

Intermediate Pewter Casting in Soapstone Beyond a Simple Site Token

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What makes it Intermediate?

Registration

Mold registration is used to get the mold pieces to line up the same way each time. This is vital when doing carvings on multiple pieces of your mold that need to line up in some way. Any two-sided piece that has more than just a diapering (repeated pattern) carved onto the backside should be registered. Any three-part mold absolutely must be registered. Mold registration, ideally, should be done before any carving takes place. This handout gives step-by-step instructions on creating two and three part molds.

Multiple steps

Often times, an intermediate casting piece will take two or more repetitions of carving and pouring. This is needed so that it is known where to put the back carvings. If you want the edges of your two (or more) sides to line up, first you must pour your mold with one side carved (and just a little sprue carving on the other side) so that you can match this to your other side(s) and trace the outline of your piece onto your other part of your mold. This process is discussed in the Creating a Button Mold section.

Multiple parts

Some intermediate casting pieces are actually fairly simple to cast (flat one or two sided pieces) but are complicated because these pieces must be assembled. This includes something like assembling a chain of estate from many, otherwise simple, pieces. This includes badges with dangling charms. This would also include the forked spacer buckle that must have its outer plates soldered to the forked spacer.

Using Pewter (Lead/Tin) in Medieval Manufacturing

Historical side-note:

Pewter buckles were not as common in the period as were copper alloy ones. Interestingly, the girdlers guild throughout the 14th century sought to ban the use of pewter on belts on the grounds of it being an inferior metal. In 1319 the regulations of the Girdlers' Guild in London proscribed the use of lead/tin fittings, but the large number of surviving pewter fittings and straps with pewter fittings from this era suggests that these regulations were not universally obeyed. The statute of 1391 recognized that pewter had been in use for some time and that its use could continue.



Figure 1 - Belt with Cast Mounts

Registering the Mold

Mold Registration Tips:

- Get your pieces *very* flat. The better your mold is registered, the less cleanup your end piece will need!
- Use a marker to note (roughly) how your mold will go together in the end as well as where you wish to drill your registration holes. This will avoid confusion during drilling that Murphy will use to make you drill your registration holes in the wrong place!!
- Use air vents from your registration drill holes.
- Open up the outer side of your registration drill holes to give your ladle a larger target.
- Get your pewter extra hot before pouring.

Registration Troubleshooting Tips:

- If you break your mold during drilling, sometimes there is room to move the hole further in.
- If you pour your pin but the nub doesn't form (and you can't get the pin out 'cause you drilled the extra angled bit like I told you to), you can drill or melt out the pewter of the poured pin and try again.
- If you do need to melt out a registration pin you will have to get it VERY HOT and then tap out the metal as it melts.

Registering a Two-Part Mold:

- Sand both pieces until facing sides are flat!
 - Use a flat surface and put sandpaper on top of it.
 - Run your soapstone piece along the sandpaper.
 - Pick it up and bring it back and run it again in the same direction.
 - Trust me on this.
- Use a drill press and drill two holes in opposite corners of the "upper" piece.
 - Drill carefully a bit at a time. Soapstone crystallizes under pressure and your piece will break if you drill too much at once leading to gnashing of teeth and such.
- Drill into the top of the registration holes about 1/2" at an angle.
 - This undercut will ensure that the pin that you pour will not turn or fall out.
- Match up the two mold pieces and, with a smaller bit, mark the bottom of the drill hole on the "lower" piece.
 - This doesn't have to be exact.. the pins just have to match up in some way.
- Using drill press, or just a drill bit, drill markings on lower piece. Nub holes should be about 1/4".
 - Use a carving tool to *ensure* that the nub holes are not undercut. A nub hole can be somewhat tapered. The tool can also be used to open up the hole on the outside of the mold so that the pewter will flow in better.
- Use a carving tool to scratch air vents from the registration drill holes (on the inner side) or the nub holes to the outside of the mold so pewter will flow in more easily.
- Match up the upper and lower pieces (the smaller bit can be used to ensure that the holes are lining up).
- *Follow all safety precautions!* Clamp the pieces together and pour pewter into the registration holes to create pins.
- Pins should be formed and your mold is registered!!! (Ta da!)

Three-Part Mold Diagram

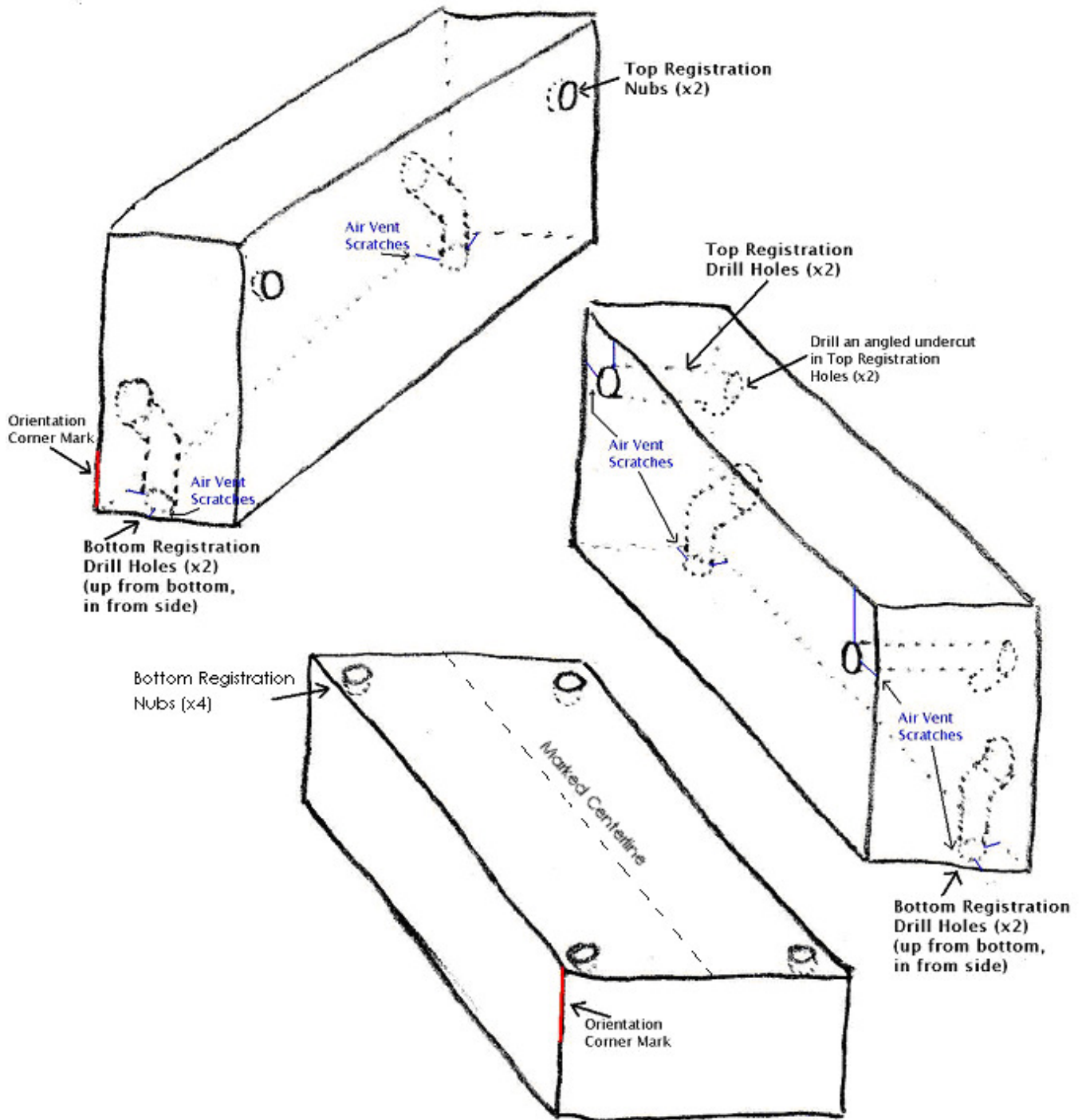


Figure 2 - Diagram of Three-Part Mold Registration

Registering a Three-Part Mold (following tips from Two-Part Mold instructions):

- Sand the facing sides of the two upper pieces until flat (as described above).
- Sand the top of the lower piece until flat.
- Drill two holes in the side of one of the upper pieces, and form matching nub holes on the matching upper piece.
 - Drill an undercut into the top of the registration drill holes about ½" at an angle.
 - Scratch air vents from registration drill holes (on inner side) to edge of mold.
 - Open up registration nub holes slightly to ensure no undercuts.
- *Follow all safety precautions!* Clamp top pieces together and pour registration pins.
 - Try to get the "bottom" edges of your upper pieces as lined up as possible (i.e. set them on a flat debris-free surface before clamping them together!)
- Sand the bottom edges of the two joined upper pieces (sand them while together!) until flat.
- Drill four holes up from the bottom corners of your upper set about 1" deep.
 - Drill holes from the outer sides of the upper set, angling downward to meet your bottom holes.
 - Open up your outer registration holes into a nice funnel to more easily pour into.
 - Scratch air vents from registration drill holes (on bottom side) to edge of mold.
- In order to know where to drill your bottom registration nubs, use a marker to mark on the outer edges of your upper set (see Figure 3) where your hole is.
 - Place your upper set on the bottom piece **and align the set to one corner of the bottom piece**. Use a marker to mark that corner on the upper set and lower piece. This makes lining the upper and lower set up while clamping everything together infinitely easier!
 - Mirror the hole markings from the upper set onto the lower block.
 - Interpolate from these markings and mark on the lower block where to put the registration nub holes.
 - Drill your matching registration nubs and open them up slightly to avoid undercuts.
- *Follow all safety precautions!* Clamp the upper two pieces together. Use a larger clamp to clamp the top set to the bottom piece. Pour registrations holes.
 - Your clamps will obscure one side of the holes. Pour two pins then reclamp to pour the other two.
 - When pouring your pins, tilt the mold slightly over so that you can pour into the side of the mold.
- Pins should be formed and your three-part mold is registered! (Ta da!!!!)

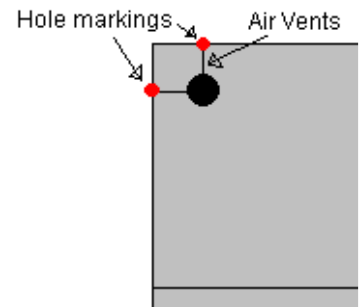


Figure 3 - Marking the Registration Drill Holes to transfer to bottom side

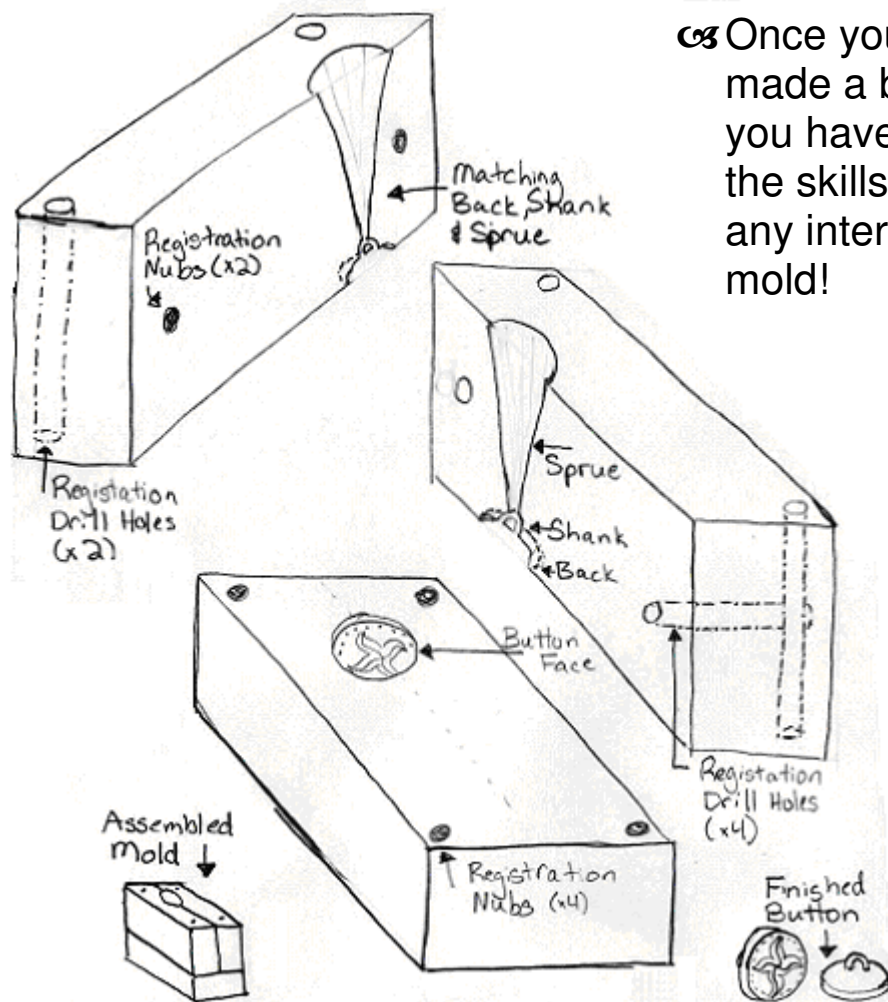
Alternate Method

You can also drill your bottom registration drill holes up from the bottom of the bottom piece and drill the registration nubs into the bottom of the top pieces. Clamp all of these together and pour the registration pins with the mold upside down. You must make sure that the mold is very securely clamped since the top of the mold is generally uneven and it will want to sit oddly.

Do NOT drill all the way down from the top to the bottom of your upper pieces. You are infinitely more likely to break the edge of your mold, drill bits are often not long enough (at this diameter) so you have to drill from the bottom and meet from the top and you lose valuable real estate because your side holes can't intersect your bottom holes.

Creating a Three-Part Button Mold:

- Register a three-piece mold.
- Mark the centerline of the upper mold pieces on the lower mold piece.
- Carve the button face centered on line.
- Put one upper mold piece on lower mold piece and mark where you would like the dome of the button and the shank to be.
- Carve a small center portion the button dome as well as the shank (not too small or the center bit may break). This will be carved in one upper mold piece only.
- Carve the sprue up from the top of the shank.
- On the opposite upper mold piece, carve a small part of the matching sprue.
- *Following all safety precautions*, assemble mold and pour until you get a piece that at least has the shank poured. Having the button face as well is better.
- Take the (*cooled*) cast piece and match it up against the opposite upper mold piece. The small matching sprue carving will help you match up the cast piece.
- Mark the edges of the sprue, shank and small dome on the opposite piece.
- Carve the matching sprue, shank and small dome on the opposite piece from those markings.
- If the button face poured (if not, re-pour until you get one,) match the button against the bottom of each upper mold piece and mark how far out any dome should go.
- Carve any desired dome out to the button's edge. Be precise with this. You don't want the back of your cast piece to go out further than the front. That looks silly.
- Finick as needed.



Once you have made a button mold, you have mastered the skills to tackle any intermediate mold!

Figure 4 - Diagram of Three-Part Button Mold

A Small Survey of Pewter Cast Items in the Medieval Period

More medieval examples can be found in the Appendix!!

Buttons

Buttons have been found with domed front, domed back, both front and back domed and flat on both sides. The shanks on most of them are bent. The thicker the shank is, the less likely that they would be bent or broken.

A button mold could also be poured effectively from the side as well as from the top (see discussion under Pins)



Figure 5- Medieval Cast Button

Annular Brooches

Brooches are defined by Museum of London as an object with a pin that is constricted somehow to a limited area of the piece. There are examples of brooches that serve as charm hangers. Brooches that are large enough can be functional as well as decorative. I would *not* recommend that the *pin* be cast pewter if you want it to hold together something substantial. I used 16-gauge wire for my pins.

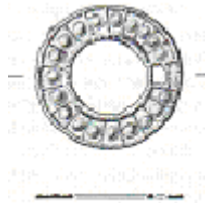


Figure 7 - Annular Brooch

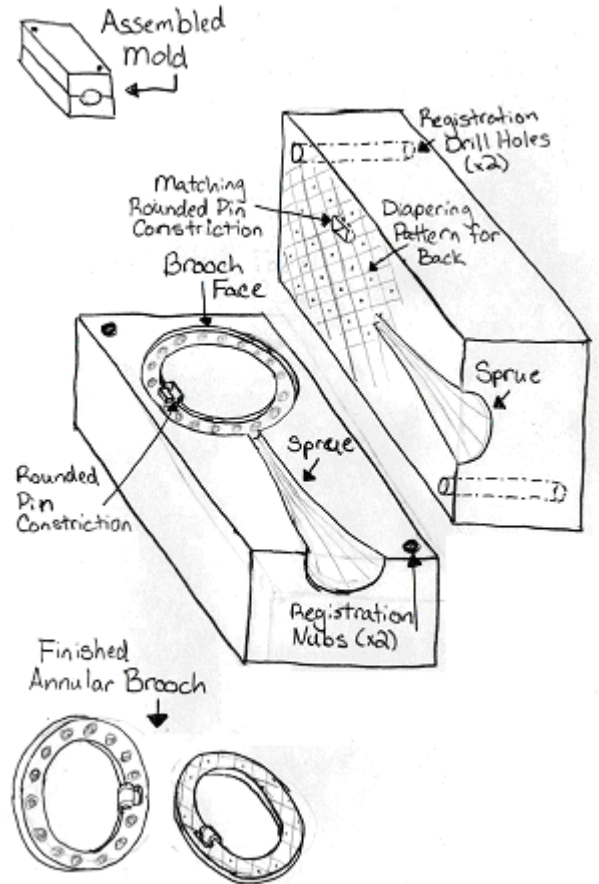


Figure 6 - Diagram of Two-Part Brooch Mold

Buckles

Double Oval Buckle

This type of buckle is fairly simple. It would be carved just like the annular brooch. Once it is cast, your belt, with a slit cut in the middle for the pin to attach through, is looped around the middle bar and riveted to itself.

Depending on the size of holes in the belt, your pin could also be cast in pewter or you could use a wire of a stronger metal.

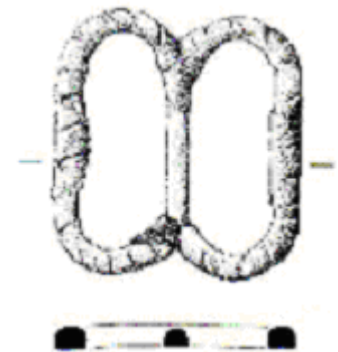


Figure 8 - Double Oval Buckle

Forked Spacer Buckle

The forked spacer buckle is fairly easy to carve and cast. The complexity here comes in the assembly. You will need to carve two separate pieces: The frame, with the buckle and the forked spacer would be carved much like the annular brooch. Then a separate sheet plate, with holes for rivets either included in the mold or drilled later, is carved to match the outline of the forked spacer. Two sheet plates are poured and soldered onto the forked frame. The belt end is inserted and rivets are placed through the holes to secure the belt.

A tip for this design is to make your sheet plate and your forked frame as symmetrical as possible. That will make it easier to use the same sheet plate on either side of the frame.

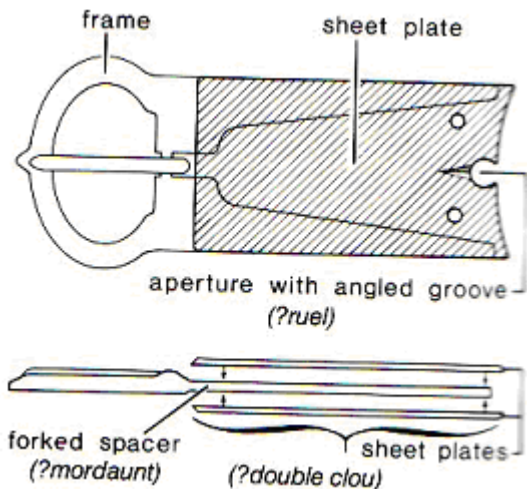


Figure 9 - Diagram of Forked Spacer Buckle

Mounts

Mounts are useful for decorating everything from belts and harnesses to quivers and bookbindings. A rivet can also be cast pretty much by making a tack mount with a flat (or domed.. as desired) plain head.

Mounts with Integral Rivet (Tack Mounts)

Tack mounts are assembled much like pins, but without the clasp. Make sure that the rivet is decently sturdy and centered on the mount face. Use a piece of sandpaper folded several times (so it has a nicely rounded crease) to get a rounded pin. The sprue for a tack mount can be carved into the top or the side of the mold (see Pins). Carving from the top can involve less cleanup of the piece.



Figure 10 - Tack Mounts

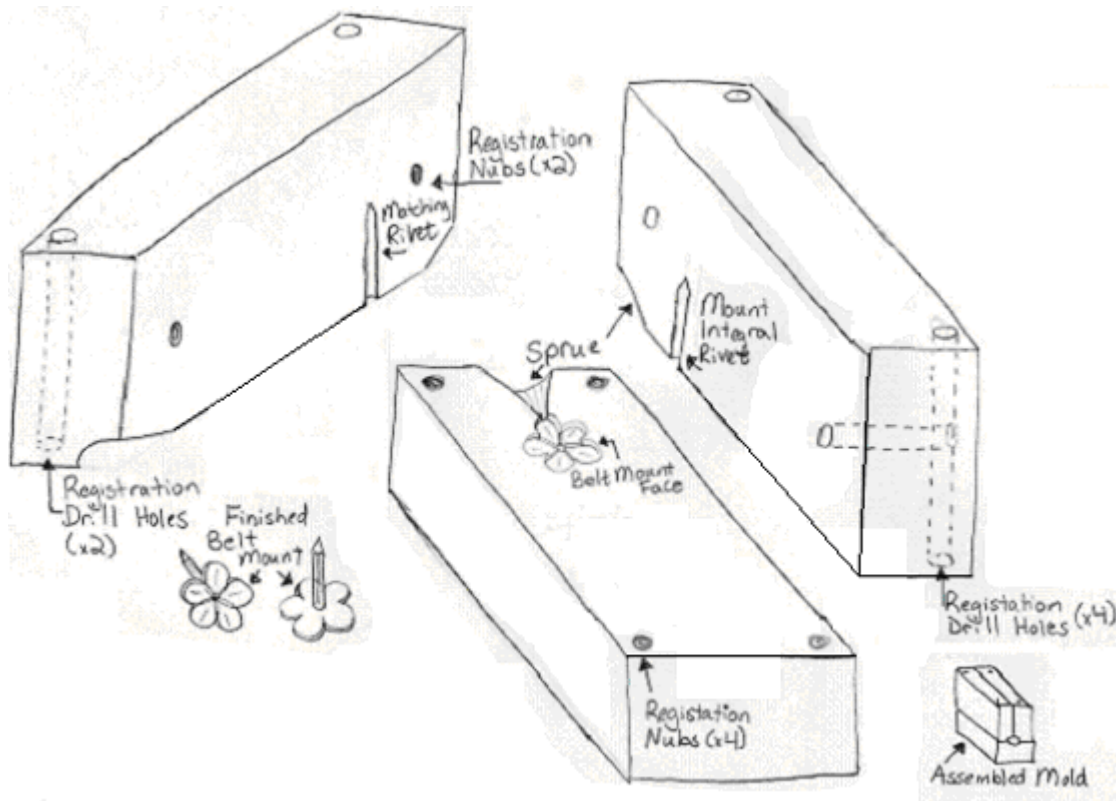


Figure 11 - Diagram of Three-Part Tack Mount Mold

Badges with Pins

To create a pin and clasp for your badge, you will want a two-sided upright pin coming from the face of your mold. Round pins are lovely. Use a piece of sandpaper folded several times (so it has a nicely rounded crease) to get a nice rounded pin. The clasp can be flat and only one-sided. It will be bent over so that the pin has a place to latch in to.

A pin can be side-poured (with the sprue carved to the side, rather than on the top) if the face is simple enough. If doing this, angle your pin carving away from the sprue to improve your pin's pouring.

Doing a diapering pattern on the bottoms of your upper mold pieces will provide good air venting and give the backs of your pins a nicely finished look.

Make sure that the pin is carved long enough to be able to bend under the clasp!

Note: If you have the room and the piece call for it, do everything. Put on a pin back and a tack mount and even a shank. Just cut off what you don't want to use from each piece and re-melt!



Figure 12 - Swan Livery Badge with Pin

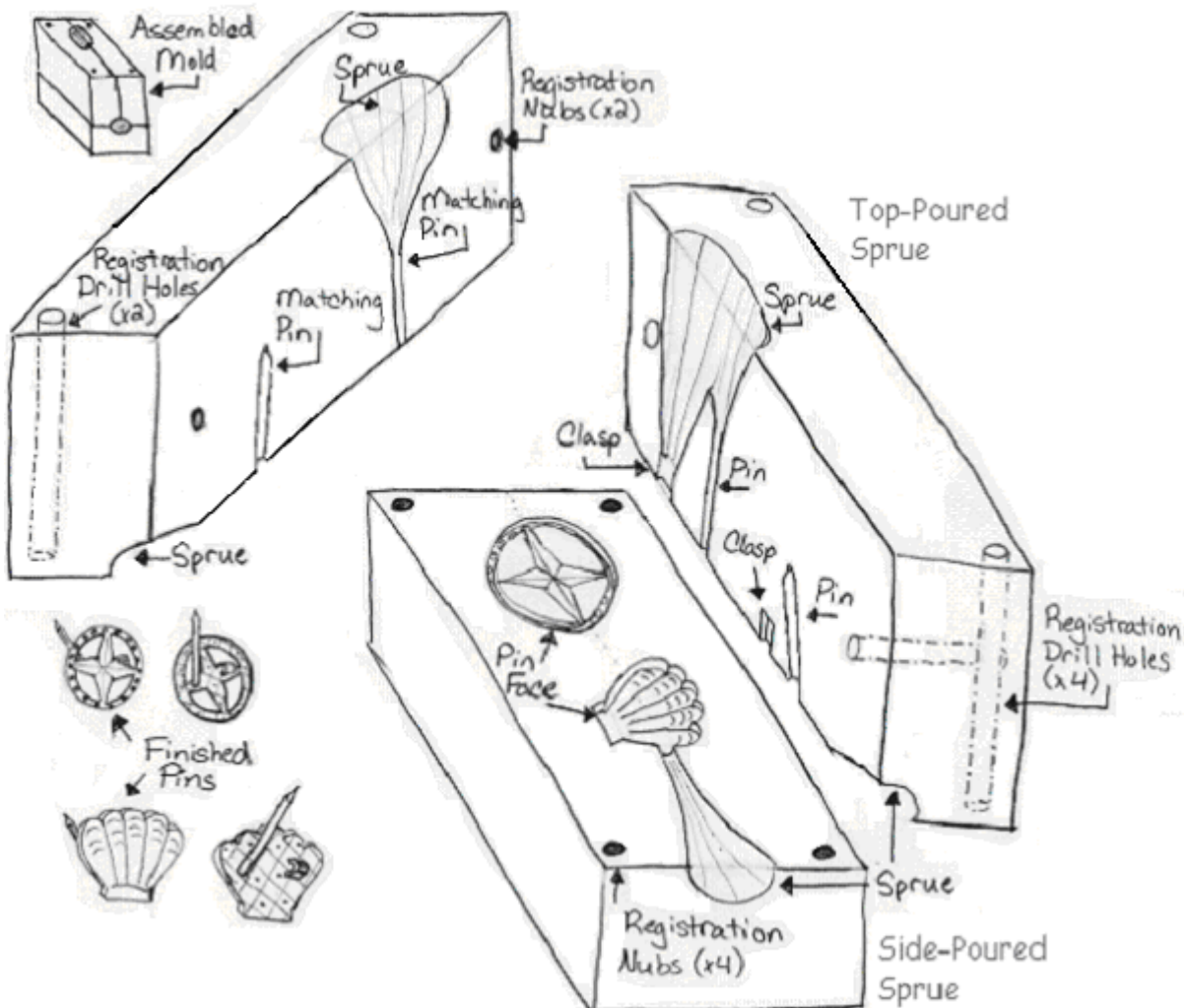


Figure 13 - Diagram of Three-Part Pin Mold

Troubleshooting for Carving and Pouring

If your mold will not fill:

- Add air vents all around outside of mold.
- Puff baby powder (NOT the corn starch version!) on mold (bottom and sprue) to break up surface tension of the metal.
- Add another sprue route to a different spot on the mold.
- Carve a matching channel on the back of the mold (bottom of the upper set) to the areas that will not fill. This does not have to be the whole width of your mold! (or particularly pretty!)
- Deepen the shank/pin/clasp/etc portion of the mold.
- Get the metal extra hot.
- Try tilting your mold one way or another as you pour.
- Try pouring a slow steady stream of pewter vs. an abrupt dump.
- Deepen your actual carved face.

If an (inner) area will not fill:

This may be because the air in the mold has no escape. If you can not get an air vent from the area to the outside of the mold (on the bottom piece or through the top set) and the other troubleshooting methods won't work, try this:

- Use a *very* small drill bit and drill *through the mold* to an outer edge.
 - This may be from a spot inside the actual carved face, from the back of the mold set or (preferably) in the middle of an adjacent non-carved space so that no mark will appear on the poured piece.
- Shove some broom straw into the hole so it is filled pretty thoroughly.
- Trim the straw so that it is flush with the face of the mold.

This will provide an air vent from the middle of the mold but not enough space for metal to flow through. Don't worry about the straw when heating up the mold. Occasionally the straw may have to be replaced but the effort is worth it!



Figure 14 – Example of Mold with Inner Air Vent Holes

If your piece is very flimsy:

Carve a matching channel on the back of the mold (bottom of the upper set) to the areas that will not fill. This does not have to be the whole width of your mold! (or particularly pretty!)

If you are having excessive flashing (extra material around the edges):

- Check that there is no debris between your mold pieces, keeping them apart.
- Make sure that no outlying areas of your registration nubs are sticking up.
- This may be your actual carved face having too many stray scratches/carving marks on the outer face. Your options here are:
 - Deal with it in post-production.
 - Melt out the registration nubs (which sucks!), sand down your blocks a bit and re-register (keeping the stones aligned the same as before!

If you are getting a lot of bubbling on the surface (from trapped air):

To help with this we need to get the air out somewhere other than the sprue. To do this:

- Carve air vent scratches ALL around/over your mold.
- Deepen your sprue so that it is a decent reservoir.
- When pouring your mold, pour in (dump) all at once as quickly as possible. This will force the air only out the side vents and provide at least some help for this issue.

Recommended Reading

Berger, Daniel. Herstellungstechnik hoch- und spätmittelalterlicher Kleinobjekte aus Zinn (Production processes of small pewter objects in the High and Late Middle Ages).

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H.J.E. van Beuningen, A.M. Koldewij & D. Kicken, Heilig en Profaan 2. 1200 laatmiddeleeuwse insignes uit openbare en particuliere collecties, Rotterdam Papers 12. Cothen. 2001. ISBN 90-9014881-7.

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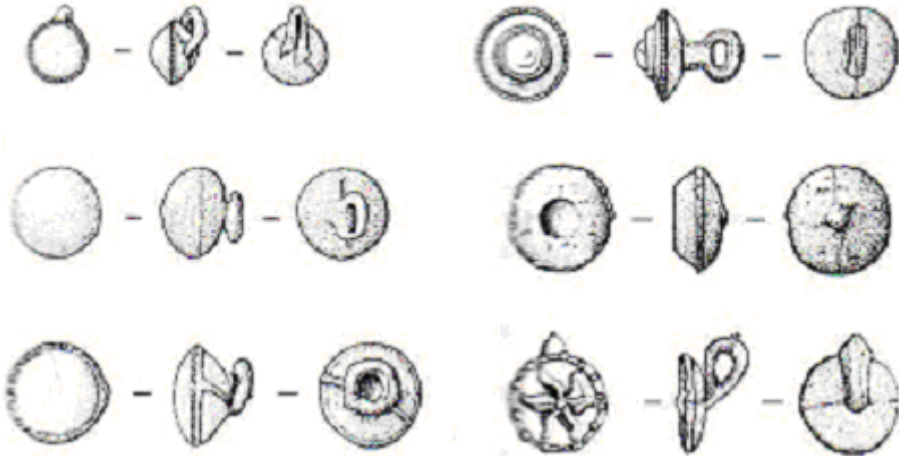
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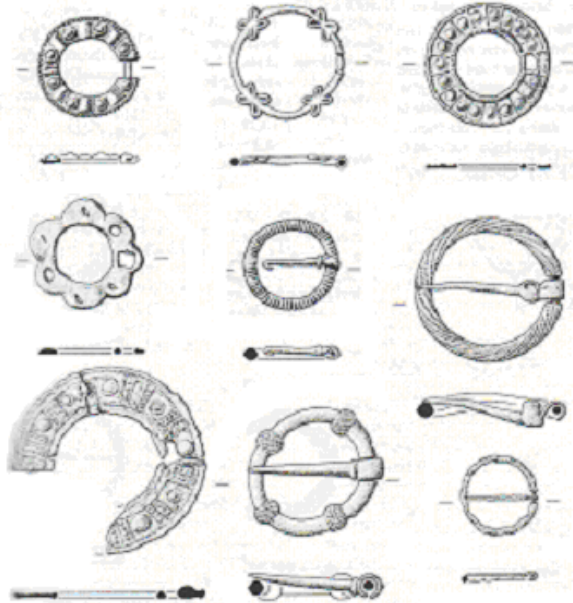
Virtual Museum of the Strong Collection. http://talbotsfineaccessories.com/cgi-bin/Strong_Collection.cgi

Appendix of Examples

Buttons

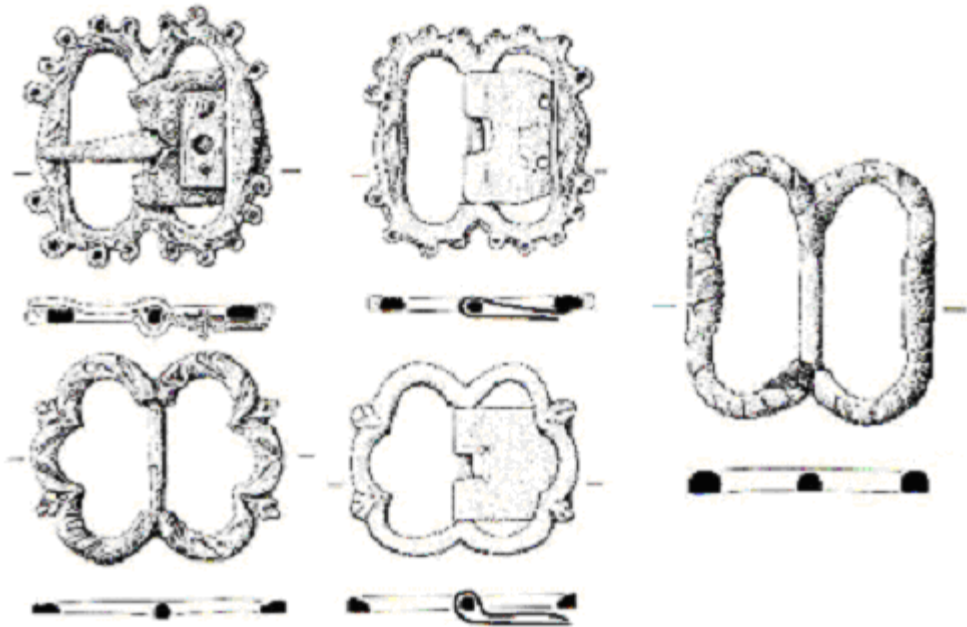


Annular Brooches



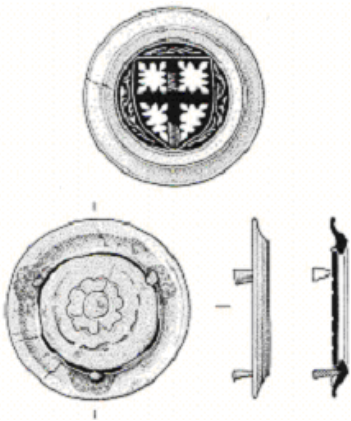
Buckles

Double Oval Buckle



Mounts

Mounts with Rivet Holes and Separate Rivets



Mounts with Integral Rivet (Tack Mounts)

