



## Physical Anthropology Section – 2004

### H62 Assessment of Saw-Blade Wear Patterns and Wear-Related Features of the Kerf Wall

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This poster presents the results of a preliminary study investigating the effects of progressive saw-blade wear on the appearance of kerf walls.

This presentation will impact the forensic community and/or humanity by adding to the established methodology for the interpretation of saw-marks in human bone in cases of postmortem dismemberment. Furthermore, it allows for greater specificity in reconstruction of postmortem events by providing the forensic anthropologist with additional information about the tool(s) used in dismemberment.

Post-mortem dismemberment of homicide victims creates a challenge for forensic anthropologists charged with identification of the victim and reconstruction of the events of the crime, based on evidence contained in the victim's skeletal remains. The pattern and distribution of the cuts may provide investigators with clues to the motivation and intent of the perpetrator in carrying out the dismemberment. By determining what class of tool was used in the dismemberment (i.e. knife, ax, or saw), the forensic anthropologist can provide police with an additional avenue by which to connect a suspect to the victim. The methodology for distinguishing among different types of saws potentially used in the dismemberment, based on the appearance of the cut marks (kerfs) they produce is well established. By virtue of the cutting action of their numerous identical teeth, saws create distinct, repetitive patterns of fine striations on the sides (kerf walls) of the cut mark. These patterns yield information on all the key characteristics of the saw in question: type and width of tooth set, tooth type, number of teeth per inch, and if it is a hand or power-saw.

This preliminary study seeks to compliment the established methodology of cut mark interpretation by investigating the impact of increasing saw-blade wear on the appearance of the kerf wall. Three questions were considered:

1. How can cuts made by a brand-new saw be distinguished from those made by a saw that has been subjected to normal usage (and now shows a fair degree of wear) based on the appearance of the kerf walls? Can corresponding differences be observed in the appearance/condition of the saw blade?
2. Is there an observable difference between saw-blade wear generated by use on bone and wear generated by use on the saw's intended substrate (i.e., wood for crosscut and rip saws; metal for hacksaws)? Correspondingly, will there be differences between the appearance of kerf walls created by saws used only on bone and those created by saws which were used first on the intended substrate and then on bone, beyond anticipated wear-related differences?
3. How will incidental damage (e.g., broken or bent teeth) to the saw-blade, occurring in normal use of the saw, affect the appearance of the kerf wall?

In this study, brand-new blades of three common types of saws (cross cut, rip cut and hack saws) were used to make series of 30 cuts in white-tailed deer (*Odocoileus virginianus*) tibiae; the kerf walls of each cut were then examined under a stereoscopic light microscope. By this manner, it was observed that the patterns of coarse and fine striations on the kerf walls became progressively more shallow and indistinct with increasing saw-blade wear. This pattern correlated well with the accumulation of rounded-off teeth and edges and eburnation of teeth along the length of the saw. Control groups, made by using three saws which were identical to those in the first group to saw through wood and metal, showed highly similar wear patterns to the saws used only on bone. No differences were observed in the appearance of the kerf walls of cut marks in bone made by saws used only on bone versus those made by saws used first on wood or metal. Only one broken saw-tooth was observed in the course of this study; it produced deep, erratic gouges on the kerf walls, which also became progressively more shallow as the cut series progressed.

**Tool Mark Analysis, Dismemberment, Forensic Anthropology**