



Pewterers guild introduction to basic pewter casting

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This guide is designed to give a basic overview of techniques used for pewter casting using soapstone moulds. The intended audience of this document is anyone who already has an interest in creating pewter items using historical materials. Starting from raw materials and covering mould creation, carving, and casting, this document outlines the basic approach taken by the Pewterers guild for the creation of pewter items using 2-part soapstone moulds.

About the Pewterers guild

The Pewterers guild is an SCA guild dedicated to the art of pewter casting using period techniques. The Pewterers guild organizes classes, encourages the creation of tokens and reproduction items, and encourages discussion of historical pewtering techniques.

The Pewterers guild is geographically organized in the Barony of Madrone, An Tir (Seattle, WA). Participation in guild discussions is open to anyone with an interest in historical pewter items, regardless of geographic location. The guild maintains an online discussion list at <http://groups.yahoo.com/group/pewterersguild/> for the sharing of pewter information.

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Tools & Materials

You will need to have access to the following things in order to practice the techniques discussed in this document. If your local group has several people interested in pewter casting, consider pooling your resources.

Required tools

Something in which to melt pewter

As molten metals go, pewter flows at a relatively low temperature, usually somewhere between 450 and 600 degrees Fahrenheit, depending on the blend. The Pewterers guild finds that a charcoal fire combined with an iron pot and ladle is the most historically satisfying casting experience, and is therefore the most fun. For casting indoors, an electric kettle of the type usually sold at hunting stores for melting lead shot will do the trick for a relatively small investment. For a low-budget casting experience, any sort of stove burner combined with a cast iron or stainless steel pot will melt pewter.

Carving implements

Soapstone of the kind used for making pewter moulds is very soft, and can be carved with just about any hard object. Even a simple nail can scratch out a design in soapstone. The Pewterers guild finds that having an assortment of pointy and not-so-pointy things on hand is useful, as it's always helpful to have carving tools of various sizes. A length of brass rod cut into sections and ground into an assortment of tips can supply a large variety of carving tools. Some favorite carving implements among members of the guild are small chisels, dental scrapers, and spherical dremel bits.

Saw

Although soapstone is soft and easy to cut, the fine particles that result from sawing it are a lung irritant, so take appropriate precautions. The Pewterers guild uses a bandsaw for cutting regularly shaped moulds from rough soapstone blocks.

Safety equipment

First and foremost, molten pewter is hot, and once it's hot, it stays hot for a while. The first motto of the Pewterers guild is "*It's Hot, Stupid!*". Leather, non-meltable gloves are absolutely required when working with molten or cooling pewter.

Secondly, powdered soapstone is a lung irritant, so avoid breathing it. When sawing, utilize a dust mask and the best dust-collection system you can muster, and always wear eye and ear protection if working with any power tools. Don't blow soapstone dust from a mould – use a brush so that the particles don't become airborne.



Recommended tools

A drill and a small drill bit (around 3/8"). A drill press is nice, but not necessary.

Masking tape.

A pencil and some scratch paper.

A kneaded rubber eraser or soft clay or silly putty

An X-acto knife

Small metal snips, preferably with one flat side

A small round file

A small drop cloth or workspace-covering paper for dust collection

A small container to contain powdered soapstone waste for easy disposal

A toothbrush or other small brush to clear waste material from the mould

Soapstone

Before you go shopping for a piece of soapstone, it's wise to have a basic idea of what sort of pewter item you would like to make. The quality of the stone you purchase should match the intended use – a hard stone is better for carving and retaining fine detail, while softer stones carve quickly and easily but hold less detail. If you know ahead of time that your group is going to be making a lot of moulds, you might be able to buy a large piece of soapstone at a low cost per pound.

Soapstone comes in a dizzying variety of colors and qualities, so there's no "correct" stone to purchase.

Soapstone to avoid

Avoid any pieces of soapstone which have visible impurities, such as obvious veins of a contrasting color. Stones showing such veins are prone to fracture and frequently present challenges when carving due to the different densities of material.

Some soapstone has a gritty feel, which indicates that impurities are present even if they are not visible as contrasting veins. If you cut these stones on a bandsaw, they will frequently throw sparks. Avoid these stones in favor of stones which feel smooth to the touch.

No reputable store will sell soapstone which contains asbestos. However, lest you be tempted to buy bargain soapstone out of the back of an unmarked truck in the alley behind your local art supply store, be forewarned that asbestos does naturally occur in some soapstone deposits. Get soapstone from a reliable source, and ask if it is certified as asbestos-free if there is any doubt.

Soapstone of the type used for kitchen countertops is much too hard to use for pewter moulds.



Soapstone to look for

The following types of stone work well and are commonly available. They are listed from the hardest to softest – the harder stones are more expensive, the softer stones less so.

African Wonder Stone
Italian Green
Brazilian Green
Cascadian Grey
Sierra Hills

Again, hard stones are better for holding detail but are more difficult to carve. Soft stones are easier to work but less detail is possible in the final design.

Sources for soapstone

Soapstone can be purchased at local art supply stores, sculpting supply stores, or lapidary stores.

In Seattle's University District, the store [Artist and Craftsman Supply](#) frequently carries the Cascadian Grey variety (as well as a decent selection of carving implements).

The online seller [sculpt.com](#) stocks many varieties of soapstone.

Pewter

Before you invest in a large bar of pewter, check with your local group to see if anyone has a local stock. Casting tokens and small items doesn't take very much pewter, and pewter is usually sold in 5 ½ pound bars. To put that into perspective, the largest amount of pewter ever used at once by the Pewterers guild for a single project – a casting run of several hundred site tokens – was about three pounds.

Types of pewter

Different pewters cast differently. Higher tin content usually means that the pewter flows well into the details of the mould, but it's not particularly strong and bends easily. Pewters which contain a small amount of copper or silver are considerably stronger but the melting point is higher and it's more difficult to cast fine detail.

The Pewterers guild normally keeps the following types of pewter on hand, both purchased from [Rio Grande](#):

Aqua Clean Casting Metal

High strength metal, does not fill out detail particularly well but works well for many moulds. Harder to bend.



Lead-Free Tin Alloy Casting Metal

Great for details, very soft and easy to cast but not particularly strong. Useful for pieces with pin-backs that need to bend easily, or for tokens that don't need to be very strong.

Safety

Historical pewter often contained lead. Most modern pewter blends are lead-free and are safe for food contact. Even if you're not making pewter utensils, it's very important that you use a lead-free pewter blend.

If you are tempted to use pewter containing lead as a historical experiment, be aware that lead is toxic and requires adequate ventilation when melting and other appropriate safety precautions which are beyond the scope of this document. You should never mix pots or tools used for lead pewter work with pots and tools used for lead-free pewter.

The Pewterers guild does not recommend that you use any pewter where you are unsure of the original metal content (such as melting down pewter items found in thrift stores). In addition to the lead safety issue, there could be any number of impurities in the second hand metal which make casting difficult.

Sources for Pewter

In Seattle, Non-Ferrous Metals Inc. in the Georgetown neighborhood stocks pewter.

Good online sources for pewter include riogrande.com (a favorite of the Pewterers guild) and miniaturemolds.com



Steps for making a two-part mould

A two-part mould is the basic workhorse of the pewter casting world. It's simple to construct and allows for the casting of thin pieces using a minimum of pewter.

Step 1: Cut the rough block

From the raw piece of soapstone, cut a rectangular block sized appropriately to the pewter item you wish to create. The Pewterers guild normally uses a bandsaw for this. Remember to wear a dust mask.

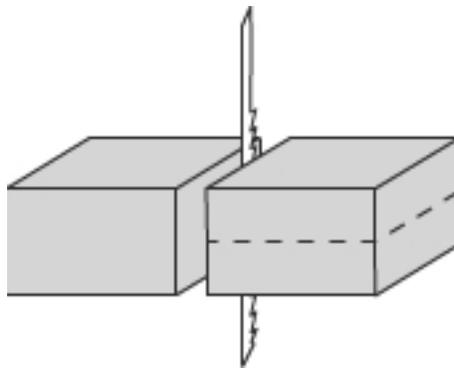


Figure 1 Cutting the overall shape of the soapstone block

Mould size: the horizontal plane

The horizontal plane is parallel to the face that will rest on the work surface when you are working on the mould; it is also parallel to the face onto which the design will be carved (which doesn't exist yet – it will be created when the rough block is halved later).

When determining a proper horizontal size for your project, the dimensions of the pewter piece is only one of many considerations. The carved piece must not be too close to any of the edges, must be clear of the register pins which will be on the corners of the mould, and space must be left on one side for the sprue. On average, you'll want the horizontal dimensions to be about three times the size of the actual pewter piece (*see Figure 7 for an example of about the right proportion*).

Mould size: the vertical plane

When determining the vertical depth for the rough block, keep in mind that the block will be sawn in half and the carving will take place on one of the interior horizontal planes (*see Figure 10 for a side-view example*). The Pewterers guild usually uses blocks that are about 1½ inches tall before they are cut in half.



Step 2: Cut the block into two equal halves

Cut the rectangular block on the horizontal plane into two equal halves. As this cut will determine the fit between the two parts of the mould, try to make the cut as smooth as possible. Because a slight saw-tooth pattern is inevitable and you'll want the mould to mesh together exactly for casting, it's also a good idea to mark at least one side to take the guesswork out of fitting the mould back together later.

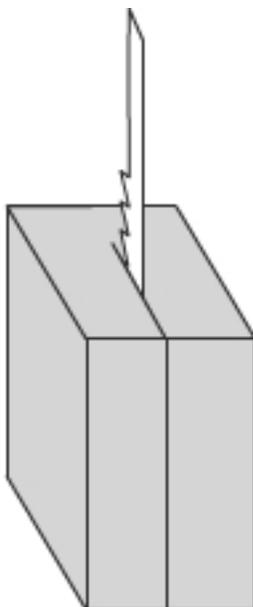


Figure 2 Cutting the block into two halves

Step 3: Drill register pins

The mould will be kept consistently aligned during casting by pewter register pins extending from one half of the mould into the other half.

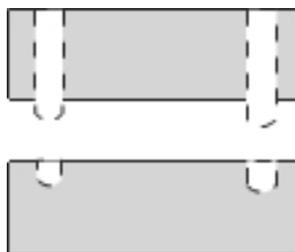


Figure 3 Register pins

A two-part mould needs at least two register pins, each at opposite corners. It's also common – but not necessary – to drill four register pins, one at each corner. Place the holes well clear of the design area and far enough from the edges of the block so that there's some strength left in the corner, perhaps 3/8" from each edge.



The holes should be drilled entirely through the first part of the mould and about 1/8 of an inch into the second part.

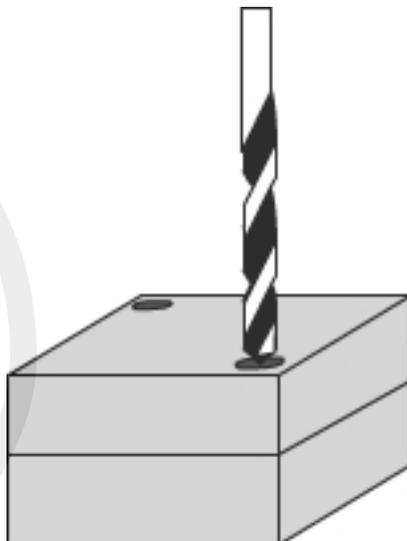


Figure 4 Drilling holes for the register pins

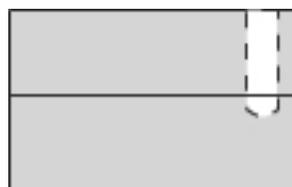


Figure 5 Proper depth of register pin holes

Step 4: Cast the register pins

Before you cast

You are going to spill some molten pewter. You are going to splatter some molten pewter on whatever you are wearing, and on the surface over which you are casting. It's inevitable, so plan on it. Don't wear your best clothes. Don't cast over a precious surface.

A deep cookie sheet is an easily obtainable splatter shield if you are casting indoors. The Pewterers guild has commissioned some leather aprons which do a splendid job of keeping pewter from clinging to our natural fiber costumes. You should be wearing natural fibers too – don't ever wear anything flammable or that would melt onto your skin. Linen, wool, cotton and leather are excellent choices. Avoid rayon, nylon and polyester.

If you're using a simple electric melting pot with a built-in heating element, make sure you have a stable heat resistant surface on which the pot will rest when you're not holding it.

Also, make sure that any small non-comprehending things like pets or children are a safe distance away and can't interact with the molten metal.



What not to do

Don't ever cast using a wet mould! This is supremely important. If the mould is wet, the water will vaporize and it will *spray molten pewter back up towards your face*.

What to do

The common technique used by the Pewters guild is, while wearing protective leather gloves, to hold the mould in one hand and pour a small amount of molten pewter from the pot or ladle into the mould using the other hand.

Initially, you'll probably over-pour, and pewter will dribble over the side of the mould, and perhaps over the gloves. This shouldn't be a problem provided you are wearing decent gloves – it will harden almost instantaneously, and you can melt it back into the pot. With practice you will learn to control the pouring of the pewter so that only the amount necessary for the task is poured.

Casting the register pins

Fill the register pin holes with molten pewter. To keep the two stone faces nicely aligned during this process, the Pewterers guild will frequently wrap the mould in masking tape before pouring the pewter.

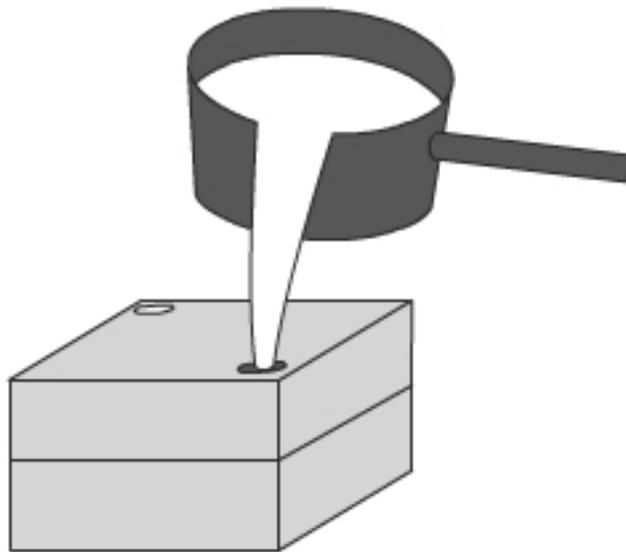


Figure 6 Pouring the register pins

From this point forward, the side of the mould with the pewter register pins will be referred to as the “top” and the side of the mould into which the register pins extend will be referred to as the “bottom.”



Step 5: Sketch the outline of the design

Now it's time to determine where on the bottom piece of the mould you will carve your design (technically, you could carve the design on either the top or the bottom, but if you carve it on the top, the register pins can be a nuisance while carving).

Normally the design is centered horizontally on the short axis and offset to one side on the long axis so as to leave plenty of space to carve the sprue (*see also Figure 8*).

Using a pencil and a light touch, mark out the approximate outer perimeter of your design. *Don't bother penciling in the design details at this point, as next you'll be scraping off that layer of soapstone.*

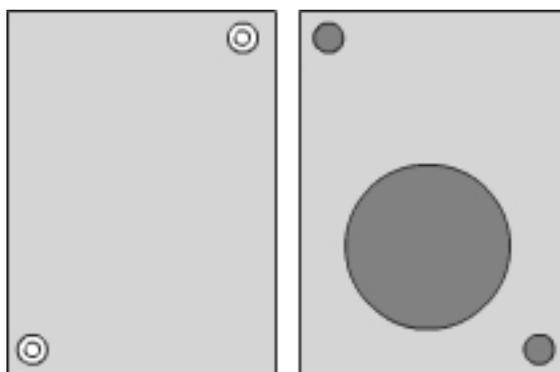


Figure 7 Ideal design placement

Step 6: Carve your design

Before starting to excavate the initial shape of your design, there are a few ideas worth reviewing. First, keep in mind that when cast, the depth is reversed and the horizontal dimension is mirrored. What appears as a divot in your mould will appear raised in the final casting. If you carve a letter, what casts in the pewter will be the same as holding the mould up to a mirror (reversed horizontally, but not vertically). If you will be putting any words or letters on your piece, practice drawing them backwards a few times on paper before attempting to carve them.

Once you have a good sketch of your design on paper, start to excavate the basic shape of your design in the soapstone. Use whatever tools you like, as soapstone is very soft and easily worked.

Normally for a mould you'll want to excavate the basic outline shape before carving the details of the design. If you carve the design before the general shape casts successfully, you may need to smooth it right back out later if you find that the piece needs to be thicker in order to cast properly.



Start small! You can always make a piece thicker if needed, but it's very un-medieval to make the piece unnecessarily thick. The medieval mindset values economy of materials rather than economy of labor. Labor is relatively inexpensive, but metal is very expensive. Using just enough pewter to get the piece to cast successfully, and no more, is a sign of this mindset.

During this process, you can use the kneaded eraser to check how your piece will look when cast by pressing it firmly into the mould and removing it to see the impression.

Step 7: Cut the sprue

Before you're ready to attempt your first cast, you'll need to carve the sprue, a funnel-like shape through which the molten pewter will flow into the actual piece. Create as small of an intersection between the piece and the sprue as possible, so that it may be cleanly snapped off after casting.

If the molten pewter has difficulty flowing through this intersection, you can always make it larger later, at the expense of the sprue being slightly more difficult to remove cleanly. Start small, though.

Also, when carving the sprue, make sure not to come into contact with the pewter register pins, as pouring molten pewter into such a sprue would essentially weld the sprue into the mould.

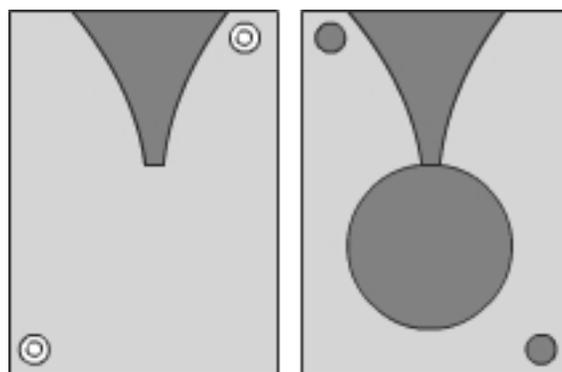


Figure 8 Location of the sprue

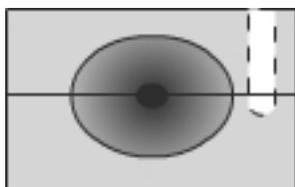


Figure 9 Front view of sprue

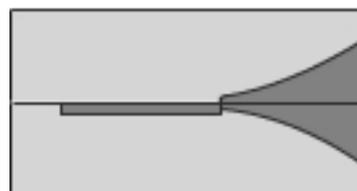


Figure 10 Cut-away side view of sprue



Step 8: Attempt the first cast

Once the sprue is cut, attempt your first cast. Don't expect it to work perfectly the first time – this cast will tell you what areas of your mould need additional work. You can always melt the pewter back into the pot, work on the mould a bit more, and then cast again.

When casting, avoid dribbling pewter over the side of the mould with the exposed register pin holes, as the molten pewter will fuse to the pewter of the register pins making removal of the piece very difficult. If this happens, you might have to dip the corner of the mould directly into the pewter pot to remove the fused pewter.

Troubleshooting

If a mould is not yet casting properly, there are a few strategies to keep in mind when determining what improvement to make.

Is the mould cold? Soapstone has a high heat capacity, so if the stone is cold, it's going to absorb the heat of the pewter dramatically. Try a few more casts and the mould will heat up, and you might get different results. If you're casting many pieces, eventually the mould – and your gloves – will heat up to the point where it is difficult to handle. Take a break and let the mould cool off a bit. Placing a hot mould on a cool dry cement surface will speed the cooling process.

Is the pewter hot enough? Just because the pewter is molten doesn't mean that it's hot enough. If you've recently added any quantity of cold pewter into the pot, it's likely that you've decreased the temperature significantly. Wait a few minutes for the temperature to rise again. Also, if you're using a ladle make sure you are keeping the bowl of the ladle hot so that the pewter isn't halfway cooled off before it ever gets to the mould.

Is the sprue large enough? This is a matter of preference, but several guild members prefer to make the sprue with as much volume as possible. It's important that the intersection between the sprue and the piece must be large enough for a good volume of molten pewter to flow through before the pewter hardens. Look for the point where the pewter stopped flowing, and enlarge that point slightly. Cast again.

Is the piece thick enough? If hot pewter fills the sprue but stops once it reaches the interior of the carved piece, your mould is probably too thin. Make very gradual adjustments, slowly deepening and smoothing the general shape, making test casts frequently. You want the piece to be as thin as possible, but there is a realistic limit to this – if it doesn't cast, it may not be thick enough.

Can the air escape? When the molten pewter flows into the mould, it's displacing the air which was there previously. If that air doesn't have an escape route, the mould will cast poorly.



Cross-hatching and venting, as illustrated below, are two ways to give the air some extra escape routes. Cross-hatching will be visible on the back of your piece – venting won't be. These techniques are not strictly necessary to use on all moulds – but they can be important tools when attempting to make thin pewter pieces.

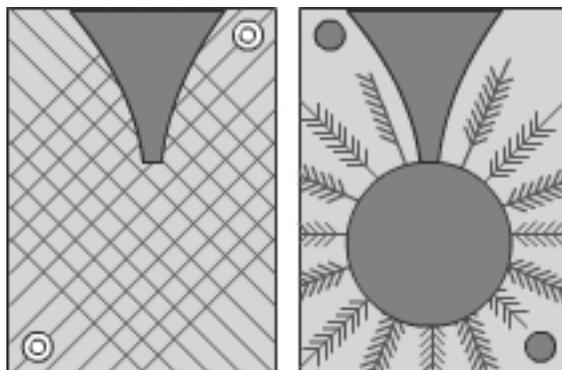


Figure 11 Cross-hatching and venting

As with all things pewter, start in moderation as you can always make the cross-hatching and venting deeper later if necessary. Remember that sometimes venting isn't the only answer – you may just have to make other adjustments.

For more information

For questions or comments about this document or about other pewter techniques, join the online discussion at <http://groups.yahoo.com/group/pewterersguild/>

If you find this information useful, please join the online discussion and let us know. Feedback and comments are also welcome.

Happy casting!

Disclaimer: The Pewterers guild is providing this information for educational purposes only. Pewter casting is a hands-on activity with inherent risks, and participants must exercise good judgment and common sense in order to avoid injury.