Metal Casting with Pewter

Last Updated: 5/13/2020

3D printing is not only useful for making plastic models. With mold-making, we can physically render designs created from CSDTs in a whole host of new materials such as wax, resin, or metal.

Pewter, a tin-antimony alloy, is a popular choice for making metals casts, and is frequently used as a material for making jewelry, tokens, and sculptures. Its relatively low melting point allows it to be cast more easily than other metals and makes it possible to clean up the final product using hand tools.

Materials

Molding

- 3D-Printed Adinkra Shapes
- Alumilite Amazing Mold Putty

Casting

- Lead-free Pewter (98% tin and 2% antimony)
- Casting Furnace
- Casting Ladle
- Baking Tray
- Grilling Tongs
- Particle Board or Plywood
- Metal Files

Safety Equipment

- Heat-Resistant Furnace/Welding Gloves
- Leather Apron
- Face Shield
- Safety Glasses

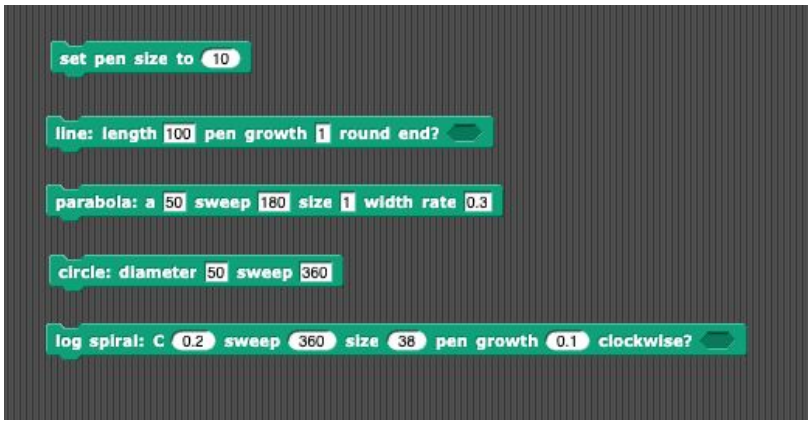
The casting furnace used in the making of this guide is the Do-It Molds Hot Pot-2, which is a portable option with a handle and spout for pouring metal directly from the unit. However, other casting furnaces remain stationary on the table and allow you to scoop out the metal with a specialized scoop called a casting ladle.

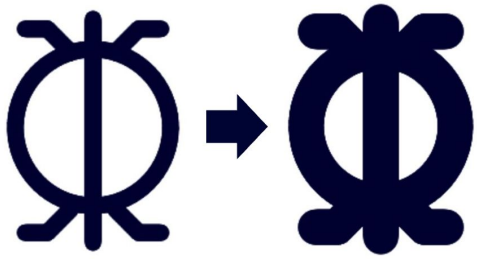
The ladle can also be used with the Hot Pot for smaller precise pours.

Making your Design

For this doc, we are focusing on the Adinkra software. However, we also recommend the Cornrow Curves software with this well. Go ahead and create your own virtual Adinkra design.

Adinkra shapes can be created by using these blocks in the software:





Regardless of which CSDT you use, it's important to **Set the Pen Size** to a relatively **high value** in your original shape. This will result in more durable Adinkra shapes that are easier to cast.

Thinner shapes are often susceptible to bending, but you can pour a solid layer of pewter as a backing plate to support the design like an embossed stamp. You may also have to do this to render Adinkra such as Adinkrahene, which is composed of non-intersecting shapes.

CSDT Design to 3D Model

Once you have created your design, you should be ready to turn it into a 3D model. Check out our 3D printing guide here.

Molding

With a physical rendering of our design printed, we're ready to create a mold. For the purposes of this tutorial, we are using Alumilite Mold Putty, which requires no extra equipment and cures quickly. The putty comes in two tubes, one with white putty, labelled “A”, and one with yellow putty, labelled “B”.
Take an equal amount of putty from each tube, ensuring that you have enough material to accommodate your 3D-printed shape. Then, mix the two colours thoroughly with your hands until they combine into one solid yellow putty.

As soon as the two parts are mixed, the putty will begin to harden. Press your 3D-printed Adinkra shape into the putty until the top edge of the Adinkra is level with the surface of the putty, filling any interior holes as best as you can. If possible, form the edges of the mold into a small crater-like shape. This will help keep molten pewter from spilling out the sides of the mold when casting.

Leave the Adinkra in the putty and allow the mold to cure for 20 minutes or until the putty reaches the consistency of hard rubber. Afterward, remove the Adinkra. Your mold will now be ready for casting.

Casting Setup and Safety

Before beginning to cast, be sure to pick a suitable location and set up your space with consideration to your surroundings.

Choose an open or well-ventilated area and provide adequate protection for any nearby surfaces. It's recommended that you provide a thick, flat piece of particle board or plywood to protect your table, if necessary.

Additionally, be especially careful to secure power cords attached to your casting furnace that could be tugged or tripped over, as this could create a sizable safety hazard if hot metal splashes out of the pot. Ensure flammable materials are kept well away from the work area.

Use extreme caution when heating and working with molten metal. Exposure to high-temperature materials in this activity carries with it significant risk of harm and/or damage to clothing and personal property if not handled with care. Those performing the pewter casting should be provided adequate protection for their personal safety, including a face shield, safety glasses, a leather apron, and heat-resistant gloves. Long sleeves, long pants, and closed-toed shoes are also highly recommended.

Onlookers should be standing a safe distance away and wearing appropriate clothing. In the case of spillage, synthetic fibers may melt on contact with molten metal and adhere to skin.

Make sure all the components are dry as excess water that comes into contact with hot surfaces could produce steam, causing molten pewter to splash uncontrollably.

Make sure that your mold is completely dry so the pewter doesn’t splash everywhere.

Preparing to Cast

Once your area is properly set up and those present have been warned about proper precautions, you can turn on your casting furnace and allow it to heat up. Allow it to heat, then with a gloved hand, take a pewter ingot and place it directly into the bowl. The pewter may not melt immediately but will gradually sink into its molten form.

If your casting furnace allows you to maintain a specific temperature, set it to a value slightly above the melting point. Not only will this reduce the potential damage in case of an accident, but it may also reduce the amount of 'slag' on the surface, a buildup of pewter which reacts with the air and turns into solid lumps that are not easily melted.

Casting

Once the pewter is fully melted and your mold has been placed on the baking tray, you should be ready to pour. Again, make sure your mold is dry, as excess water will evaporate on contact with the hot metal and could cause it to splash. Carefully pour the pewter into the mold to fill as much of the impression as possible.

Depending on the casting furnace you have, you can do this by directly pouring the metal from the pot, or if your casting furnace requires a ladle, scooping metal into the spoon and into the mold. For those with casting furnaces that allow you to pour directly from the pot, it still helps to have a casting ladle around to precisely fill smaller gaps. If necessary, you can gently shake the tray with the tongs in order to encourage the pewter to fill any remaining gaps. If you have a particular large mold, or the pewter risks overflowing, you can try pouring parts of the mold and allowing it to solidify before moving to other sections.

When you're satisfied with the amount of pewter in your mold, allow the metal to cool. It should take less than 10 minutes to fully harden, but allow ample time for the pewter to cool before attempting to remove it from the mold. In a pinch, you can cool the piece quicker by submerging it in a bucket of water, but be very sure that the metal has fully solidified before attempting this.

DO NOT attempt to re-use wet molds or re-melt wet pewter. The excess water will turn into steam and may cause the pewter to splash unpredictably. If you are unhappy with your cast or

made a mistake, you can put the pewter back into the pot and try again. The mold should be able to withstand multiple casting attempts of the same shape.

After the cast is complete, you may use metal files or other tools to remove rough edges or clean up the design.

Congrats! You physically rendered your design using pewter!