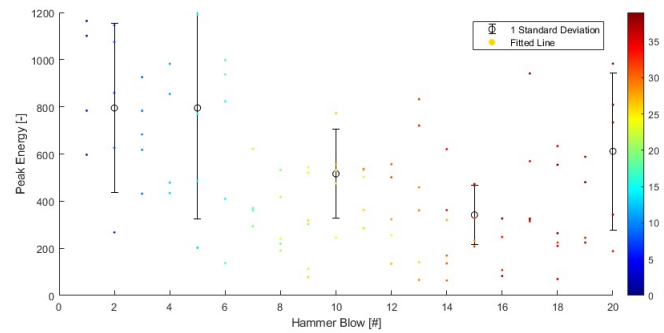
Supplementary figure 4. The same graph as Figure 5, with hammer blow on the x-axis. (a-d) are isolated peak energies of the larger broach condition for the four main peaks at 1400 Hz, 2400 Hz, 3140 Hz and 4660 Hz respectively.

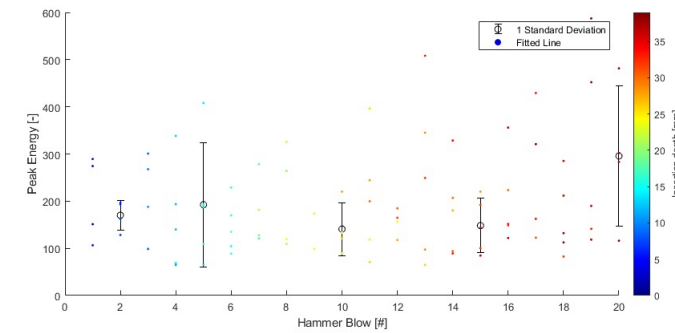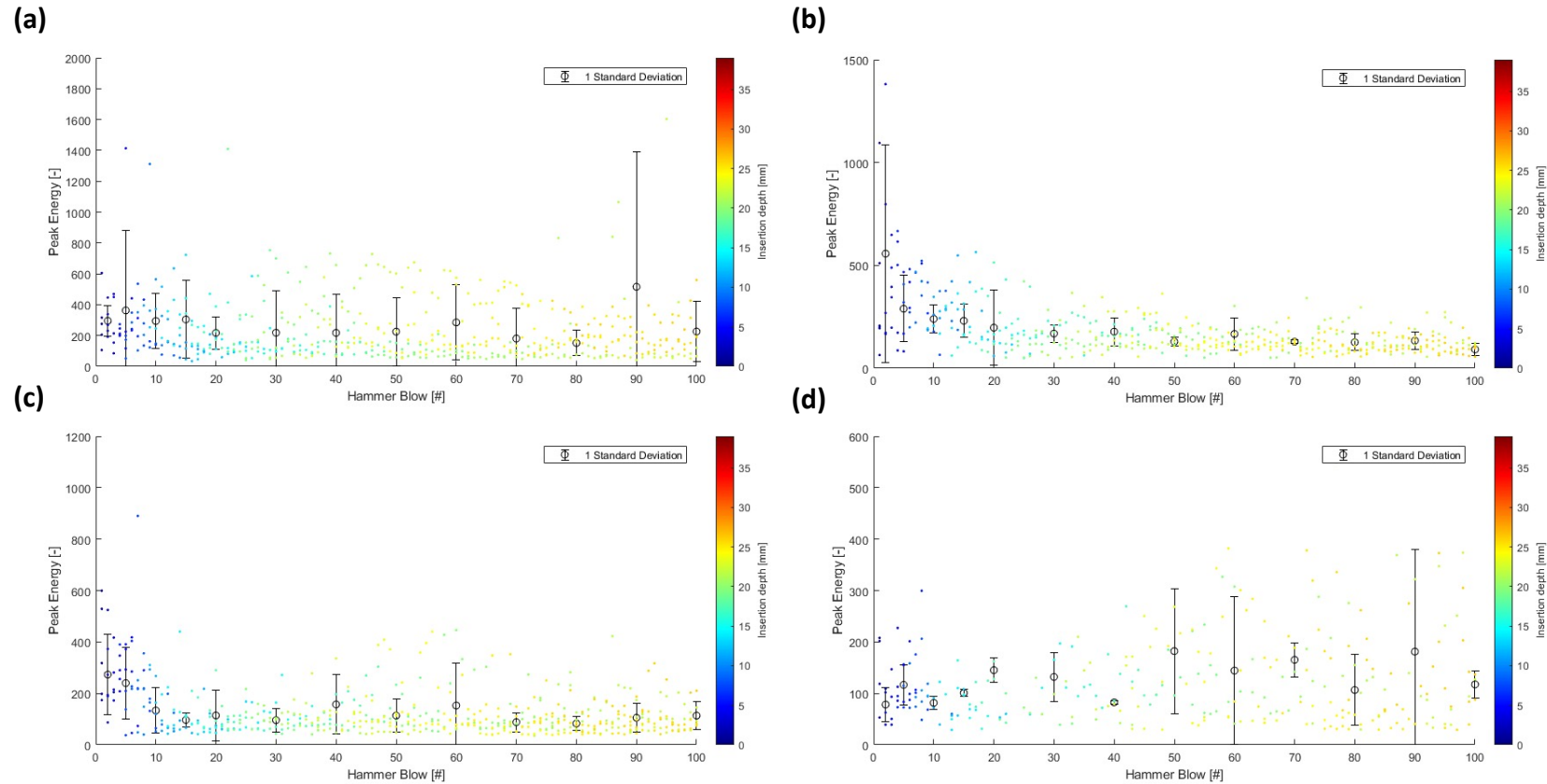**Supplementary Figure 5.** The same graph as **Figure 6**, with hammer blow on the x-axis. (a-d) are isolated peak energies of the larger broach condition for the four main peaks at 1400 Hz, 2400 Hz, 3140 Hz and 4660 Hz respectively.