

# **A Step by Step of the Dung and Clay Method of Mold-Making**

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## How to Mix the Layers of the Dung-Clay Method of Mold-Making

You will need:

- sieve of fine mesh, medium mesh and coarse mesh (for the dung and grog)
- bowls
- gloves (optional)
- dung
- red fireclay
- fine, medium and coarse grog (or use crushed already used molds and sieve through appropriate sieve)
- water

### Mold Wash:

Make some mold wash by mixing powdered graphite and denatured alcohol together. The consistency must be between water and maple syrup. To test if you have the right proportions of graphite and denatured alcohol, brush some mold wash on the cup of your piece. If you can see the wax through the mold wash, your mixture is too thin and more graphite must be added. If you cannot see the wax, but you see the brush strokes from the brush, your mixture is too thick and more denatured alcohol must be added.

### Slurry Layer: 1 part red fire clay, 1 part graphite

The slurry layer consists of equal parts powdered graphite and red fire clay. Water is added until the mixture is the consistency of thick lotion. You want it to be thick enough that you can add it on with a paintbrush and make it 1/8 to 1/4 inch thick, but it must be smooth enough to pick up all the fine detail in your wax pattern. Make sure to get all the clumps of graphite and clay out. This layer must be as smooth as possible.



### Fine Layer: 1 part red fire clay, 1 part fine dung, 1 part fine grog

The fine layer is made up of equal parts fine dung, fine grog and red fireclay. To make fine dung, sieve chunks of dung first through the medium sieve and then through the fine sieve. If you just put the dung through the fine sieve, it takes twice as long. Combine the fine grog, fine dung and the red fireclay into a bowl. Add water until you can squeeze the mixture into a clump without it cracking. The consistency should be that of cookie dough. You want it to be wet enough so you can mold it around your pattern, but dry enough so it won't slide off because of gravity.



**Medium Layer:** 1 part red fire clay, 1 part medium dung, 1 part medium grog

The medium layer is made up of equal parts medium grog, medium dung and red fireclay. To make the medium dung, sieve chunks of dung through the medium sieve. Combine the medium grog, medium dung and the red fireclay into a bowl. Add water until you can squeeze the mixture into a ball and it doesn't crumble. The grog in the medium layer makes it slightly harder to apply, but if you need to you can add a little more fireclay to make the mixture stickier.



**Coarse Layer:** 1 part red fire clay, 1 part coarse dung, 2 parts coarse grog

The coarse layer is made up of one part red fireclay, one part coarse dung and two parts coarse grog. To make the coarse dung, just break up the chunks of dung into smallish pieces, about the size of a nickel or a quarter. Combine the coarse grog, coarse dung and the red fireclay into a bowl. Add water until you can squeeze the mixture into a ball and it doesn't crumble apart. The amount of grog in the coarse layer makes it a bit difficult to get it stick together and to apply, but if you need to you can add a little more fireclay to make the mixture stickier.



**Final Layer:** 1 part coarse grog

The final layer is just coarse grog.

## How to Apply the Layers of the Dung-Clay Method of Mold-Making

You will need:

- spray bottle
- gloves (optional)
- pieces of scrap cardboard
- your waxes

To start off:

It's a lot easier in the process if you mix all of the layers before hand, that way you don't have to worry about each layer drying out too much while you mix the next layer you need to use. As you go from slurry to coarse, you will need more of the layer. About twice as much medium and coarse layers than slurry and fine layers. Also it helps if you make it so your pattern and the gating system are able to stand up on it's own. I attach my waxes to little pieces of cardboard by melting the bottoms of the cups and then sticking it right to the cardboard. This way they are easily transportable and I can even hold my piece by the cardboard when I'm doing the first layer.

### Step 1:

Have your wax pattern ready to go. That includes your piece sprued and simply gated. The cup must be at least half of the volume of your pattern. Since the dung in the dung-clay mixture leaves pockets of air when it's burned out during the wax melt-out process, this type of mold breathes more than a sand, investment or ceramic shell molds. Notice the vents in the pictures below. Since the tips of most of my pieces are thin, I decided to vent them (left and middle picture). But on my thicker piece, I chose not to use a vent (right picture). I can do this because the molds breathe and the gasses are able to escape through the air pockets the burnt dung leaves.



## Step 2:

Brush mold wash onto your entire pattern.



## Step 3:

Next you add the slurry layer. Make sure it is just a light coating of slurry layer. Try to get the thickness as even as possible all the way around the piece. Wait until this layer is tacky to the touch (but not stiff!) until you add the next layer. If the slurry is too thick (second picture below) then it will crack and a lot of flash in will occur.



TOO THICK!

#### Step 4:

Apply the fine layer next. This layer needs to be about 1/4 inch thick. Make sure to squish it well into the first layer so they stick together. You want the layers to merge where they touch each other so when they dry there is no separation between layers.



Applying the fine layer



Applying the fine layer



The fine layer completely applied

#### Step 5:

Next is the medium layer. It needs to be about 1/4 inch thick. If the fine layer is firm to the touch the mold is too dry. Spray the mold with a spray bottle of water before applying the medium layer. As with applying the fine layer, make sure to press the layer on well so that the medium and fine layers merge at the point they touch.





Spraying the mold with water before adding the next layer.



Adding the next layer.



**Step 6:**

Next add the coarse layer, also about 1/4 inch thick. This layer is the trickiest because it's so dry from all of the grog. You may have to spray the mold before adding the coarse layer so it sticks.



Part of the coarse layer applied.



Final grog layer applied

**Step 7:**

The final layer is just coarse grog, applied as a coating on the outside of the coarse layer. This helps draw out the moisture from the inside layers of the mold.

## How to do the Wax Melt-Out Charcoal Kiln of the Dung-Clay Method

You will need:

- bricks (hard or soft)
- blower
- pipe (steel)
- sand
- scrap bricks or brick/kiln shelf chunks
- bot mix (see recipe below)
- kiln shelf pieces in various sizes
- charcoal (hard wood charcoal works best)

Bot Mix Recipe:

- 1/3 part sawdust
- 1/3 part clay
- 1/3 part sand
- beer

Consistency of the bot mix should be sticky enough to be able to make sausage shapes.

### Step 1:

Set 4-5 inches of sand on the ground where your kiln will go. Lay out kiln shelves for the bottom of the kiln. Hard bricks should be stacked for the walls. Make sure a small tuyere is left at the front of the kiln for the pipe to fit into. The kiln should be the size of how many dung molds you have to melt out. Place the molds into the kiln onto pieces of bricks or kiln shelf to raise the molds off the bottom of the kiln. This is so the wax can easily melt out of the mold. Taller molds should be towards the back where the flue is located.

Building the kiln with bricks for the walls. The molds are set on bricks so they are raised enough for the wax to melt out.





The tuyere left for the pipe to fit into.



The flue at the back of the kiln.



If there are any significant holes/spaces between bricks use the bot mix to seal them. This helps keep the heat in the kiln.

## Step 2:

Place the pipe into the airing space built into the front wall of the kiln. Attach the blower to the pipe, but do not turn the blower on yet.



### Step 3:

Once the kiln is built and your molds are in it's time to light the charcoal. Take a propane torch and light the charcoal. Once lit, carefully dump the charcoal into the kiln making sure to get some in every space on the bottom. Add unlit charcoal on top of the lit charcoal and place a kiln shelf over the top of the kiln. Turn the blower on.



### Step 4:

Once the charcoal is sufficiently burning turn the blower off. Wait until the charcoal becomes embers, roughly 1.5-2 hours.



**Step 5:**

When ready to pour, pick the molds up with tongs and pack them in sand, just like you would with ceramic shell. Pour. Let cool. Break open.

