

Case Report

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Forensic Footwear Imprint Examination using Adobe Photoshop Digital Imaging Software - A case study

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Abstract

Foot imprints found at the scene of crime form one of the most vital evidence to the investigating agencies. The foot imprints can be examined using the conventional method based on the shape and size of the foot features. But in the foot wear imprints examination only the pattern / design features of the foot wear are compared. Also many a times the foot wear imprints at the scene of crime are either partial or very faint which precludes the examination. In such situations certain techniques in addition to the conventional method are required. In the present case study the use of Adobe Photoshop Digital Imaging software for foot wear imprint examination by superimposing technique is discussed.

Key Words: Foot Imprints, Adobe Photoshop, Superimposition Technique

Introduction

A case of murder and robbery was received in the laboratory. As per the brief case history, a woman in her middle age was murdered by slitting the throat and the motive of the crime was found to be robbery. The victim was lying in a pool of blood and a blood soaked right foot wear imprint on a bed sheet (**figure-3**) was found close to the body. The investigating officers forwarded blood soaked bed sheet containing imprint of the foot wear found at the scene of crime and the right foot wear (**figure-1**) of the accused to the laboratory. In the laboratory the Adobe Photoshop Digital Imaging Software along with conventional foot imprint examination methods was utilized to find whether the blood soaked foot wear

imprint matched with the foot wear of the accused.

Methods and Material

Adobe Photoshop or simply Photoshop^[1], is a graphics editing photography software program developed by Adobe Systems for Mac OS X and Microsoft Windows, designed to assist professional photographers in managing thousands of digital images and doing post production work. It is an image management application database which helps in viewing, editing, and managing digital photos. The blood soaked foot wear imprint (**figure-4**) is marked as EX-1 and the reverse side foot wear of the accused (**figure-2**) is marked as EX-2 and here on will be referred as EX-1 and EX-2.



Figure 1: Footwear of the accused (front side)



Figure 2 : Footwear of the accused (reverse side)



Figure 3: Blood soaked footwear imprint on the bed sheet at the scene of crime



Figure 4: The blood soaked footwear imprint of the right foot

In the present case study Adobe Photoshop* CS version 8.0 was used. Firstly both images are taken of the same magnification and size. EX-2 was inverted (positive image converted to negative), converted to a transparent image and then was superimposed on to the EX-1 (**figure-6**). The foot wear pattern/ design if same should fit into each other.

In addition to superimposition technique, certain standard characteristic patterns or features^[2, 3] of the foot wear imprints were

observed visually (**figure-5**) and microscopically:-

1. The design features like the stripes and dots.
2. The number of horizontal stripes and the dots.
3. The smudged blood imprint in some areas of EX-1 corresponding to the areas of the damaged areas of EX-2 due to wear and tare.
4. The round or circular shaped feature of the strap, beneath the toe position.
5. Embossed design features.



Figure 5: Horizontal stripes and dots in EX-1 & 2

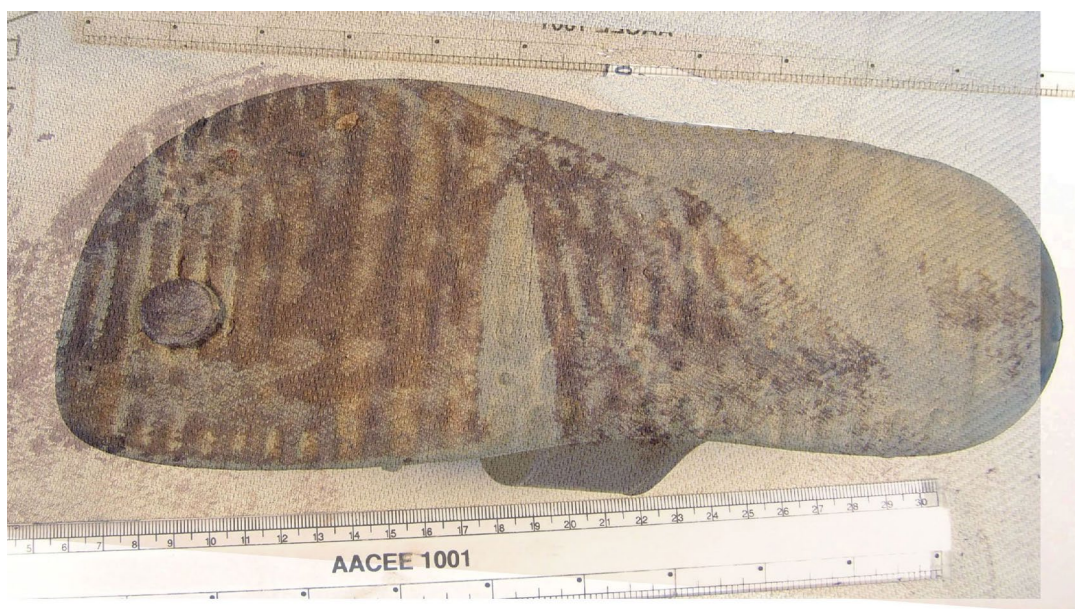


Figure 6: Superimposed images of EX-1 and EX-2

Results and Discussion

The superimposition technique using Adobe Digital Image software can be used for comparison of other physical tool marks and also in the comparison of the human skull to the photograph. The software is very convenient compared to the wet process technique used in conventional film roll based cameras which is time consuming. Also the software can be used to enhance the photographic details which will aid in better identification of matching parameters. The authenticity of the technique is ensured because any changes applied to one parameter will be applicable to the entire image. Also the images are photographed with measuring scale at the side, so any manipulation could be observed in the difference in the scales of both the images. Even though the software is very handy in forensic physical comparison but the extent of utilizing the software is limited.

Limitations of using the software are

1. Many a times the foot imprints on the clothing or other material are not exactly parallel that can be superimposed on to the test imprints. Many situations like foot imprints on to folded clothing or uneven ground surface preclude the use of the technique.
2. If crime foot imprints are in the form of photograph and if it is are not photographed parallel to the ground. Any variation in the angle or position of photography distorts the image and difficult in superimposing with control.
3. If the test impression are not taken properly.
4. Also lot of blood on to the foot wear/ foot leads to smudging and thus the features are not visible clearly.

In all such cases it becomes difficult to use the method and the traditional methods can be relied. However if at least a part of the

imprint giving details of the foot imprint pattern is present then it is possible to use the technique to some extent and can be used as a preliminary examination.

The superimposed images of EX-1 and EX-2 (**figure-6**) using the Adobe Photoshop software^[1] showed that the stripes and dotted pattern were fitting into each other exactly. The position of the stripes and dots were found to be same. The stripes in the middle and smaller stripes at the edges were found to be exactly fitting. The circular embossed part of the strap holding the toe was found to be matching. Also based on the visual and microscopic observation, the features of both EX-1 and EX-2 were found to be corresponding to each other.

Conclusion

Based on the superimposition technique using Adobe Photoshop Digital Imaging Software and other characteristic feature examination of the foot wear imprints it was found that the blood soaked foot wear imprint matched with that of the foot wear. Adobe Photoshop software technique is thus one of the most convenient and accurate methods for the foot imprint / footwear examination.

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