



## KILN CAST TABLE TOP: Glass for Art and Architectural Applications



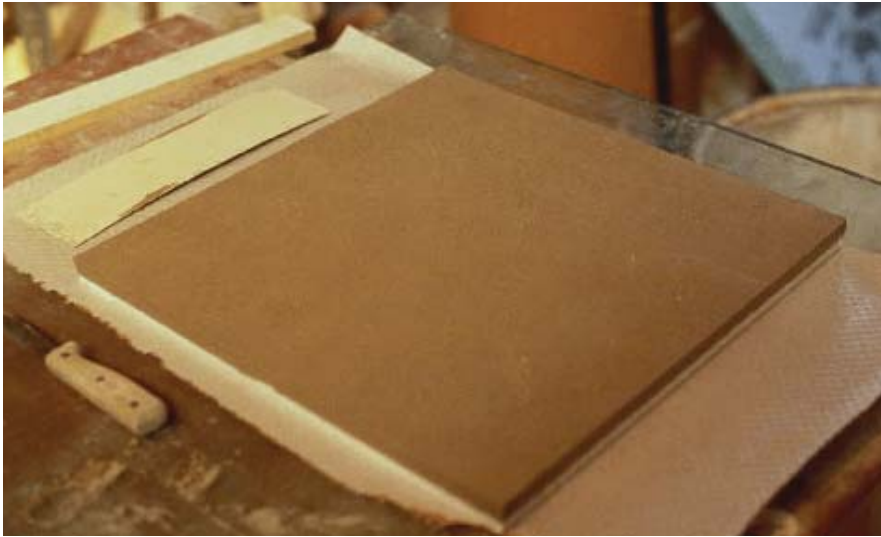
Table top is 15"x15"x $\frac{3}{4}$ "

### ..... **Overview of this project**

This project demonstrates how to make a 15"x15"x $\frac{3}{4}$ " bas relief cast glass table top with clear casting glass using colored elements for decoration. The colored elements can be frit, rods, sheet pieces, stringer, noodles or twisted cane. It will weigh approximately 16.5 lb (7.5kg).

### **The basic steps are:**

- A clay positive is formed
- A mold box is built
- Mold mix is poured over clay
- The mold box and clay are removed from the mold
- The mold is filled with glass
- Firing and Annealing
- Break away the mold to reveal the finished piece



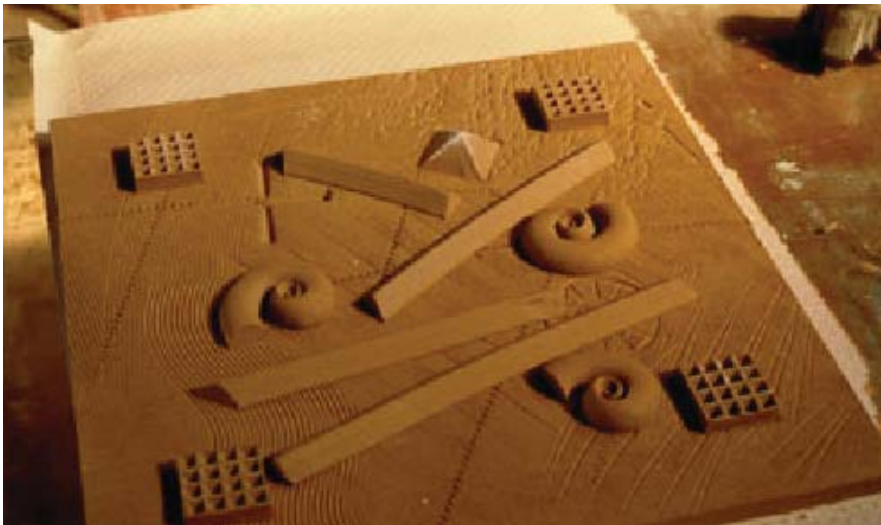
Step 1

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**Step #1 Form a clay positive**

A 0.75" thick slab of clay is rolled out for the positive model.

Place clay on a sheet of heavy paper on top of a smooth flat surface, such as a Formica topped counter.

The slab will be the size and shape of finished piece.



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**Step #2 Detailing clay positive**

A variety of relief details are possible including undercuts and extremely fine details. Finer clays will give more detail while coarser, rougher clays yield less detail. This "break-away" mold process requires no mold release coating.



Step 2



Step 3

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**Step #3 Build mold box**

Trim away excess paper around the perimeter of the clay positive. Set up a mold box around the clay using  $\frac{3}{4}$ " thick boards on all four sides. Leave about  $\frac{3}{4}$ " clearance between the edge of the clay and the mold box. The height of the mold box should be  $\frac{3}{4}$ " above the highest point on the clay positive.



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**Step #4 Apply splash coat**

Use "Splash Coat Mix" (50% 200 mesh silica sand or flint and 50% pottery plaster) to face the positive with a creamy layer approximately  $\frac{1}{16}$ " to  $\frac{1}{8}$ " thick. Pour a steady thin layer trying to flood it on and not trap air.

The Splash Coat is soft and will keep the fine details of the cast. All materials should be at room temperature.



Step 4



### **Step #5 Fill mold box with mold mix**

Use "Uroboros Mold Mix" to finish filling the mold volume. It is a stronger, coarser material than the Splash Coat. Mix and water should both be at room temperature.

The mold mix should have the consistency of heavy cream. It should flow into the mold box, not so runny that it flows under the box, and not so thick that it traps air.



Over fill mold box slightly.

When the mold mix is starting to set, use a straight edge to screed off the surface leaving it flat. This insures the top surface is parallel to the bottom. It is this flat surface that will be flipped over and placed onto the kiln shelf.

Let the mold set up undisturbed.



Step 5



Step 6

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**Step #6 Remove clay**

After the mold has set, the mold box is removed. Allow mold to set at least 30 minutes more before flipping over and removing clay. Save clay for weighing when calculating glass weight later. Wash mold gently to remove any clay residue, any small repairs or changes to the mold face can be done at this time using the Splash Coat mix.



Step 7

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**Step #7 Dry mold**

Air dry mold (with or without forced air or heat) for several days. This releases a large amount of water. After air drying finish drying the mold upside down in your kiln. To kiln-dry your mold ramp 1 hour to 200° F, hold at 200° F for 1 hour, ramp to 600° F over 6 hours, hold at 600° F for 2 hours then turn off the kiln and let it cool.

The plaster mold should be as dry as possible. When the mold is really dry, it will be more stable, be less apt to warp during the glass cast firing and leave a cleaner glass surface. However because the molds are so dry, they have to be handled with care. Try not to handle them too much. If possible just turn them over and fill.



## Step #8 Filling mold with glass

When filling a mold with glass consider the type of glass used and the form of the glass used.

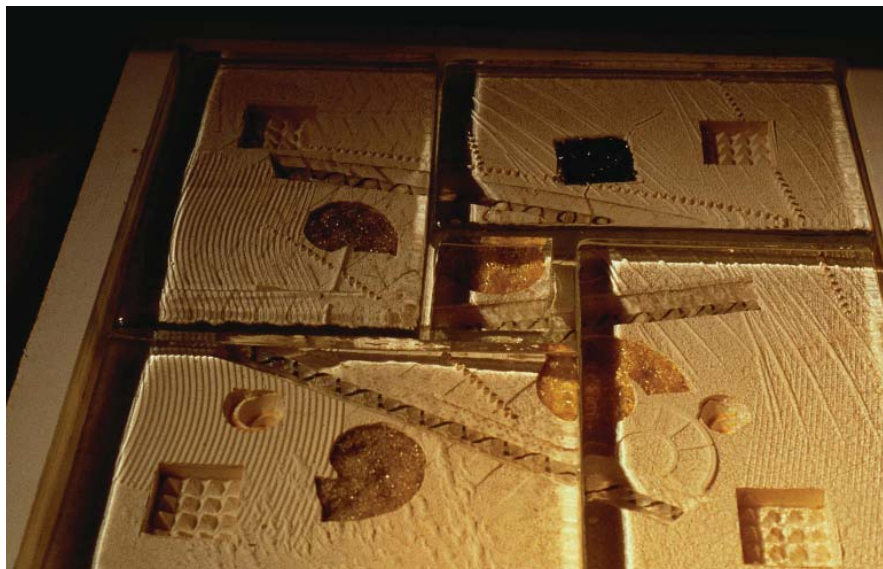
### Glass Calculation

Filling molds requires some calculating. It is necessary to determine the volume of glass needed to fill the mold volume. Weigh the clay removed from the mold then add 30%. This weight should be the corresponding glass weight needed. For a simple square or rectangular shape, fill volume at the rate of 2.8 grams per cubic centimeter or 160 lb per cubic feet.

Once the amount of glass is known, place the glass in the mold covering the entire mold surface. If using billets or sheets to fill your mold, leave a slight gap between the glass and the mold walls. This will prevent "touch" points from forming, which can be very sharp.

Stack the remaining glass in a shallow mound in the center and over deep cavities. As the glass starts to melt it will flow down into the mold details and then flow out to the mold wall and level out. Mounding the glass in the center provides enough material to move toward the mold walls first and then to roll up the side, forming a nice smooth edge.

When using sheet glass or billets, make sure the glass is clean! Dust and contaminants like fingerprints can show up in the final cast as devitrification.



Step 8  
Rods and frits in various sizes and colors create color spots. Clear billets are arranged on top. Note extra square in the center.

## Kiln Profile

Segment Number	Ramp in Degrees F/Hr	Setpoint (Degrees F)	Soak Time
1	150°	1250°	150 min
2	150°	1450°	<45 min
3	AFAP	960°	360 min
4	12°	775°	0
5	24°	500°	0
6	75°	75°	OFF

\*AFAP (as fast as possible)

## Step #9 Firing Schedule

This Firing Schedule is for this project using casting billets, and assumes a 1½" thickness for the thickest parts.

Vent the kiln until it reaches 1000° F to allow vapors to escape.

Slow and careful are the watchwords for successful casting.

Uroboros has other excellent firing schedules, in table format, downloadable from the "Tech Center" tab of our website. The schedules cover ⅛"- 6" thick castings.

A cast mold is an excellent insulator, so the glass can cool through the top only. It will take some time to cool, especially if the the work is large, thick or complex.

When cooling, don't open your kiln too soon. The risk of breakage is highest when the interior of the piece is warmer to the touch than the edges. Waiting longer to unload is better than unloading too soon.

Segment Number	What's going on in the firing
1	Mold must be dry. Time spent soaking here pays off later in the firing. Let the kiln and contents soak to even out the temperature.  All kilns are different and these temperatures may need some adjustment. For example, 1250° in one kiln may read 1270° in another.
2	Ramp up slow enough to squeeze the air out as the glass flows into the relief and out to the mold walls. The glass is slowly getting softer so any bubbles are being held under the surface. At the soak point the glass is being given the time to melt and level out.
3	Quick cooling here minimizes surface divitrification. The long soak allows the glass and the mold to equalize temperature before entering the annealing range.



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**Step #10 Breaking the mold away from the glass.**

This is the fun part. You finally get to see the finished piece! Molds made with Uroboros Mold Mix can be broken away by hand quite easily. Care should be taken with fine or fragile details. Running water and a stiff brush will scrub off remaining mold bits. Also, a pressure washer works well to remove any mold bits from rough surfaces or deep cavities.



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**Types of glass**

There are a variety of glasses that can be used in kiln casting.

Uroboros offers the FX 90 and System 96 palettes. Both are specially formulated for hot glass work and designed to be fluid in a large range of kiln casting temperatures. This property allows the glass to flow and fill your mold.

Uroboros glass products resist devitrifying and have good mold release characteristics. Choose the form that will work best for your particular project.





Sheet glass stacked in a mold

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**Forms of glass**

**Sheet glass:** Available in Opal and Transparent colors sheet glass can be cut and stacked to fill a mold. This can be labor intensive and can trap air but allows good control of design elements and color placement.



FX90 clear casting billets

**FX 90:** Casting billets, 6"x9"x $\frac{3}{4}$ " clear glass "bricks", are a way to get very clear, pure castings. The Uroboros FX 90 casting billet formula is specially designed for kiln casting.



System 96 billets

**System 96:** Casting billets, 7"x7"x $\frac{3}{4}$ " in clear and a range of colors that are designed for thick cast designs.

Casting billets are a good choice when casting large-scale tiles, slabs, or architectural elements. They are specially formulated to resist devitrification, have low veiling (this is the touch-line between the billets). And, because they are already  $\frac{3}{4}$ " thick, allow you to create thick, low bubble count castings quickly and easily.



**Frit, Noodles and Stringer:**

Both the FX 90 and System 96 palettes have a wide range of colors, transparent and opal, to be used in your casting projects.

Frit



**Rods:** System 96 has a growing palette of rods in transparent and opal colors. Straight or curved they can be very interesting in kiln cast work. Available in 6mm and 10mm diameters.



Slumped and curved rods