1.0 PURPOSE:

It is sometimes necessary to create custom parts or arterial models that are not commercially available. Casting a low-melting point metal into a high-melting point metallic mould allows you to create various shapes and models. The metal core is later used to cast a silicon wall that will mimic the properties of tissue for ultrasound experiments.

2.0 SCOPE:

2.1 This document focuses only on the related tasks involved with the casting of the metal core.

2.2 Procedure is to be performed in a containment level 1 (CL1) laboratory including a class B fumehood.

3.0 RESPONSIBILITIES:

3.1 An individual that has had WHMIS training as well as having been trained by a qualified technician is permitted to perform this procedure.

4.0 DEFINITIONS:

Casting – the process of making a solid object by pouring molten metal into a mould and allowing it to cool.

Mould – a symmetrical two-piece aluminum encasement with a defined shape.

Trace – etched groove on the aluminum mould.

5.0 REFERENCES:

None.

6.0 MATERIALS AND EQUIPMENT:

6.1 MATERIALS

- Cerrobend

6.2 EQUIPMENT

- Aluminum mould
- Large container
- Heat gun (Master Heat Gun)
- Stove
- Syringe (60cc)
- Tempered melting pot

7.0 PROCEDURES:

All procedures are to be performed wearing a pair of gloves and a dust mask.

7.0.1 MELT THE METAL

Perform this procedure in a class B fumehood.

1. Place cerrobend material into the melting pot.
2. Fill ¾ of the melting pot with water.
3. Place the melting pot on the stove and position the knob on the stove to the 6th increment bar.
4. Turn the stove ON.
5. Wait until the cerrobend is in liquid state. This may take 10-15min.
6. In the mean time, you may proceed to *7.0.2 PREPARE THE MOULD*.

7.0.2 PREPARE THE MOULD

1. Clean the mould with ???? [Up to Hristo to decide this]. Pay particular attention to the traces.
2. Use two C-clamps and clamp the mould together.
3. Place the mould vertically on a laminated wood piece.
4. Plug in the heat gun. Open the air intake aperture on the heat gun 1/3rd of the way.
5. Place the gun 5-8cm from the mould.
6. Aim the nozzle of heat gun at the center of the mould.

7.0.3 FILL THE MOULD WITH LIQUID METAL

1. Place a large plastic container in the sink.
   NOTE: The large container must be able to accommodate the size of the mould.
2. Turn OFF the heat gun. Refer to *7.0.5 TURNING OFF THE HEAT GUN*.
3. Stand the mould vertically in the container.
4. Use a 60cc syringe to draw in cerrobend from the pot.
5. Move the syringe to the mould with a pot lid under the syringe.
6. Slowly dispense the cerrobend from the syringe into the mould.
   NOTE: Continuously tap the mould during this step to allow any air bubbles to escape.
7. Put the syringe with excess cerrobend at the tip back into

7.0.4 SOLIDIFY THE METAL IN THE MOULD

1. Start a gentle stream (about 15mL/s) of water from the tap into the container with the mould.
2. Wait a few moments to allow the interior of the mould to turn into the right temperature.
3. Take the mould out of the bath. Unclamp it and open the mould.
4. Inspect the metal core.

   If the core is in satisfactory condition:

   a. Remove any excess material on the metal core that has formed at the interface of the mould pieces by gently sliding an exacto knife to shave away the excess.

      △**CAUTION:** Filing the metal core could result in harmful airborne particles.

Perform this step in a fumehood.

b. Put excess material back into the melting pot.

If the core is in unsatisfactory condition:
a. Put the core back into the melting pot to allow it to melt and merge with the other cerrobend.
b. Repeat the steps beginning at *7.0.2 PREPARING THE MOULD*.

7.0.5 TURNING OFF THE HEAT GUN

1. Set the switch to COLD.
2. Completely open the air intake aperture.
3. Wait until the air leaving the heat gun is cool.
4. Set the switch to OFF.

7.0.6 CLEANUP

1. Place all materials back into the spots where they were found.
2. Clean up the mould with a paper towel. Close the mould and put it back on the shelf.
3. Dump the extra water out from the container. Leave some water that has remnants of the material in it and dump the water into the pot. Put the container away.
4. Turn off the stove and let everything sit and cool. After everything's cooled off, dump the water out, put the lid back on, and put it away. (The cerrobend stays in the pot).

7.1 DETECTION LIMITS:

N/A

7.2 SAMPLE STORAGE AND HOLDING TIMES:

N/A

7.3 RISKS TO PERSONNEL AND PRECAUTIONS FOR RISK REDUCTION:

7.3.1 Refer to *section 7: Basic Safety* of the *Robarts Research Laboratory Health and Safety Manual* for standard lab safety practices.

7.3.2 Wear impervious (preferably non-latex) gloves and a NIOSH approved respirator during the entire procedure. If inhaled fumes cause difficult breathing, seek medical attention by contacting security at x34041.

7.4 ANALYSIS:

7.4.1 Data analysis: what values will be collected and how will they be used?

7.4.2 Step by step analytical procedure.

7.5 CALCULATIONS:

None.

7.6 ACCEPTANCE RANGES:

N/A

7.7 CONTINGENCIES:

7.7.1 CERROBEND SPILL

△**CAUTION:** Never use water as an extinguishing media in areas near molten metal.

If cerrobend spills, allow it to solidify. Collect and place in sealed container.

8.0 REPORTING AND DOCUMENTATION:

None.

9.0 REVIEWS AND REVISIONS:

This procedure shall be reviewed for compliance and effectiveness and revised as necessary.

10.0 ATTACHMENTS and REFERENCE FORMS:

None.