

Production lost wax casting for knifemakers

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Why would I want to do this?

- 「 We want to be able to make really cool stuff
- 「 We want to make a living at this right?
- 「 Time saving
 - Create a design for hardware once and make multiple copies
 - Standardizing hardware allows higher production volume of “bread and butter” design knives

Why would I want to do this?

- ┌ Allows creation of masters using whatever process and material you are most comfortable with regardless of what your final material choice will be
- ┌ Unique fittings help distinguish your work from all of the people who buy off-the-rack parts from the online supply shops
- ┌ No need to try to source odd dimensions of barstock in different metals

Process Overview

Planning

Creation of the model

Making RTV Molds

Making Injection Waxes

Sprueing Waxes

Investing

Burnout

Casting

Finishing

Creation of the model

Wax

- Carve the wax model to fit your tang, or template
- Through holes will shrink about 5% in the final casting
- Properly done, the process will hold very intricate detail
- Any surface flaws in your model will likely be in your final piece



Creation of the model

Wax

- Easy to carve
- Fast
- Requires careful handling
- Can be cast then the metal casting used



Creation of the model

Metal

- We all know how to work with metal
- Use whatever metal is best suited to the form you are making
- Robust material
- Much slower to work than wax

Making RTV molds

Mold frame

Glass mold sides

Hot glue gun

Release wax (optional)

Castaldo Liqua Glass 2 part RTV

(Ottofrei.com part #122.603)

Making RTV molds

Attach a sprue or sprues to your model

- Be sure that any transitions are smooth
- Be sure that there are no air pockets in the joint(s)



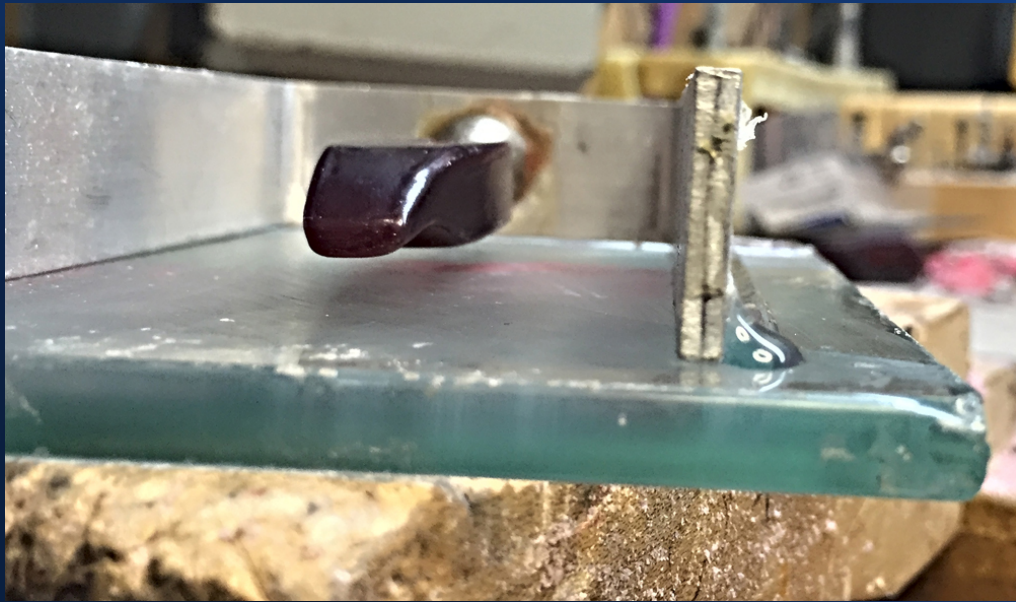
Making RTV molds

Set the model with a sprue in your mold frame



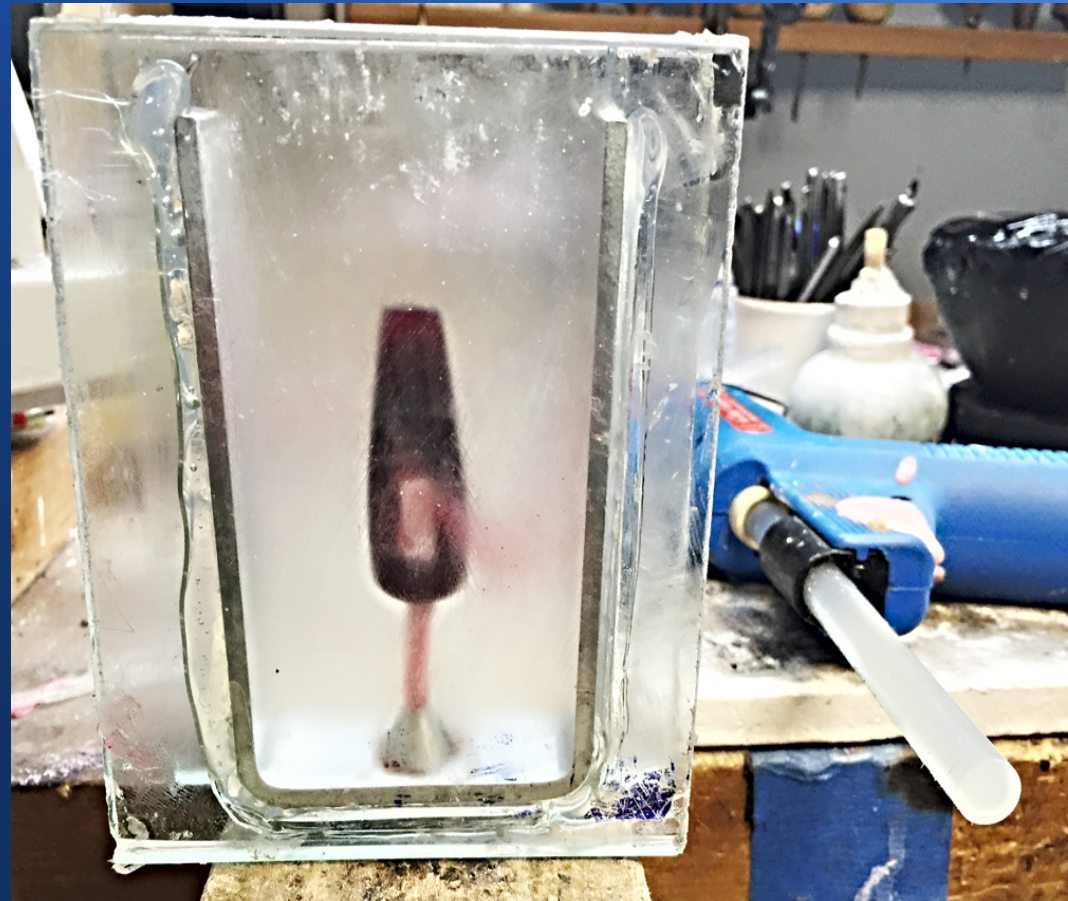
Making RTV molds

Seal the sideplates to the mold frame with hot glue



Making RTV molds

Seal the sideplates to the mold frame with hot glue



Making RTV molds

Mix and vacuum the mold compound following the directions, pour and vacuum again, allow to cure.



Making RTV molds

- Remove sideplates and frame carefully
- Cut model free using faceted small cuts
- Cut vents for air to escape as needed
- Dust with cornstarch to allow freer venting



Making injection waxes

- Set wax injector pressure to between 5 and 10 PSI
- Set wax temperature to recommended melting temperature, and allow time to melt
- Hold RTV mold between two stiff flat plates
- Hold mold sandwich firmly in both hands and press onto injector valve until mold filled
- Be careful, wax coming out sides is uncomfortably hot

Making injection waxes

- Use two hands
- One hand only works in pictures
- Seriously . . .
- Leather gloves might not be a bad idea
- ;)



Sprueing waxes

- Remove waxes from molds
 - Trim any mold flashing
 - Fill any bubbles in part wax
 - Set up main sprue in flask base
 - Using hot tool add part sprues to main sprue
 - If part has heavy cross section allow reservoir to avoid shrink porosity
 - Make sure transitions are smooth.
- Turbulence causes trouble



Sprueing waxes

- Populate your sprue
- Make sure waxes do not touch



Investing

- Carefully fit flask onto base
- Make overflow collar out of blue painter's tape
- Spray with rubbing alcohol to prevent air bubbles



Investing

- Mix and vacuum investment according to directions
- Digital postage scale is a good idea
- Use rubber mixing bowl



Investing

- Pour investment gently down side until flask full and waxes covered
- Try not to pour directly onto tree, you'll break waxes off (trust me)
- Vacuum flask to remove bubbles
- Allow to sit



Burnout

- Remove tape and base
- Place flask in kiln sprue side down
- Burnout following temperature and time instructions from investment manufacturer



Casting

- Put casting grain/scrap in crucible
- Add a tiny amount of flux
- Wind up centrifuge
- place flask carefully in cradle



Casting

- Use torch with slightly reducing flame to melt metal
- When metal is properly fluid release stop
- Allow centrifuge to come to a stop, be patient!
- Allow flask to cool until most of the glow is off the button
- Plunge in water to de-invest



Finishing

- Cut castings from sprue
- Tumble to rough finish
- Trim any casting flash and sprue
- File, sand, and polish as necessary

Planning

What are your process limitations?

- What limitations do your molding equipment place on your process?
- How big a flask can you invest ?
- How big a flask can you pour?
- What is your heat source?

PLANNING

- Production considerations
 - ┌ Is this going to be a one-off or a production piece
 - ┌ Standardization concerns:
 - is this design going to be built to a template
 - Is this going to be used as a general purpose piece with parts fitted to it
 - How close to final form do you want to make your design

PLANNING

- Design
 - ┌ Choose the most appropriate material for your particular model design
 - Wax is quick and easy to carve and machine, but it is not the only option
 - Metal models work really well
 - You can always decide that you want to use an extant piece as a model

PLANNING

equipment and supplies

- Kiln capable of controlled temperature ramp to 1350f
- Casting machine, centrifugal preferred, vacuum works.
- Torch with “rosebud” heating tip
- Vacuum pump and chamber (bell jar preferred)
- Wax injector
- Jeweler's wax
- Mold frame, glass, hot glue gun
- Jewelry investment plaster (Kerr Satincast)
- Castaldo Liqua Glass 2 part RTV (ottofrei.com part# 122.603)