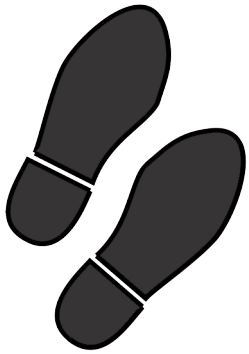
Footwear Forensics

Introduction

Tracks left by footwear are valuable pieces of evidence at crime scenes that are often overlooked. Learn the different ways that tracks from shoes can be used to develop possible suspects in a criminal case.



Concepts

- Footwear impressions/casting
- Forensics

Materials

Bio-Foam® Impression Foam System
Calcium sulfate, $CaSO_4 \bullet ½ H_2O$, 425 g
Talc, $3MgO \bullet 4SiO_2 \bullet H_2O$, < 1 g
Water, distilled or deionized
Balance
Brush, beaker or flask type
Graduated cylinder
Plastic bag, re-sealable, 1-gallon
Ruler, cm

Safety Precautions

The BioFoam contains ≤ 1% formaldehyde. Formaldehyde causes skin and serious eye irritation and may cause an allergic skin reaction and cancer. Wear chemical splash goggles, chemical-resistant gloves and a chemical-resistant apron. Wash hands thoroughly with soap and water before leaving the laboratory. Follow all laboratory safety guidelines. Please review current Safety Data Sheets for additional safety, handling and disposal information.

Procedure

Making the Impression

1. Obtain a box of footwear foam and open it carefully. *Note*: Touching the foam with your fingers, even lightly, will leave an impression.
2. Select a group member to make a footwear impression.
3. Step gently onto the foam, depressing your shoe about half-way through the foam. Do not place too much weight on the impression foam.
4. Carefully remove your shoe from the foam. Another group member may need to hold the box down so the impression is not damaged by wiggling your foot to remove it.
5. Very lightly sprinkle talc powder over the impression to serve as a fixative. Tap the sides of the box over a garbage can so that that talc is evenly distributed over the impression.

Preparing the Casting

6. Measure 425 g of calcium sulfate in a 1-gallon resealable bag.
7. Measure 215 mL of distilled water and add it to the plastic bag containing the calcium sulfate.
8. Seal the bag and make sure it is completely closed.
9. Shake the bag vigorously for 30 seconds.
10. Gently knead the contents of the bag for 1–2 minutes. Verify that the contents of the bag are not lumpy and are roughly the consistency of pancake batter. If not, add 10 mL more water at a time until desired consistency is achieved.

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11. Open the top corner of the bag and gently pour it at an angle into the foam casting. Do not pour directly on the casting where the flow of the material will change the cast.
12. Allow the casting to harden for 30 minutes or until hard to the touch.
13. Remove the casting and foam from the box.
14. Gently peel away the layers of foam from the casting. *Note*: As the foam is removed, check that the casting has properly solidified before vigorously removing excess foam.
15. Once the impression has completely hardened, clean off the excess foam by brushing the impression with a beaker brush to remove foam from the smaller grooves of the impression.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. All materials may be disposed of according to Flinn Suggested Disposal Method #26a in the regular trash or saved for future use.

Tips

- This activity was adapted from Flinn Forensic Files—Footwear Evidence (Catalog No. AP7752), one of the kits that make up the Flinn Forensic Files.
- This activity was tested mixing calcium sulfate hemihydrate with tap water. However, depending on your water quality, it may be necessary to use distilled or deionized water.
- If desired, Shake-N-Cast™ (AP7754) can be used in place of calcium sulfate and water.

Discussion

Footwear impressions are often used to place a suspect at a crime scene. It makes sense that a criminal must enter and exit the crime scene on foot at least for a short distance, making the footprint a common denominator in most crime scenes. Criminals have realized it is important to conceal their fingerprints with gloves or their faces with masks. In fact, in the wintertime you might not think anything of a person wearing either of those accessories. However, most people don't wear shoe covers in their daily lives and doing so would cause a person to stand out.

Footwear evidence is obtained by prints or impressions. Just like fingerprints, footwear prints can be visible or latent. *Visible prints* are found when the footwear is contaminated by a foreign object such as blood or wet paint. The person then steps on a clean surface leaving a visible print. *Latent footprints* are commonly overlooked as they are not visible unless they are dusted with powder just like fingerprints. Footwear evidence can also be obtained by taking impressions. Impressions are taken when the footprint is evident on a softer surface such as wet sand, mud or snow. First, the medium is treated with a hardening spray followed by casting similar to that used to take dental impressions. Once the casting material has hardened, the 3-D model can be compared to suspects' footwear as well as saved with other evidence for future reference.

References

Hilderbrand, D. S. *Footwear, The Missed Evidence*. http://www.crime-scene-investigator.net/footwear.html. (Accessed September 2015).

Materials for *Forensic Footwear* are available from Flinn Scientific, Inc.

Catalog No.	Description
AP7749	Flinn Forensic Files—Footwear Evidence Individual Kit
AP7752	Flinn Forensic Files—Footwear Evidence Classroom Set, 8
AP6024	Brush, Flask, 250-mL
C0032	Calcium Sulfate, 500 g (Plaster of Paris)
C0033	Calcium Suflate, 2 Kg (Plaster of Paris)
AP7755	BioFoam® Footwear Impression
AP7754	Shake-N-Cast™ Impression Kit
AP7756	Aerosol Dust and Dirt Hardener

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.