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Impression Casting

TECHNICAL NOTES

Background

Three-dimensional casting is the most reliable technique to reproduce evidentiary marks made by shoe outsoles and tire treads in soil or other soft substrate. Casting requires few tools and supplies to complete the task competently. The technician should have a camera with removable flash, tripod, casting powder, water and a mixing vessel at his/her disposal to record the minute details of any impression located at a scene of crime.
While proper photographs alone will, in most instances, give the examiner a reproduction of detail of the shoe or tire, the detail is only represented in two dimensions, possibly leaving some detail undetectable. Three-dimensional cast in addition to photography is the best and most reliable technique to recover track impressions found at the scene.

Safety

As with all chemicals, always read the MSDS (material safety data sheet) to learn about the safe handling and health hazards of each chemical. When mixing any casting material appropriate PPE should be used to protect the eyes and skin.

Detecting Marks and Impressions

Finding impression tracks at scenes of crimes is relatively simple. If in a low light situation, use a strong flashlight or other light source that can be placed near the ground providing a good cross light to visualize the tracks. Once tracks are detected they should be marked with number tent or flag to help keep department personnel from treading over them. After the tracks are detected then they should be notated as to direction, anatomical side (right or left), and any visible style difference (if dealing with multiple subjects or high traffic area). It is recommended that all impressions detected at the scene be photographed and cast because not all tracks are perfect, but all can provide minute details to the examiner.

Why should we cast?

1. The cast provides a replica of the object making the original impression.
2. The cast provides a reproduction of macroscopic details.

3. In deep impressions, the casting can provide a reproduction of sides of the outsoles or sidewall markings on a tire. The casting can also give a reproduction of the midsole area of the shoe that may not be captured in two-dimensional recovery methods.
4. Photographic problems such as focus, and scale are eliminated because of the life-like reproduction.
5. The casting provides tangible three-dimensional evidence for comparison and court presentation.
6. The casting can be used to support the crime scene photography of the impression.

Photography

After identifying the impression that is to cast, place the tripod mounted camera over the mark or impression so that the camera will be located directly over the track and point toward the impression with the film plane parallel with the impression. Care should be taken not to add debris into the impression while moving about the area. The image of the impression should fill the frame of the viewfinder to record as much of the detail as possible. The image of the impression should fill the length of the view finder. The flash should be removed from the camera and connected with the flash extension cord. If the flash cannot be removed from the camera, the light should be redirected away from the impression with an index card taped in front of the flash. The light will be supplied from an auxiliary flash or spotlight. The light is positioned about 3-5 inches from the ground and pointed toward the impression. This side lighting will enhance the detail using shadows. Practice exposures with the light will determine the distance from the impression the light should be, but generally, about 6-12 inches is enough distance. After determining the distance of the light, at least 4 exposures of each track should be made with the light source relocated around the impression at four positions on the clock, 12:00, 1:30, 3:00 and 4:30. A scale of at least 6 inches and a case identifier card should be visible in each image.

Now care should be taken to FUSS over the impression:
Fill the frame of the camera
Use a scale
Side lighting
Several shots

Note: the acronym FUSS is attributed to Ernie Hamm, retired US Army and FDLE

Casting the Impression/Mark

After photography, the impression should be cast as soon as possible to prevent the chance of contamination or destruction. Castings can be made with the assistance of a limiting frame or can be poured like a pancake. When casting with a frame, more material is used to make the casting thicker for support. When making a “pancake” cast, a minimal amount of material is used. The techniques discussed below will cover the “pancake” type casting.

Whether using Traxtone, dental stone or Plaster of Paris, the casting technique is the same.
Traxtone and dental stone powders can be pre-measured and have water added to the powder to prepare the mixture. Plaster of Paris requires the measuring of water first then the addition of the powder to achieve a proper mixture.

TRAXTONE
Open the 2-pound bag of Traxtone and add 9 ounces (250ml) of water. Seal the bag and begin kneading the mixture. Traxtone has color crystals to help the technician see that the mixing is complete. Thoroughly mix the powder and water, taking care to get all the powder in the corners of the bag. Open the bag and begin pouring Traxtone at a point outside of the impression that allows Traxtone to flow into the depressed area. This initial pour should be as close to the surface as possible for the mixture to flow gently into the depression. Do not pour directly into the depressed mark but direct the flow of Traxtone into the track by advancing the pour on deposited Traxtone which will spread the flow over the entire depressed area. Do not stop the pour in mid-cast as hesitation lines will form and could hide characteristics in the impression.

DENTAL STONE
Dental Stone generally has the same tensile strength characteristics as Traxtone but without the mixing crystals. Dental stone can be pre-measured and stored in zip-top bags until needed. Use dental stone in the same manner as described above.

PLASTER OF PARIS
If using Plaster of Paris, a mixing container is necessary. To pour a typical shoe sized impression, about 3-4 cups of water are needed. If using a casting frame, a larger volume of liquid and mix will be required.

Before mixing the plaster, support material must be added over the impression to give strength to the finished cast. The best material to use is ½" wire mesh. Cut the mesh to a size that will extend over the length and width of the impression without interfering with the detail of the impression. The corners of the rectangle of mesh can be turned down to give some height to keep the mesh from touching the impression.

Begin adding powder with a sifting action and mix by agitation. Continue adding powder until the mixture starts to thicken. A finished mixture will have the consistency of pancake batter. When the mixture is ready, do not stop agitation as this will signal the components to start the hardening process. Pour the mixture into the impression using the technique described above.

Collecting the Cast

Most casts will dry in about 30-45 minutes on average. All castings should be photographed in place with some sort of background to show location relative to the scene. Castings need to be marked with case number, date, technician ID, north arrow and location. Please refer to your department's regulation regarding marking evidence. A dried casting can be lifted from the ground using a shovel or other tool. Insert the tool under the casting a couple of inches from the edge to dislodge the dirt around the casting. The casting will have a coating of dirt on the impression side. This dirt should be left in place and not disturbed for at least 24 hours. In this time frame, the casting will be completely dry and ready for washing. Casts should be stored, whether temporarily or permanently, in a porous container. Castings may still have some water content to them, even though they seem dry and storing them in paper or cardboard will allow them to shed the remaining moisture. Storing in plastic may cause the casting to become brittle over time. To clean a dried cast, run a steam of water over the cast and gently remove the soil with a soft brush or your hand. Do not use force or an abrasive brush to remove the dirt to prevent damage to the casting detail.

Additional Information

Other techniques that may be useful when pouring impression casts:

Snow Print Wax is used to pre-harden snow impressions to protect the detail from the heat generated by the curing of the casting material. Snow Print Wax is sprayed indirectly over the impression until a light coating is deposited. Use the spraying description below to achieve a proper coating over the impression.

When casting on hard pan roads or shallow dry dirt/soil, the use of hair spray or spray paint can help lessen the chance of disruption of the impression detail during the pouring of the cast. If it is decided to use this technique, the direct spray from the can must be at a secondary target, a piece of cardboard or board. The idea is to allow the fine mist from the spray to land on the impression and not the heavy fluids. If using paint, a bright color will allow for visualization of the distribution of the material. Only a light coating should be applied. Too much material and the fine details of the impression may be obliterated. It is recommended that this technique be used as a last resort and only after considerable training in the technique.

If casting a raised mark from a contaminant (grease, oil, dirt transfer) on a hard surface like concrete or asphalt, it is possible to make a casting without destruction of the detail of the mark. The casting material should be mixed a little thicker to prevent absorption into the surface material. Typically, removal of less than an ounce of water will achieve the proper consistency to make a hard surface casting. It is important to note that casting with a heavier mixture will cause the casting material to set up a little faster than normal so the pour should be done without hesitation. To remove the cast, slide a thin piece of metal under the cast to release it from the surface.

If casting on a thick pile carpet where impressions are visible, again a thick casting material should be mixed. Like on hard surfaces, the casting material is mixed to prevent the mixture from soaking into the pile of the carpet. Removal from the carpet is a little more difficult in that the fibers must be released from the cast a little at a time. By wedging the fingers under the cast, it will slowly release from the carpet.

Ordering Information

TRXT-KIT	1008075	Traxtone Kit
TRXT-20BB	1008066	Traxtone Bulk Refills, 20 bags
TRXT-25LB	1008068	Traxtone Bulk, 25lbs
TRXTB-KIT	1008081	Traxtone Buff Kit
TRXTB-20BB	1008077	Traxtone Buff Bulk Refills, 20 bags
TRXTB-25LB	1008078	Traxtone Buff Bulk, 25lbs
4-1103	1005729	Crime-Cast Dental Casting Powder
4-1105	1005731	Shoe Print Casting Frame
3-3015	1005349	Storage Box for Castings