



Engineering Sciences Section - 2013

C14 Examination of Microstamped Cartridges

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After attending this presentation, attendees will gain an understanding of the durability and reliability of microstamped firing pins. The quality of the alphanumeric identifier will be discussed as well as how the gear code on microstamped firing pins can be deciphered. How the transfer of the identifier varies between different guns and ammunition will also be discussed.

This presentation will impact the forensic science community by providing results from a microstamped study, an area that is currently receiving a lot of attention. This presentation will add to research being carried out in ballistics by broadening the understanding of factors that affect the transfer of the alphanumeric identifier as well as a circumferential gear code and its decipherability.

Recently, firearm microstamping, which involves placing unique identifiers on the end of a firing pin that is then transferred to the primer upon firing, has been proposed as one method of improving forensic identification. Current microstamped marks consist of six to eight alphanumeric characters and a surrounding circular gear code, which is intended to confirm the alphanumerics. While a quick visual observation can determine which alphanumerics are clear, any distortion of the identifiers or sanding of the firing pin tip can make identification difficult. In these cases, the gear code could provide information that could fill in missing identifiers, or could replicate the whole alphanumeric code if it is illegible.

This study seeks to evaluate the transfer of gear codes from microstamped firing pins to a variety of ammunition types. The initial part of this study has already appeared in print.¹ Briefly, 1,000 cartridges were fired with three different semiautomatic handguns: a Sig Sauer P226, a Taurus PT609, and a Hi-Point C9. Microstamped firing pins for each gun were optimized with six alphanumeric characters. Of the 1,000 rounds, ten different brands of ammunition were chosen with a variety of primer types represented. The fired cartridges were then evaluated through a stereomicroscope and assigned a grade based on the number of legible alphanumeric identifiers. The poorest quality transfers from this study were chosen to be examined through Scanning Electron Microscopy (SEM).

Like the identifier evaluation in the previous study,¹ the Sig Sauer had the best transfer of gear code. The Taurus did not transfer its gear code well, and the Hi-Point transferred its gear code consistently, though only certain sections. Interestingly, the overall clarity grade was improved most, not from the gear code, but by simply changing the imaging technique. SEM allowed more of the identifiers to be clearly read, though some still were too smeared to decipher.

In addition to evaluating the poorest quality cartridges, the lowest graded clips (10 cartridges per clip) from each gun were also evaluated to examine the possibility of using parts of the gear code and identifiers to form a complete microstamp. As was the case in the earlier part of this study, the Taurus cartridges did not have good gear code transfer.¹ No gear code transferred beyond the second character; however, the identifiers did reveal the whole code. The Sig Sauer was the only gun that had every section of its gear code transfer at least once. The Hi-Point's gear code only appeared, at most, to confirm the first three identifiers.

In conclusion, this study investigated the transfer of the identifier and gear code in microstamped marks from three different guns. In no case was transfer universal. Poor transfer was also seen and, in the case of the gear code, occasionally contained errors. However, using both the gear code and the alphanumeric identifiers, the complete microstamped code could be deciphered in every case when using all the information contained on cartridges from a 10-shot clip. The identification of the alphanumeric was most easily facilitated by simply using SEM instead of a stereomicroscope for evaluation.

Reference:

1. L.S. Chumbley, J. Kreiser, T. Lizotte, O. Ohar, T. Grieve, B. King, & D. Eisenmann (2012). Clarity of microstamped identifiers as a function of primer hardness and type of firearm action. *AFTE Journal*, 44(2), 145-155.

Microstamping, Gear Code, SEM