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Class characteristics of tool marks and the identification of tool makes and models

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ABSTRACT

In forensics, tools used in crimes have been linked to their tool marks left at a crime scene by observing the individual characteristics of the tool (Nichols, 2007). This research proposes that make and model identification can be narrowed down using class characteristics. This was accomplished by creating tool marks and measuring the various dimensions created by the tool into various mediums. These dimensions were then analyzed for significance. It was determined that the length of a tool mark is the greatest contributing factor to the identification of a tool based on a tool mark. One example of this is that the length measurement of the resulting tool mark from Pipe Cutter BCT002 was significant (p-value =0.00051005). It was also determined that there is a need for further research to gather more data of all types of tools.

INTRODUCTION

Tool marks can be generally understood as impressions or marks that are produced by a tool (Nichols, 2007). When a tool contacts a surface with sufficient force, a mark or an indentation is permanently left on the receptive surface. It has been well established in the field of forensic science that tool marks can be observed, collected, and analyzed as evidence for criminal investigations (Bachrach et al., 2010)
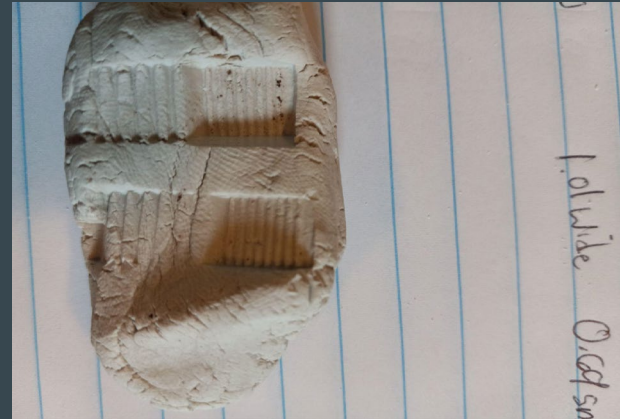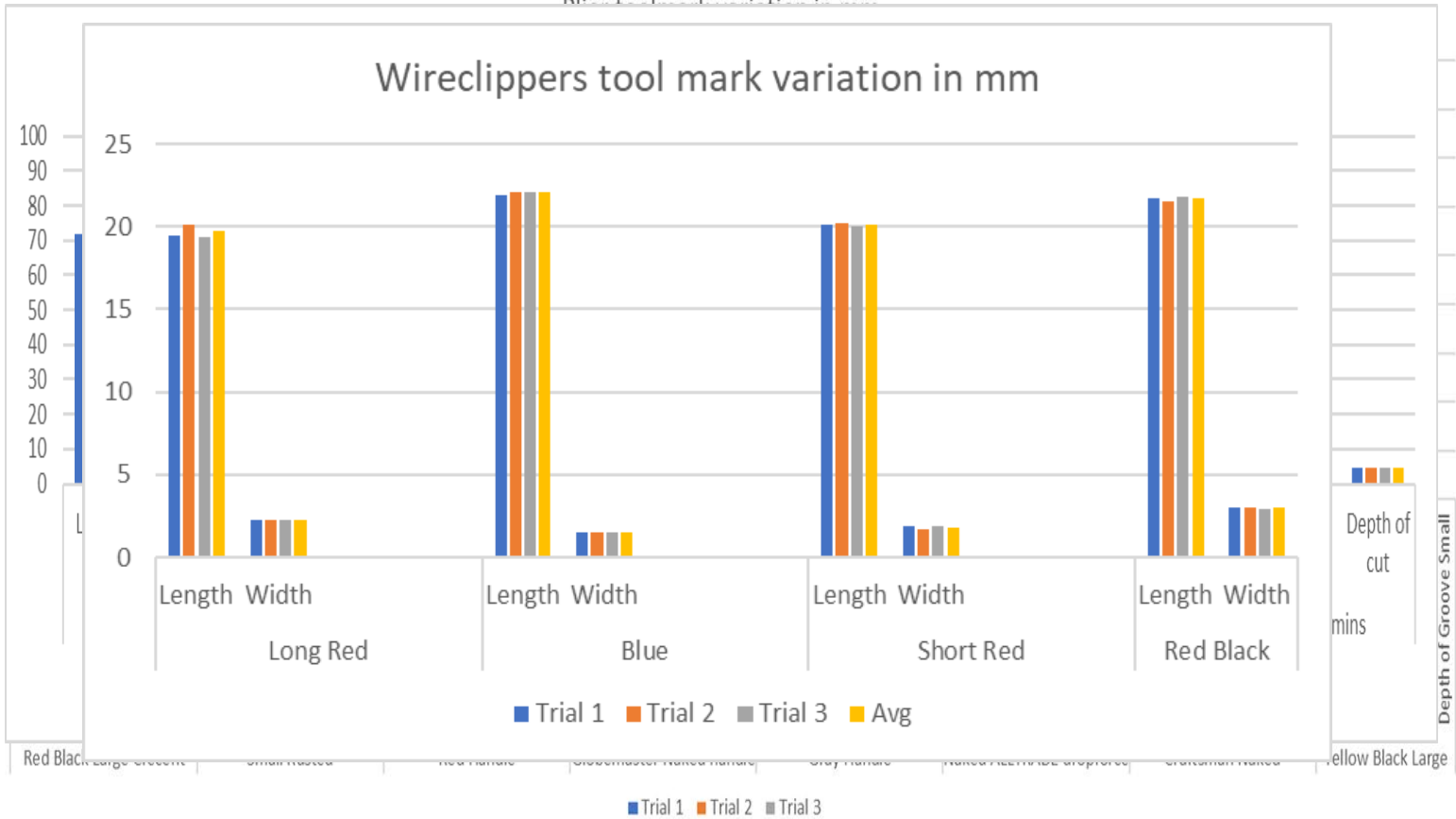
INTRODUCTION (continued)

Another, less utilized, set of characteristics are also found when observing tool marks, class characteristics. These class characteristics are unable to lead investigators to a specific tool, however they can convey important information based simply on the tool marks general shape and size which constitute class characteristics (Bachrach, 2009).

MATERIALS AND METHODS

The study was conducted utilizing various different brands, types, and styles of tools capable of creating tool marks. For the purposes of this research the tool types selected are: pipe cutters, wire cutters, straight cut shears, and pliers. More types of tools were collected, though not in significant quantities. More research should be conducted to include more tool types to determine which tools should be included in the proposed data set of class characteristics.

Res

Wireclippers tool mark variation in mm

Length Width — Long Red
Length Width — Blue
Length Width — Short Red
Length Width — Red Black

Trial 1   Trial 2   Trial 3   Avg

Results continued

As shown in the previous figures, there were variations primarily in the length of tool marks that proved signficant. This would prove useful for the purposes forensic investigation as certain tools can be ruled out or fit into a list of possible tools based on the length of the tool mark.

Due to the lack of significance in the measurements of tool mark width it can be concluded that generally the measurement of width should not be used to categorize and determine the matching tool to a tool mark.

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