

# Casting Made Simple and Predictable.

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## Preparing the Model (master) and the Mold:

Seal all materials that will stick to the mold before starting the mold process.

Wood and plaster need to have at least 2 coats of a lacquer based sealer. Once the sealer has dried apply 2 coats of mold release to the model (master) - the products will vary depending on the manufacturer.

The mold release can be either brush on or a spray on. This prep work will prevent the mold from sticking to the model (master) reducing the risk of damaging the original.

## Preparing the Mold Box.

Once our model is ready to be used as the mold master, we need to build a suitable mold box. The mold box will contain the silicon rubber in a defined space. A well designed mold box should be square so that the final mold can be removed from the box and realigned with the same box easily and accurately - this is especially important with multiple part molds (Closed Mold). For an (Open Mold) this is not as critical it does however make for a better casting surface when the mold will be used to produce the final cast parts.

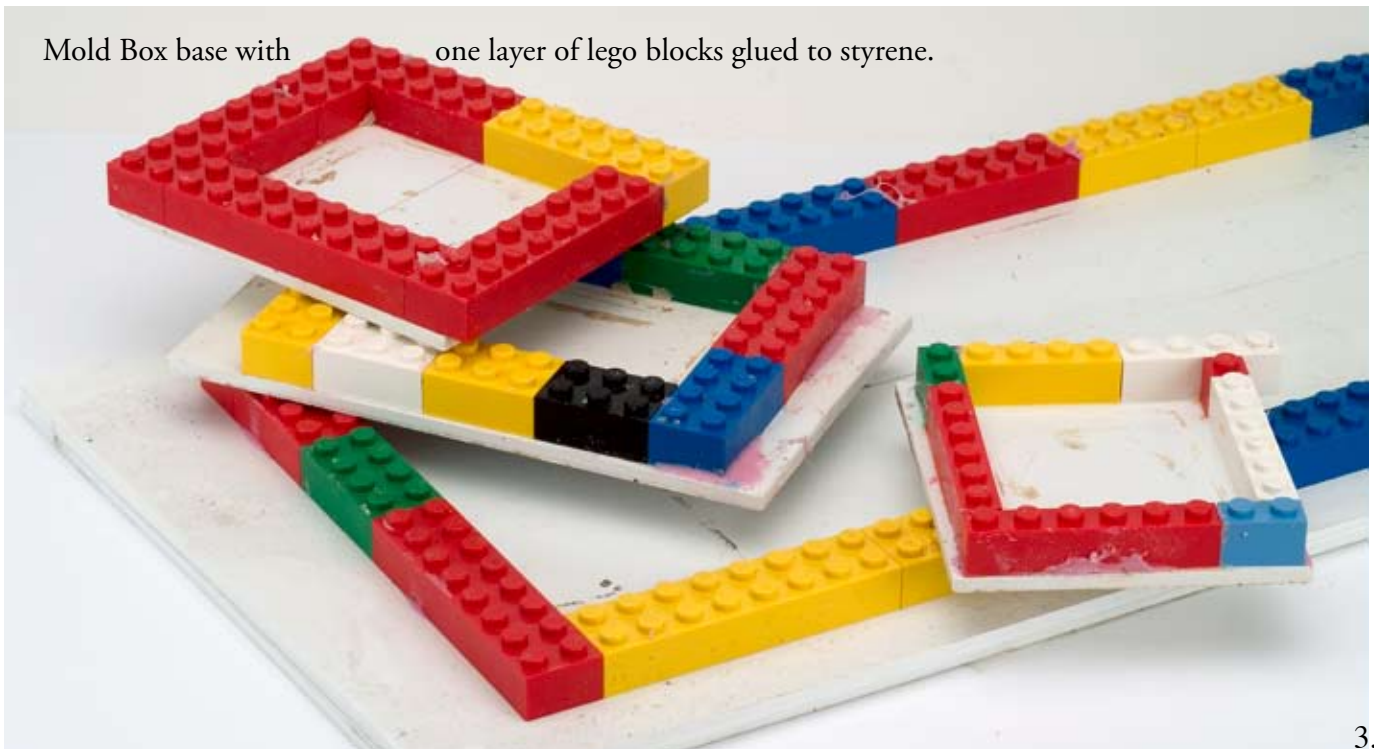
## Materials required for the Mold Box.:

Any material that can be used to produce the model may be used in building the mold box. However since wood requires sealing to avoid moisture contamination and sticking to the mold itself I have found Plexiglas or preferably styrene the best solution. The base of the mold box is constructed of 1/4" styrene (this can be attached to a piece of wood if more support is needed although I have not found this necessary unless the molds are very large. The mold box walls are built up of Lego blocks which provide an economical, accurate and quick assembly, dismantle quality. The other material you will need is clean clay which is a sulfur free clay.

**\*This is very important as sulfur will prevent the silicone from curing .**

The clay will be used to build up supports for the model (master) while in the mold box. Latex or Nylon gloves - you want to avoid as much contact as possible with both the silicone rubber and resins.

Mold Box base with one layer of lego blocks glued to styrene.



## Measuring and Mixing the Silicone and Resins:

Silicone and Resin is measured using one of two methods depending on the product:

**By Volume 1:1 :** These materials are mixed by measuring equal parts A and B.

- Pour a set amount of Part A into a container
- Pour the same amount by volume into another container of Part B.
- Pour Part A into Part B and mix thoroughly (make sure you scrape the sides of the container to obtain as complete a mix as possible) then pour the mixed solution into a new container and continue mixing - this assures a consistent mix. The Silicones that are mixed in a 1:1 ratio tend to have lower elasticity and tear strength.

**By Weight :** These materials are mixed by weight, the most common ratio being 10:1 Unlike the materials that are mixed by Volume these require a great deal of accuracy, and either an electronic scale or balance beam scale is required. The positive aspect is these materials exhibit a far greater tear strength and elasticity.

- Set empty container on scale to calculate its weight or zero the scale. Set the balance beam to the weight required or add Part A until the desired weight is reached.
- Calculate 10% of the weight used and either adjust the balance beam scale or zero the digital scale and add the correct amount of Part B.
- Follow the remainder of the mixing process as outlined above.

Before mixing any materials stir the parts to make sure no parts have settled on the bottom of the container.



## Pouring Silicone into the mold box:

### Pouring Silicone “RTV”

In order to obtain consistent and accurate castings you need to eliminate as much air from the process as possible. During the mixing stage a lot of oxygen can get trapped into the mixture by over vigorous mixing. The ideal process is to degas before using the mixture. (*A vacuum chamber will benefit both silicones and resins greatly. If a vacuum chamber is used it must pull 30 inches of vacuum to be effective.*) When pouring the silicone rubber into the mold box you first pour into the lowest point in the cavity using a very fine stream. This will help prevent air from being introduced into the mold. Allow the silicone rubber to rise until it completely covers the model with a minimum of half an inch of material. Let the mold cure for the set time. Try to keep temperature and humidity consistent during the curing process.

## Simple Open Mold :

Advantages: One piece mold - easy to cast into.

Steps:

- Secure the model to the bottom of the mold box using fine wall of clean clay. see fig 1.
- Build up the mold box walls to a least one inch above the highest point of the model. see fig.2.
- Spray the model with a release agent (not necessary with silicone as it has great release properties naturally, it just helps insure a clean release.
- Place the mold box on a level surface
- Pour silicone rubber mixture using a fine stream into the lowest point in the mold box allowing the mixture to slowly rise over the model.
- Allow the mold to cure (usually overnight).

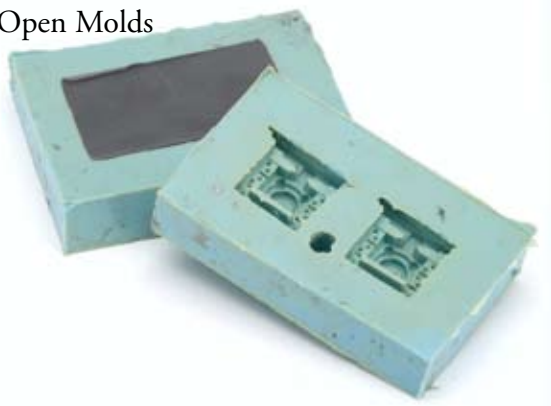
Dis-Advantages: One side (usually the bottom) has no detail. Requires some finish on non detail side.

Once the silicone mold has cured carefully breakdown the mold box and remove the mold.

- Inspect the mold for any large air pockets or flaws in the mold
- Place mold on a level surface and coat with a light dusting of non perfumed talc powder.
- Mix the resin and pour into the lowest point of the mold using a fine stream to avoid trapping any air bubbles into the casting
- The thinner stream also helps direct the resin into intricate areas of the pattern.
- Pour the resin so that it is flush with the top of the mold and let it cure for the set time.
- Once the resin has fully cured it can be removed from the mold and the mold prepared for the next casting.

Open Molds do not work well when cast under pressure as the top surface will end up with a concave finish.

Open Molds



Casting from Open Mold



## Complex Closed Mold: Two part molds.

**Advantages:** Allows for a model to be completely reproduce (All Sides)

Steps:

- Decide on a parting line in a way that the model does not get locked into the mold (undercuts).
- Place a clean clay base in the mold box. This will provide the platform for keeping the model in place. and provide a location lock for the two mold halves. Make the clay base an irregular shape so placement of the two halves is obvious. see fig 1.
- Place the model into the clay base and fill in any contact areas with clay, creating a full seal between the model and base. fig. 2.

fig. 1.

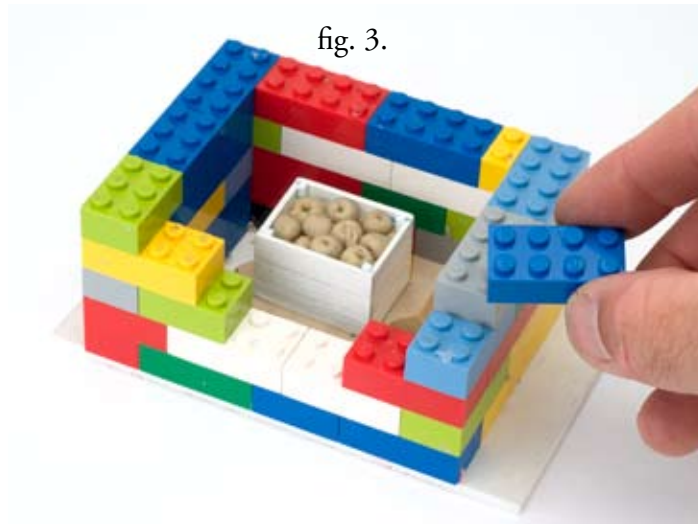


fig. 2.



- Build up mold box so that the silicone will cover the model with a minimum of 1/2" thickness.... see fig 3.

fig. 3.



Mix up silicone rubber and de-gas if possible. Then pour silicone into the mold box covering the model with a minimum of half inch of silicone rubber. Pour the silicone from a height of at least a foot using a very fine stream this will keep air entrapment to a minimum, and allows for a more accurate pour. Pour the silicone into the lowest point of the mold and allow it to rise naturally. For areas where air bubble entrapment is highly likely the a thin film layer of silicone rubber can be poured onto the area. Bubbles can also be broken by blowing compressed air onto the mold, surface blowing the silicone rubber into all the crevices.

After Silicone Rubber has fully cured (usually overnight) remove lego blocks from mold box. see fig 1. Carefully remove mold and flip over. With small pick slowly remove the clay base being very careful not to move the model in the mold. see fig 2.



Once the model has been carefully cleaned of any clay, place the mold back into the mold box and rebuild the lego walls to a height of at least half inch above the first part of the mold. see fig 3. **\*\*Spray the mold and part with mold release or coat with a thin coat of Vaseline.** Miss this step and your model will be sealed inside the mold. Let the mold cure overnight. Once the silicone rubber has fully cured remove your mold from the mold box. The two parts of the mold should separate fairly easily and your model can be careful removed. Your mold is now complete. see fig 4.



Dis-Advantages: More Difficult to produce and creates more possibilities of air entrapment .  
Works well when pressure cast.

## Casting in Your Molds:

Now that you have a mold lets cast some parts and put the mold to work. Before I use any mold I bake it in the oven at 200 degrees Celsius for at least two hours. This evaporates the residual alcohol from the curing process and also helps extend the mold life. Not doing this step will probably mean the first two or three castings will not cure properly and may have more air than normal. *(A small toaster oven works really well for this step).*

### **Steps to Cast a Part:**

- Brush the mold lightly with talc powder (non scented)
- Bang the mold to remove 95% of talc powder leaving a fine dusting.  
*(The talc powder servers as a release agent - pro-longing the life of the mold and produces a slightly matt finish casting which helps paint adhere to the mold.)*
- Place the mold on a level surface - determine the amount of resin needed - mix resin - see page 4 for mixing process.
- Pour resin into mold using a fine stream into the lowest point on the mold.
- If you are using the squish process place the lid on the mold starting at one end and gently roll the lid onto the mold allowing the air to escape out the opposite end.
- If you are using the injected process pour or inject the resin into the pour spout until the resin comes out one of the air vents.
- Let mold sit until the resin has cured. If there are large sprues the parts can be removed a little earlier as the sprues are easier to remove when the resin is not fully cured.



Squish mold



Injected Mold