



### B23 An Analysis of Test Exemplar Techniques in Relation to Footwear Examinations

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**Learning Overview:** This presentation will determine the best practices for obtaining the most detail in the test exemplars. This in turn will lead to developing potential for more accurate and detailed footwear impression examinations. The main objective of this study was to compare one technique to another to determine the one with the most reliability.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by demonstrating that acquired characteristics observed in the outsole of four pairs (eight shoes) of athletic shoes can be used to differentiate wear in a common sole design and will provide the best practices for obtaining the most detail in the test exemplars. This in turn will lead to developing potential for more accurate and detailed footwear impression examinations.

The Adidas® Superstar athletic shoes (size 4½) were worn by the same female subject (50 years old) over a period long enough to cause noticeable and unique wear, cuts, and stone-hold characteristics on the outsoles. These randomly acquired characteristics were studied and compared to the characteristics observed in the scanned outsole of each shoe. After collecting the shoes, six techniques were used for obtaining test exemplars. These were: Kiwi® polish, magnetic powder, TreadPrint®, Speedball® Ink and Inkless Shoe Print, WD40® with magnetic powder, and bichromatic powder. The outsoles of each shoe were then photographed and documented after using each of the six techniques. They were then re-examined to locate the visible randomly acquired characteristics.

A total of 48 test exemplars were created and the collected data statistically analyzed using chi-square and the Analysis of Variance (ANOVA) test. Significance was determined by p values <0.05. A comparison of these randomly acquired characteristics revealed that, although the numbers varied, the results were consistent. They also indicated that any of the methods were as good as the others for defining the acquired characteristics developed in the similar sole pattern. The resulting exemplars were suitable for footwear examination.

Footwear examiners will use any and all information available to provide a complete examination of the evidence presented to them. Photographic documentation of the footwear impression evidence on scene alongside the documentation of the outsole of the known shoe and a highly detailed test exemplar have been the best form of evidence utilized in a comparison. This project relied heavily on the ability to properly document the outsole and obtain detailed test exemplars. The methods utilized captured the randomly acquired characteristics of the outsoles extremely well compared to the scanned outsole. However, it was surprising to find that the observed number of randomly acquired characteristics in each outsole was comparable.

In conclusion, further research should be performed in order to aid with the investigation of footwear and possibly tire tread examinations related to crime scenes.

#### Patterned Evidence, Footwear Evidence, Test Exemplars