

Metal Casting

Soapstone Casting Metals

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This document describes the process that is used to create items from pewter. Items such as buttons, coins, buckles and aglets can be easily and quickly made using this ancient technique.

In this document I will describe the basic materials needed and an overview of the technique of molding pewter objects in soapstone. I intend to write more guides on pewter casting for specific projects in the future, so check back later for more.

This method of making objects from metal is one of the most straight forward and simplest ways of working with metals that I have come across.

The basic principles of pewter casting can be abbreviated as:

1. Make a mold from soapstone; and
2. Pour molten pewter into the mold.

There really isn't much more to it than that.

Make the mold from soapstone

Soapstone is a type of sedimentary stone formed by the compaction of talc over a long period of time. The technical name for soapstone is "*steatite*". Soapstone is a very good substance for making molds for taking molten metal as it is a thermally stable type of stone that is a very fine grained structure.

Acquiring soapstone is not an easy task for a Tasmanian. I have not been able to locate any in Tasmania, however, Artery have indicated that they will order the soapstone in from the mainland with sufficient lead time. I purchased a 3 lb block of soapstone from the mainland distributor for \$45.00 (including postage). I understand that purchasing soapstone from Artery will be approximately the same price.

Tools Required

Soapstone can be worked with a variety of tools, from as simple and straight forward as a nail to the more expensive rotary tools (such as a Dremmel). Woodworking carving tools are an inexpensive and fine enough to be used on soapstone with very little practice (Figure 1). The other advantage of using woodworking carving tools is that they can often be picked up from a tool sale or budget tool shop pretty cheaply. I bought a set of 12 woodcarving tools for \$12.00 some time ago (from K&D).



Figure 1 - Woodcarving Tools

Smoothing your soapstone can be done using sandpaper. I use a coarse grit sandpaper (80) to roughly flatten my soapstone blanks and then use a much finer grit sandpaper (200) to make the stone very smooth and clean. I also use a nylon scourer when smoothing out the basic mold shape before adding detail. The scourer gives a nice smooth basic shape.

Cutting your soapstone can be done using normal wood saws. I use a bandsaw to cut my soapstone for two reasons:

1. The bandsaw blade is fine and does not waste a lot of soapstone in the kerf; and
2. I can set the bandsaw up for consistent thickness of my soapstone blanks.

Alternatively, I have used a dovetail saw and mitre box to cut the soapstone and this gave good results too.

If you use a rotary tool to carve the soapstone, the types of attachments that are useful are:

- Cut-off Wheel;
- Fine cone bit;
- Fine Cylinder bit;
- Broad Cylinder bit;
- Brush bit;
- Diamond cut-off wheel.

Also, if you are using a rotary tool, you will need breathing apparatus (such as a respirator) due to the amount of very fine dust that will be produced by the rotary tool.

I also use some blu-tac as a method of testing my molds before committing to a pour. The blu-tac is pressed into the mold and then peeled out to reveal what the mold looks like in positive (care should be taken not to use the blu-tac too often as it leaves a residue in the mold).

Working Soapstone



Figure 2 - Steatite blanks

Carving the design into the surface of the soapstone is a matter of marking out the design and then cutting away the waste soapstone (put simply).

Depending on the item that you are making, this is a process of marking out the basic shape to be made and then when the basic shape is carved, registering the relief design in reverse.



Figure 3 - Carved Design

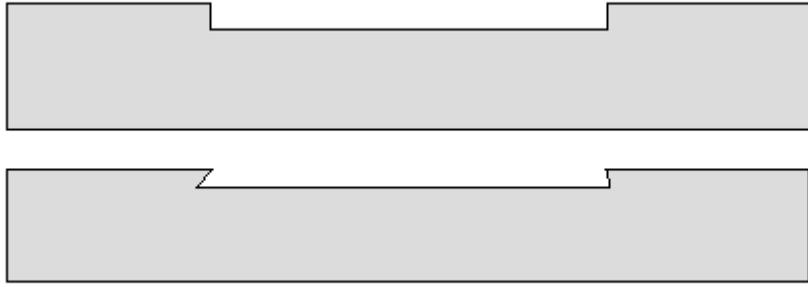


Figure 4 - Carving Cross-section

When cutting the soapstone, make sure that you do not undercut the soapstone (as in the lower figure: Figure 4) this will make it difficult to remove the metal from the mold. When the metal does come out of the mold, it will break the soapstone mold.

Molds 101

Gates are simply a hole in the mold where the metal is poured. Think of a gate as a pouring spout (Figure 5).



Figure 5 - Carved Gate

A sprue is a part of the mold where that is used to allow the molten metal to pour easily into the mold and to allow gasses to be passed away from the significant part of the mold.

Sprues are also used to join multiple molds together (in the same soapstone blank). Essentially, a sprue in this context is more like another gate within the mold.

In the figure below (Figure 6), a riser has been carved into the upper part of the mold. It is expected that gas will be trapped in the riser hole, for this reason, the riser should be made larger than the intended final size. The excess will be cut off from the unmolded item when it has cooled.

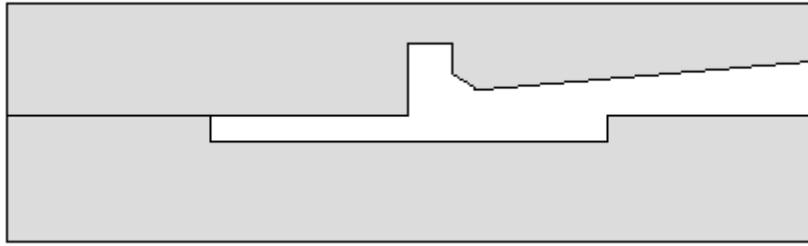


Figure 6 - Carving Cross-section showing gates

It will also be necessary to cut off the metal that will cool in the gate from the unmolded item.



Figure 7 - Molded Positive cross-section

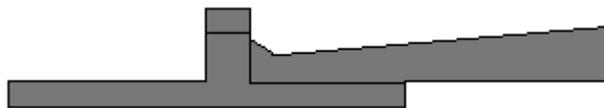


Figure 8 - Molded Positive showing cut marks

The second figure (above) shows where the unmolded item would be cut. This could be done with a metal file, a metal saw or a rotary tool with a cut-off wheel.

Melting and Pouring Metal

The pewter that I use for molding is silver pewter rather than lead pewter. Lead pewter gives off toxins and toxins are baaaaaad.

Getting silver pewter can be as easy as going to the tip shop and looking for old pewter mugs or tankards. I paid between \$4.00 and \$5.00 for the tankards that I bought. Silver pewter should be stamped as silver pewter. If there is no mark, assume that it is lead pewter.

I start by melting down an entire tankard into smaller ingots. For this I use the portable gas stove, an old stainless steel pot, a stainless steel ladle, an old biscuit tray and an old muffin tray (all of the pots, ladles and trays were bought from the tip shop for \$8.00 in total).



Figure 9 - Portable Gas Stove

I find that this setup (Figure 9) is more than adequate for smelting silver pewter and provides me with something that I can easily pack up when I am done.

When the pewter is molten, it can then be poured into the muffin tray to give you smaller and more manageable amounts of pewter to melt and pour for your projects. I tend to pour two ingots from a single pewter tankard.

Also, the process of melting down the pewter scrap burns off the impurities in the metal that may have formed on the surface from usage and handling. A scummy film will appear on the surface when it is melted; this will appear as a dirty grey covering. Some of this is produced by the interaction of oxygen with the molten metal and some of it is the impurities mentioned previously. It should be noted that the more times that you melt your pewter, the more oxidisation occurs. It should be melted as few times as possible.

When you are ready to pour your molten pewter into the mold, clamp the two halves of the mold together so that you do not need to handle the mold. The mold will get very hot when you cast two or more objects and the pewter is very hot (Figure 10).

You can either pour the pewter directly from the pot or ladle some material from the pot into the mold. You will need to pour the right amount of pewter into the mold as the object will not mold properly if you do this in more than one pour (usually the gate gets clogged with solid metal).



Figure 10 - Mold clamped for pour

Pour until the molten pewter comes out of the top of the mold, this will take some practice. Let the mold cool down and then take the clamp off. If you are only pouring into the mold once, the mold should cool down fairly quickly (although this has more to do with how much molten metal has been poured into the mold). Soapstone tends to build up heat, so it will take longer to cool down each time you pour molten metal into the mold.

To unmold, all you need to do is to take the clamp off and separate the two halves. You may need a pair of tweezers to ease the positive from the mold, but, take care that you do not twist the metal in the mold as this may erode the design.

Final Words

Safety should be at the top of your mind with mold making and molding.

- Steatite when carved makes a lot of very fine dust, this can cause lung inflammation and congestion, you should protect your nose and mouth while working with steatite;
- Woodcarving tools are sharp; you should take care when carving soapstone that you do not cut yourself. Always cut away from yourself and use safe practices when carving;
- Silver Pewter is very hot when it is molten, take care to avoid spilling molten metal on flammable surfaces (including you!);
- Lead Pewter gives off toxic fumes when melted, I recommend that you do not use lead pewter at all.