Technical Note

Casting Bloodstain Patterns: AccuTrans versus Mikrosil

Zack Kowalske

Roswell Police Department
Roswell, GA

Abstract: The use of casting agents is common for molding impressions of tool marks and latent prints on uneven surfaces. This study compares two casting products (AccuTrans and Mikrosil) and their ability to cast bloodstain pattern impressions. The results indicate that AccuTrans provided more detail.

Introduction

Traditionally, the concept of bloodstains has been considered from a two-dimensional perspective because impact stains or a bloody finger impression or a bloody shoe impression all have an inherent seeming flatness. However, they are not simply flat. These stains are composed of substance, a medium transmitted onto a substrate. Therefore, bloodstains and impression patterns, such as fingerprints, inherently have a three-dimensional quality, and the principles of casting tool marks or lifting prints from textured substrates apply [1, 2]. Currently on the forensic market are two products that are primarily used for this type of collection: AccuTrans (Coltène/Whaledent Inc., Alstätten, Switzerland) and Mikrosil (Kjell Carlsson Innovation, Sundbyber, Sweden). At the National Forensic Academy, this question was posed: Which is better for the casting of bloodstains, AccuTrans or Mikrosil?

Received March 30, 2016; accepted June 18, 2016

Materials and Methods

The application of casting impression evidence is simple and consists of mixing two components, the silicone base and a hardener, to create a workable puttylike material. The material is then applied to the substrate and allowed to set. It takes about 10 minutes to set, depending on volume and temperature. When set, the cast is removed and packaged.

AccuTrans consists of a cartridge that contains two tubes: one contains polyvinyl siloxane and the other contains a hardening compound [3]. The cartridge is placed into an extruder gun, in which the two compounds are squeezed and mixed with exact predetermined proportions. The system has tips that can be applied to the mixing tip to allow an even spread of the paste.

Mikrosil has two paste tube containers: one is identified as Mikrosil (which contains polydimethylsiloxane) and the other is a casting hardener [4, 5]. The user squeezes an equal length of each onto a backing card and manually mixes the two compounds with a wooden spatula. The resulting paste is then applied to the impression with the spatula and allowed to set.

Materials used during this experiment were white ceramic tiles as the substrate, one AccuTrans extruder gun with brown and white colored cartridges, multiple spreader applicator tips for the AccuTrans extruder gun, one white and one gray Mikrosil kit, wax paper, one four-inch ink roller, and 10 mL of screened human blood.

The experiment consisted of two types of bloodstain patterns: patent bloodstained friction ridge impressions and a small cast-off bloodstain pattern.

For the Mikrosil experiment, a bloodstain print was placed on a tile (Figure 1). The impression was allowed to air dry for 10 minutes at room temperature. After the allotted drying time, the Mikrosil was prepared using approximately five inches in length of the Mikrosil and catalyst. The sample was mixed until the consistency was even. It was then applied to the friction ridge impression using the wooden spatula. Wax paper was then placed over the Mikrosil and then it was rolled to an even thin layer (approximately 5 mm) over the impression using the ink roller. The wooden spatula with the remaining Mikrosil was placed on a square of wax paper to serve as a control for drying time. Both casts were allowed to set and cure for 10 minutes before lifting. This method was repeated for a subsequent three additional impressions.

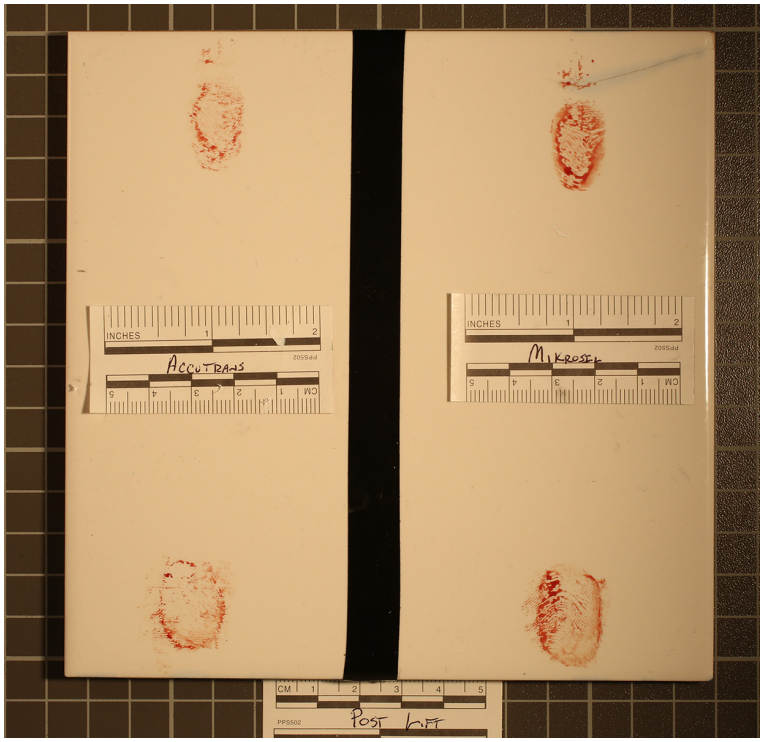


Figure 1
Bloody ridge impressions.

For the AccuTrans experiment, a bloodstain print was placed on a tile. The impression was allowed to air dry for 10 minutes at room temperature. After the allotted drying time, the white AccuTrans cartridge was loaded within the extruder gun and a spreader tip was attached to the tip. The AccuTrans was then applied in a coat over the friction ridge impression. Wax paper was then placed over the AccuTrans and then it was rolled to an even layer over the impression using the ink roller until the AccuTrans was a thin (approximately 5 mm) layer. This methodology was repeated for a subsequent three additional impressions.

The second aspect of the experiment was the casting of a small cast-off bloodstain pattern, using the same method as the patent friction ridge impression. For this stage, one stain pattern was created on each of the ceramic tiles (Figure 2). Each stain pattern was then cast twice with the casting materials, following the friction ridge impression procedure.

Results

The Mikrosil casts failed to yield a classifiable impression (Figure 3). The AccuTrans produced a superior cast of greater detail, to the point of being able to cast the ink impression of a scale located next to the cast-off stain pattern (Figure 4).

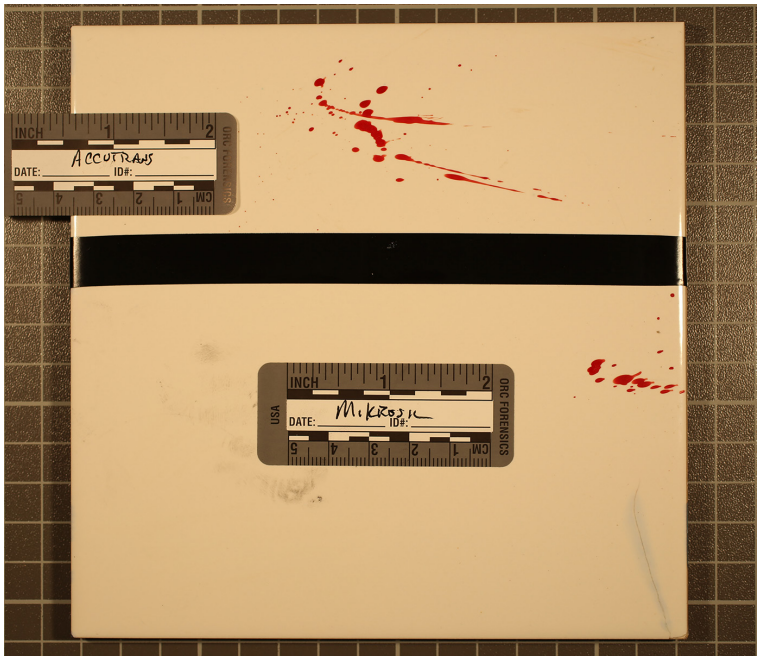
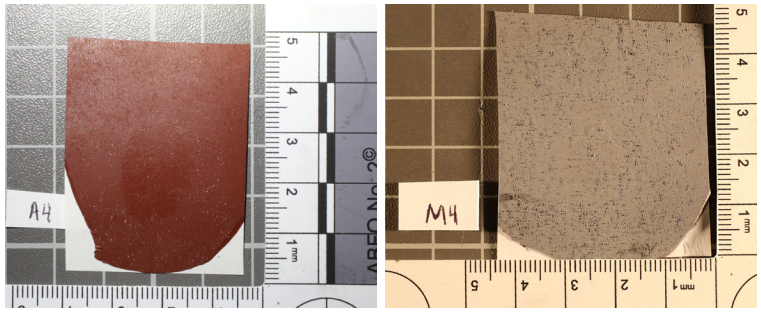


Figure 2

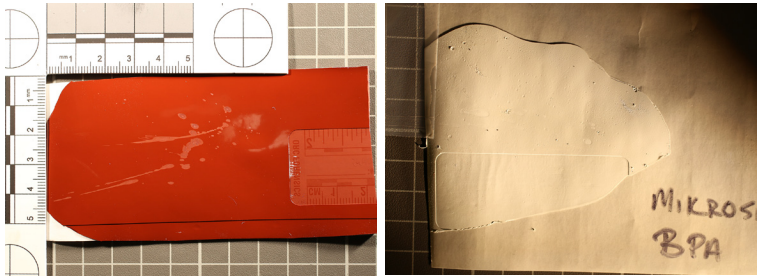
Bloodstain pattern impressions.



(a) *(b)*

Figure 3

Cast of bloody friction ridge impressions: (a) Accutrans; (b) Mikrosil.



(a) *(b)*

Figure 4

Cast of bloodstain pattern: (a) Accutrans; (b) Mikrosil.

Discussion and Conclusion

The results of the experiment showed that the cast produced by the AccuTrans product provided more level of measureable detail. Upon applying a blood reagent dye stain (Coomassie Blue), a positive reaction was observed in the AccuTrans-captured stain pattern. This same process was not observed in the Mikrosil casts. Other aspects of this technique to take into account after collection are those that would affect subsequent examination procedures. Because this process is casting the stain pattern or bloody friction ridge pattern, it is important to remember that the final product is a reversal of the actual impression or stain pattern. It should be noted that the purpose of this study was only to compare the two products as they pertained to casting the medium of blood. This is why the experiment was conducted on standardized tiles, to eliminate as many variables as possible. At the onset of the experimentation, the hypothesis posed was that, because of the predetermined mixture of AccuTrans, there would be fewer variables for error and therefore the cast would capture more detailed impressions. AccuTrans did outperform Mikrosil. Whether this was due to the manner in which the products were prepared and delivered or whether it was the result of the makeup of each product is unclear. What is clear is that the use of AccuTrans as a casting agent for bloodstain impression evidence provides a macroscopic level of collected detail. Further, because of its ease of use and predetermined mixture, it is convenient to use during the course of a forensic investigation.

For further information, please contact:

Zack Kowalske
Roswell Police Department
39 Hill Street
Roswell, GA 30075
zkowalske@roswellgov.com

References

1. Attinger, D.; Moore, C. B.; Donaldson, A.; Jafari, A.; Stone, H. A. Fluid Dynamics Topics in Bloodstain Pattern Analysis: Comparative Review and Research Opportunities, *For. Sci. Int*. **2013**, *231* (1–3), 375–396.
2. Balthazard, V.; Piedelievre, R.; Desoille, H.; Dérobert, L. Etude des Gouttes de Sang Projecte (Research on Blood Spatter), in Proceedings of the XXII Congress of Forensic Medicine, Paris, 1939.
3. Sirchie, Safety Data Sheet according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations.
4. Mikrosil, Base – Material Safety and Data Sheet, Kjell Carlsson Innovation, Sundbyber, Sweden, updated August 19, 2011.
5. Mikrosil, Hardener – Material Safety and Data Sheet, Kjell Carlsson Innovation, Sundbyber, Sweden, updated August 19, 2011.