

Preparation**1. The Supplies.**

- Under your bench in the fingerprint laboratory you will find a large plastic kit labelled "Casting Kit". Take the kit out and open the lid. Inside the lid is a list of contents as follows;

Stapler	Felt tip markers	Pump powder sprayer
Box of staples	Lumber crayon	Powder atomiser
Box of paper clips	Grease pencil	Deflector cards
Cardboard strips	Ear syringe	Elastomer kit
Scissors	Mineral oil	Elastomer mixing pad
Tweezers	Mist sprayer	Spatula (1/2")
Cotton swabs	Water bottle	Putty knife (3")

and three pre-measured bags of dental stone.

- Check the contents against the list to ensure that the kit is complete. Replenish anything that is missing. You will find the supplies on the shelves on the south-east wall of the laboratory. If you cannot find what you need, notify the facilitator.
- You will note that this list of supplies is longer than the list on p.76 of the textbook. As you follow the directions in this and succeeding Activities you will discover the reason for each of the items contained in the kit.

2. The Casting Box.

- In a cupboard under the bench you will also find a casting box. This is an open tray containing several centimeters of fine sand. Take out the box and place it on the bench.
- Remove any chunks of dental stone which may have been left in the box. Using the three inch putty knife break up any heavy lumps of sand.
- If the sand is powdery dry it will be difficult to leave a good impression. You should now prepare the sand by wetting it to give it some body.
- Pour a litre or so of water into the box and mix the sand thoroughly until all of the sand is damp but not soaking wet. You can test whether you have the right amount of water by taking a handful of the sand and squeezing it. It should tend to stay together and mould itself to the palm of your hand.
- When the sand is thoroughly dampened it is ready for you to make an impression.

Making the Impression.

- Place the box on the floor so that you can "walk" through it. Do not step into the box from a stationary position. Place it so that it will be in the correct position to step into with one foot as you walk across the room.
- Wear footwear with a well-defined pattern for this exercise. You will find some footwear in the supply cupboard if you prefer not to use your own.
- Make the impression as described above. Place it so that you will have room to put a second impression of the heel at one end of the box.
- Make a second impression, concentrating on recording the heel area, in a corner of the casting box where it will not interfere with the first impression.
- Lift the casting box onto your workbench using care not to bump it and damage the impression.
- Because you have dampened the sand you will not have to strengthen this impression. (You will practice that technique on the second impression.)
- Leave the second impression alone for the present time, you will work with it after it has completely dried out. Take care not to damage it as you work on the first one.

Cleaning out the Impression.

- The next step is to clean out the impression. Be sure that you have read the pertinent part of p.76 of the text. In the field you would not remove any debris unless you were sure it had fallen, or been blown, into the impression after it was made.
- Do not prepare the second impression at this time.
- Using tweezers, carefully lift out any small lumps of sand which may have fallen in as the first impression was made or when you moved the casting box.
- If the sand lumps break up as you try to pick them out you will need to use the cotton swab method.
- Dip a cotton swab into the mineral oil so that it is well dampened but not dripping. Then touch it to the small particles. They will stick to the swab and can be lifted clear of the impression

Using the pump powder sprayer or the powder atomiser, apply talcum powder to the impression to act as a release agent. (If you were outside you would do this from the upwind side and let the powder "float" down onto the impression.)

If the contrast is enhanced during this process you should re-photograph the impression.

Placing the Form.

- As noted on pp.77-78 of the text, it is not absolutely necessary to use a form when the impression is on a level surface. At O.P.C. however, we recommend that you use a form every time since it enables you to make a thicker cast for strength and also makes a neater-looking exhibit when you are displaying it in court. Neatness does count towards your credibility as an expert!
- You can use thin strips of almost any material to make the form. Cardboard strips about 75mm wide and long enough to surround the impression work well. One big advantage is that you simply dispose of them when the cast has cured, leaving nothing to clean.
- Make a circle of cardboard large enough to surround the heel area of your first impression, leaving about half an inch to an inch of space all the way around. Ignore the sole area of the impression, we will not be using it in this exercise.
- Staple the ends of the form together to form the circle.
- Press the form into the sand around the heel portion of the impression, being careful not to push sand into it from the sides of the impression.
- On the outside of the form pull some sand up around the cardboard to prevent the stone from escaping under the form and to provide support for weight of the stone.

Mixing the Dental Stone.

- Into one of the pre-measured bags of dental stone pour the appropriate amount of water.

<p>NOTE: The actual amounts will vary depending on the brand of stone, (usually something close to 600g of stone to 225 ml water +/- 25 ml). Check the sign on the container of dental stone in the supply cupboard. (<u>Not</u> the original mixing instruction from the manufacturer, which makes too thick a mix.)</p>

- Seal the bag with a twist tie and knead the water and stone mix until there are no lumps. Lumps indicate dry powder which will not record the impression.
- The mix should now have the consistency of pancake batter, thick but runny.

- For our purposes it is much better to make the mix too thin than too thick. If it seems too thick, (toothpaste consistency) add 25 ml of water to the bag and remix.
- Place the large spatula to hand then, supporting the bag of stone in your hand, hold one of the bottom corners up and cut it off, as you would with a bag of milk.
(the next step is easier if you have someone to help you)
- Hold the spatula about 1-2 cm above the impression inside the form. Pour the dental stone onto the spatula so that it runs off onto an area at the side of the impression close to the form. Do not pour the stone directly into the impression.
- Allow the stone to run onto the spatula until the whole impression is covered, then you can allow the remaining stone to run directly into the impression.
- Smooth off the surface of the stone with the spatula.

Appearance of the Cast

As the cast cures it will go through several stages.

1. Within a few minutes the cast will have a layer of water on surface.
2. It will then take on a dull, flat appearance. It is still liquid at this stage.
3. When the cast has started to thicken, scratch the identifying information onto the surface with a toothpick or similar instrument. (Name, date, place, exhibit number)
4. The dull appearance will remain as the cast begins to heat up about ten minutes after pouring.
5. As you check you will find that it gets quite warm. This is the exothermic reaction between the gypsum and water.
6. When you feel the cast beginning to cool you know that the reaction is completed.
7. Do not disturb the cast. (In the field you could now retrieve the cast to take it to the office but it will still be relatively soft and must be protected for 24 hrs.)
8. Place the casting box, with the cast in place, back in the cupboard and leave it for a minimum of 24 hours.

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Cleaning the Cast.

- When the cast has cured for at least 24 hrs. remove it from the casting box, being careful not to disturb the second heel impression.
- If a thick layer of material is adhering to the surface you may remove it with your fingers. Do not scrape with any hard objects. If it will not come off easily just leave it to be washed off.

NOTE: With sand as the impression medium there is rarely a problem of large amounts of material adhering firmly to the cast. It is frequently the case with clay, but the following procedure will clean the cast easily, quickly and, most importantly, without danger of damaging the cast.

- Make arrangements with the facilitator to go to the wash bay in the garage.
- Place the cast on the floor in the wash bay, impression side up.
- Use the high pressure spray hose with a fan-shaped spray to wash the cast.
- Direct the edge of the spray stream back and forth across the cast and you will see the sand being removed.
- About fifteen seconds of spraying should be sufficient to remove all of the sand that will come off.
- Do not expect to get it completely clean. The sharp edged grains of sand tend to remain embedded in the stone more firmly than particles of soil or clay.
- Give the back of the cast a quick rinse, being careful not to abrade the impression side on the concrete floor.
- Wash the floor of the bay and replace the equipment, then return to the laboratory.
- Allow the cast to air dry.
- You should now have an exhibit suitable for comparison with the original footwear.
- Set the cast aside in a safe place for use in a later module.

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Casting an Underwater Impression

As explained in the Guide and on p.85 of the text, casting impressions that are underwater is quite a simple procedure. The following exercise will provide you with the experience of casting an underwater impression. It will not give you an opportunity to deal with a typical impression made in fine silt. Be sure you have read the above sections and understand the care that will be required to prevent damaging impressions found in puddles etc. when you are in the field.

Making the Cast

- In the supply cupboard you will find an elastomer mould of a heel impression in a plastic tray.
- Fill the tray so that the impression is covered by at least 2cm.(1inch) of water
- Sprinkle dry dental stone powder over the surface of the water above the moulded impression until there is a layer about one-half to one centimeter thick over the whole impression. (Using a kitchen flour sifter from the upwind side of the impression makes this task a little simpler when you are in the field.)
- Make a retaining form of cardboard, as you did earlier, and push it into place in the dental stone around the impression, leaving at two to four centimeters of space all around.
- Add 10 to 20 ml more water than normal to one pre-measured bag of dental stone and mix until there are no lumps remaining.
- Pour the dental stone onto a spatula held just above the level of the impression, this can be in the water if necessary. Allow it to flow from just outside the edge of the mould and slowly cover the impression.
- Once the dental stone has been poured simply leave the cast to cure.
- Since it is an exothermic reaction and cures, rather than drying, it does not require air. Unless the water is particularly cold, the curing process will take very little longer than it normally does.
- Whether in water or not it is always best to leave the cast to cure for as long as possible before moving it. At a crime scene you can make the casts early in the investigation and then carry on with your other work, picking up the casts just before you leave the scene.

- You will find that very little cleaning is required when the cast has been made in water.

NOTE: This exercise has been designed for you to prove, to your own satisfaction, that it is possible to make casts of impressions that were made in a puddle or which have since filled with water. You have not had to deal with the problem of disturbing the silt but in the field that becomes a most important consideration. When sprinkling the dry dental stone over the impression be very careful not to cause miniature waves by allowing large amounts to fall into the water.