BULLET CASTINGS: RECOVERY OF STRIATIONS

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ABSTRACT
The Mikrosil® and TRITECHFORENSICS Silicone Casting Material casts gave a negative image of the fired bullet (Figure 3) as shown in Figure 2. To make a cast in the same orientation as the fired bullet, jeweler’s wax was used to make a double cast. The double cast wax bullet is shown below in Figure 4 with the corresponding bullet in Figure 3. Figure 5 shows the correlation between the same land of a wax bullet and a fired bullet. In Table 1 the number of striations counted on each land and groove of a fired 9 mm bullet and its corresponding wax bullet are shown with the percent recovery of striations.

RESULTS
The obtained average percent recovery was 85% for the lands and 82% for the grooves.

MATERIALS AND METHODS
Fired bullets were placed under Leeds Firearm Comparison Microscope. Each land and groove of the bullet was photographed using SPOT Advance version 4.6 software. The material used was Mikrosil®. Mikrosil® is a silicone based casting putty that comes in two separate tubes. Equal lengths of each tube were squeezed onto a card and mixed together for a few seconds. The Mikrosil® was then spread onto the fired bullet’s surface. This method caused many air bubbles in the cast. Next, the Mikrosil® was mixed and placed in a bottle cap. The fired bullet was then placed in the cap and rotated to cover all sides of the bullet. This method also left behind many air bubbles in the cast. A small piece of solid wood was then drilled with holes ½ inch, 13/32 inch, and 23/64 inch in diameter. The Mikrosil® was then mixed and spread into opening of the 13/32 inch hole and the bullet was forced in the hole to allow the Mikrosil® to cover its entirety. This hole was used for 9mm bullets and the ½ inch hole was used for 40 and 45 caliber bullets. The Mikrosil® was found to not be easily removed from the wood bar. A small steel bar was then drilled with the same diameter openings. The Mikrosil® was easily removed from the steel bar, but under the microscope air bubbles were still present. Since Mikrosil® takes longer to dry in colder temperatures, the steel bar was then placed in the freezer to cool. The Mikrosil® was then mixed and placed in the opening of the cold steel bar. The bullet was then guided to the center of the hole using a toothpick and forced in the hole. The bar was then returned to the freezer for approximately 20 minutes while the Mikrosil® set. The bar was then removed from the freezer; the bullet and cast were removed from the bar. The cast was then inverted to show the side with striations and photographed under the microscope.

DISCUSSION
These results show that the wax bullet does retain the majority of the striations from the fired bullet as seen in Table 1. As seen in Figure 5, the striations can be matched between the wax bullet and the fired bullet. The Mikrosil® and TRITECHFORENSICS Silicone Casting Material casts were negative images of the fired bullets and could not be directly compared. By freezing the metal bar, the occurrence of air bubbles was reduced and the quality of the cast was improved. This was most likely due to the longer drying time at the lower temperature. This allowed for the Mikrosil® to settle in the microscopic striations.

The bright blue color of the TRITECHFORENSICS material led to less ideal photographs. The striations were not visible in the lighting of the microscope. The casts were sufficient to make wax bullets from, but the actual casts could not be properly examined.

The wax bullet lands and grooves were slightly smaller than the lands and grooves of the fired bullet. This may be because the Mikrosil® cast expands when the bullet is removed. To match the wax bullet to the fired bullet, the picture had to be expanded.

CONCLUSION
Silicone castings of fired bullets may be useful in creating a double cast for comparison. Since the silicone castings are negative images of the actual bullet they cannot be used for direct comparison. Double castings made with wax are temporarily useful to be used for comparison. The surface of the wax is easily scratched which destroys the striations. Mikrosil® and TRITECHFORENSICS Silicone Casting Material are both suitable to make casts of fired bullets. The method of using Mikrosil® had to be changed from the included directions. The material must be cooled to allow proper casting without air bubbles.

Further research needs to be done concerning bullet fragments and casting materials to see if striations can be recovered. Further research also needs to be done on a more permanent double casting material that will not be as easily destroyed as the wax bullets.

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