

SCOUT: Silicone/Urethane Casting Process

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Read these directions in full before any prep work or casting is performed. The steps outlined are a fairly specific guide to ensure good parts are made using a clear process. As always, if you encounter something not addressed here, use your best judgement.

Finish Raw Master Model

- Finalized CAD should be 3D printed on an FDM, Polyjet, or SLA process machine. This guide assumes a rough finish from an FDM (uPrint Plus or equivalent) process.
 - *NOTE: FDM parts will be cheaper and stronger, but will require more finishing work. I prefer FDM parts since they are low cost and hold up to abuse - they are ABS and thus have material properties similar to injection molded parts.*
- Clean the part in a mild detergent solution to remove oils and prepare for painting.
- Place part in a **clean room with adequate ventilation**, using drop cloths or boxes to **protect the room from overspray**.
 - *NOTE: As a general rule have no less than 18 inches of overspray clearance around the perimeter of your spray area.*
- Use Rust-Oleum Filler Primer (gray or red) to lightly coat the external surface (cosmetic) of the part in primer. **Wait 3-5 minutes.**
- Use the filler primer again to apply a moderately generous coating - this will begin to fill the stair steps on the part. Do not allow the paint to pool - always build up layers by passing over quickly - never stop and spray in a single place.
- After coat has dried AND cured (wait at least 2 hours) wet sand with a medium (60-100) sandpaper or sanding sponge. **Sand under running water** to remove debris and get a smooth finish.
- Repeat the last 2 steps until the part is mostly smooth and all visible gaps are filled. On the final coat wait at least 12 hours before sanding, and use a higher grit - (600-1000).
- *NOTE: Do not handle the part excessively to avoid fingerprints and oils on the part surface.*
- Set up the paint area as specified above.
- Use Rust-Oleum Textured (fine) paint (black) apply a light coat onto the external surface (cosmetic) of the master model. **Wait 3-5 minutes.**
- **Apply a second coat within 15 minutes.** This will be the final coat before molding, so inspect the part to ensure total coverage on **all cosmetic surfaces**.
 - *NOTE: Pay careful attention to avoid pooling/dripping as fixing at this stage is a hassle. If you do get a pool of paint, let it dry and cure before trying to touch it. That will allow you to salvage more of the finish than if you try to touch it*



wet.

- *If you are unable to apply the 2nd and final coat within 15 minutes, you must wait at least 1 hour before adding another layer due to the paint curing process.*
 - Leave the part to dry overnight, or wait at least 24 hours before molding.
 - Store the finished part in a safe, dry location to await the molding process.
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Prepare Master Model for Molding

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Creating the Master Mold

- Mix
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Casting Parts

- Before you begin, gather all of the following items
 - Rubber/Latex Gloves
 - Mixing cups (various sizes)
 - Stirring sticks (new popsicle/craft sticks or thumb depressors for large mixes)
 - Digital Scale (accurate to at least 1 gram)
 - Paper/Plastic to lay down on the work surface (this should be replaced often)
 - 60CC Catheter Syringes
 - Master Mold and Corresponding Mold Box
 - Mold release spray (Freeman Pattern Release 202)
 - 10+ Gallon Pressurized Tank or 3CFM/80PSI Air Compressor
 - Pressure Pot with pressure regulator set to 50PSI (blowoff valve at 60PSI)
 - Urethane parts A and B
 - Urethane Tint
 - Mixing Recipe
- Set up your area to prepare for casting. Lay out paper/plastic roll over your work surface.
 - Cut a piece of clear plastic drop cloth large enough to cover the digital scale and cover the digital scale.
- Ensure the pressure pot is connected to the pressurized tank/air compressor. The pot will need to be pressurized quickly when the filled mold is placed inside. Open the lid of the (unpressurized) pressure pot.
- Layout your workspace so everything needed is within arm's reach. Once you begin mixing the urethane the casting process will proceed very quickly. There is not time to leave and find missing materials once the urethane is mixed as it will begin to gel and become un-pourable.

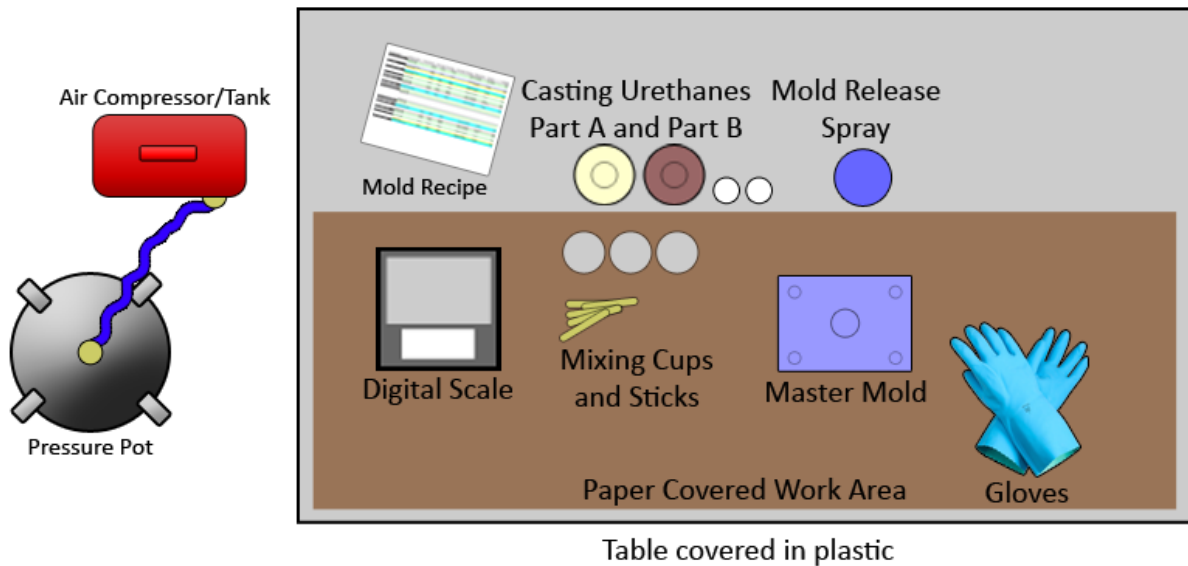


Figure 4: Suggested Layout

- Put on the rubber/latex gloves before pouring.
- Spray the inside surfaces of the master mold with mold release spray and assemble the mold halves. Place the mold halves in the mold box.
- Turn on the scale and put it into correct units. Cover the scale with the plastic you cut earlier, and place an appropriately sized mixing cup for the given part your are making.
- Zero (tare) the scale.
- If you are tinting the part, add Part B first to the mass specified in the recipe.
- Add tint as specified for that color and part. Stir until color is fully uniform. Use the stirring stick edge like a squeegee along the inside of the mixing cup to ensure no untouched liquid remains.
- Add Part A as specified in the recipe. You can re-zero the scale for this part, or fill to the total overall mass (Part A + Part B).
- Stir the mixture until well mixed. You will need to be quick but **smooth** so as to not introduce bubbles into the mixture.
- Draw the fully mixed liquid urethane into the syringe and place over the mold sprue. Inject a small amount into the mold. Lifting the mold swirl the liquid around inside to coat the surface.
- Quickly inject the remaining volume of liquid until the mold (including sprue and any allowed overage) is filled.
- Carefully place the mold in a lined pressure pot. Seal the pot and pressurize to 40-50psi.
- Leave the pot under pressure for the specified demold time (see recipe).
- When it is time for demolding, depressurize the pressure pot using the safety release valve. When all pressurized air is expelled, open the pot and remove the master mold.
- Carefully pry open the master mold and remove the cast part.
 - *NOTE: The part will not be fully cured and thus may a be pliable. This will aid the demolding process, but handle gently so as not to deform the cast part.*

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- Remove any flash from the edges of the cast part, and cut off the molding sprue and vents.
- Place the cast part in a safe, dry location for total curing, generally 24-72 hours.
 - *NOTE: You must let the part cure before assembling.*
- Wipe the master mold out with a clean, dry cloth and store in a cool, dry place.

Additional Resources

Freeman Supply has some great video demonstrations on both casting and mold-making. A general YouTube search will turn up videos from Smooth-On and Alumilite, which are other reputable and knowledgeable suppliers.