

# Concrete Countertops for the Kitchen - Solid Surface on the Cheap

by [doubleabattery](#) on July 20, 2007

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## Intro: Concrete Countertops for the Kitchen - Solid Surface on the Cheap

So I wanted to redo the kitchen in my 1916 Foursquare and I was bored with all the countertop options. Unless you're getting formica, they all cost about the same as granite or marble, look just like granite or marble, and are as typically typical as granite or marble.

The one material that I found was much more customizable than the other solid surfaces was concrete. The colors and textures are endless, you can mold it into just about any shape you can imagine, and it retains the advantages of solid surfaces. But it's concrete, so it must be cheaper than milled stone, right? If you have a professional do it for you, it can actually cost MORE than other solid surfaces...do it yourself, and you can save a bundle. I priced granite countertops in my kitchen and they came out at around \$4,000. My custom concrete counter tops ended up coming in at below \$800, including the rental of the concrete mixer.

Now before you get ramped up and ready to pour, I will preface all of this with the drawbacks to doing your own concrete countertops.

+ This is not a project that can be completed in a weekend. No matter how small the countertop is, there's at least a 10 day curing process which you will need to do your grinding and polishing in.

+ Concrete needs to be properly sealed at the beginning and waxed about every 30 days to avoid staining.

+ The final outcome might not be exactly what you expected, especially if you're doing it for the first time. The good news is that there's ways to remedy many outcomes that you may not like.

I highly recommend that you buy the book [Concrete Countertops by Fu-Tung Cheng](#) before attempting ANY concrete countertop project. Fu-Tung Cheng is the Master and if you're looking to be the Karate Kid of concrete countertops, buy this book. Ralph Macchio wouldn't even think of doing concrete countertops based on my instructable.



## Step 1: You'll Need (Good) Help

As you'll see in this instructable, I've got the assistance of Mr. P, an evil genius (albeit "special") who lends his raw power and expertise to the project. There are many steps that can be accomplished solo, however concrete is heavy and expect to need anywhere from 2 to 4 people to help move around your countertops on more than one occasion. You'll need at least 3 people involved in your pour. It's best to cure the countertops inside a garage, however grinding and polishing them is very wet and messy, so you'll want to do that outside. Then you'll need to install them in place, so prepare to have people available to help at different times.

Note from Mr. P: If a substance does not have a MSDS, testing should be carried out before prolonged exposure. Not all methods of testing are OSHA approved. With all due sincerity wear a mask, gloves and safety glasses when mixing concrete or using adhesives and solvents.



## Step 2: Make A Template

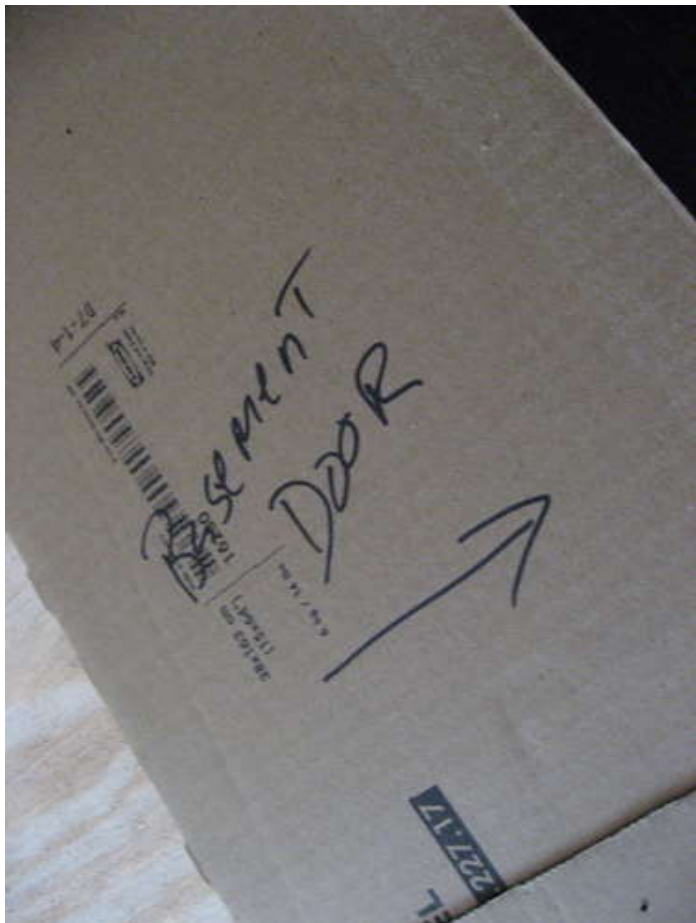
Templates are a necessity, especially in an old house like mine where settling has caused the walls to be out of square. It also takes a lot of guesswork out of the process and believe me - the last thing you want is to spend lots of money and time on your countertops to find that they won't fit because you were off by 1/8".

Cheng uses doorskin for his templates, but I had plenty of cardboard boxes left over from my IKEA cabinets, so I recycled them into templates. I made sure to use the factory cut edges of the cardboard around the perimeters of the and inside the sink cutout to make sure it was all perfect. A glue gun works great for putting the template together. While forming the templates, I allowed for a 1 1/2" overhang from the cabinet face and a 1/8" overhang around the sink cutout.

You'll notice that I reinforced my cabinets with 3/4" plywood and also did a plywood top to add support to the concrete. This is a necessity for anything as heavy as concrete and I wouldn't recommend skipping that step. Depending on the construction of your house this may not be necessary, but I also supported my floor underneath the island with steel supports in the basement to compensate for the added weight.

Make sure to label your templates so you'll know which sides are what. This can be a huge time saver since edges of the countertop that aren't exposed, don't need to be ground and polished.

As you can see, Mr. P is very proud of his work.



### Step 3: Building The Mold

The mold is the most important part of the whole process, however it's also one of the only parts of the process that you can take your time with and rework if it isn't right. Make sure that every detail is thought through before you start pouring.

The best material to use to build your mold is 3/4" Melamine since it is perfectly smooth and straight and, if properly built, will hold water without swelling up. You'll need to use a tablesaw with a fine tooth blade so that it will rip down the melamine without chipping or splitting it.

The minimum recommended depth of a concrete countertop is 2" if you're going to add some sort of metal support for it. Since I don't have any significant overhangs, I'm just using standard concrete wire mesh. If your countertop is less than 2" thick, you risk having problems with "ghosting" from your supports - lighter areas in the concrete that are patterns of whatever metal you used.

We ripped several long strips of melamine down to 2 inches for depth and then used a miter saw to make our cuts to length. Then lay the template on the mold.

I CAN'T STRESS ENOUGH TO MAKE SURE YOU TURN THE TEMPLATE UPSIDE DOWN - YES, THAT'S RIGHT, THE TEMPLATE SHOULD BE FACE DOWN.

This is because you're pouring the countertop upside down. The top of your countertops will be the bottom of the mold. If you forget this step, as I did, your countertops will most likely not fit and might become a pretty little mini-patio in your backyard. Thankfully, I caught my mistake before the pour and was able to rework the mold.

We assembled the sides of the mold by predrilling holes every 3 inches or so then used a countersink bit so our screws would be flush with the top. The top of the mold needs to be perfectly flush so you'll be able to screed the concrete during the pour. Drywall screws are the easiest to use, but be very careful drilling them in. If you drill them too hard, they will split the melamine and ruin that side piece. This is especially so when you drill too close to the end of the piece. We reinforced the corners with blocks of scrap melamine since they would be under a lot of pressure.

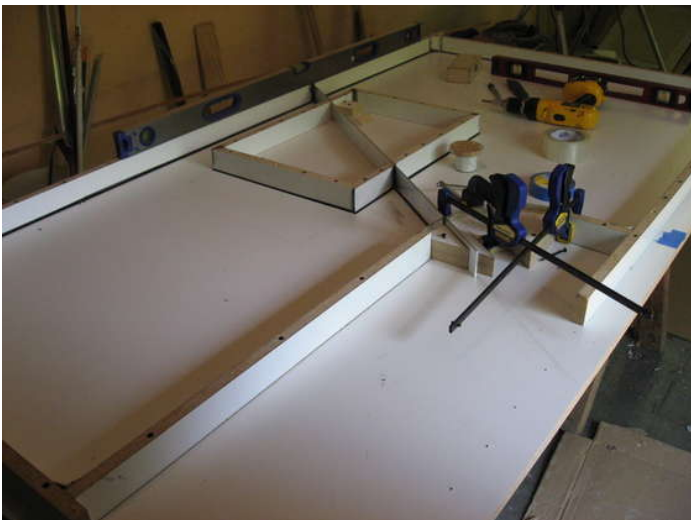
Due to the size of the island countertop I opted to do it in 2 pieces instead of one big one. There are a couple of reasons for this - one being that it makes it much easier to handle without an army of people. The other reason is that large spans of concrete are sensitive to shifting of weight over time and need intentional "stress fractures" (Go outside and take a look at your sidewalks). By separating it, you're ensuring that if there's any stress on the countertop, it will crack in the seam, which can be easily repaired and ground back down.

Instead of having a seam go straight through the middle of the countertop, I wanted to do it at an angle and highlight it with an aluminum strip. That way I could refer to it as a "decorative feature" instead of a "stress fracture". I bought a 1/8" x 2" x 12' strip of aluminum at Lowe's and propped up on the mold to decide what would look good, then marked it on the sides and template. We then used an angle guide to transfer the proper angles to the miter saw, where the sides and sink cutout were cut and then screwed in the mold with a 1/8" gap to allow for the aluminum strip to slide into the mold.

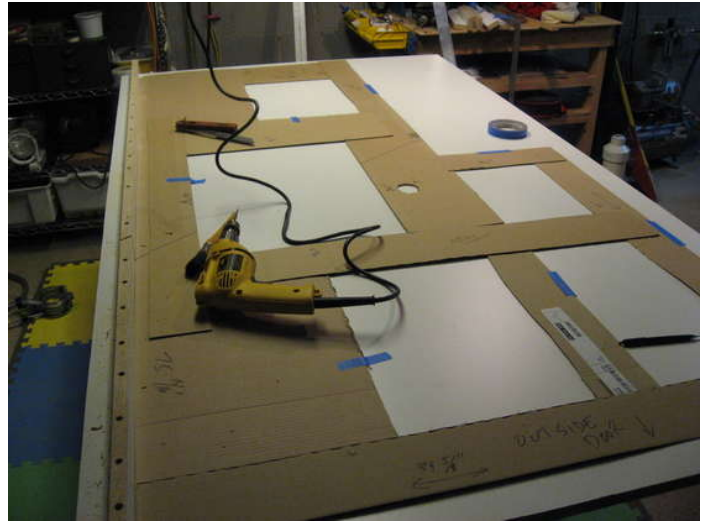
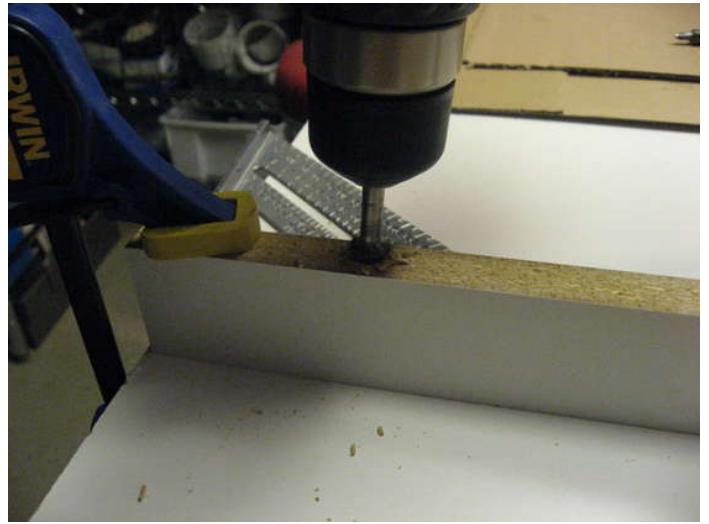
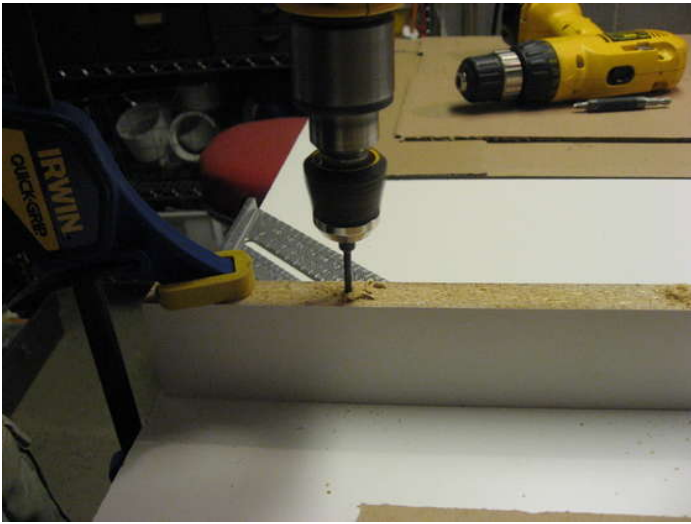
Another challenge was a big curve that I wanted to put in the countertop for a little barstool nook. To accomplish this, we cut the desired curve with a bandsaw out of two pieces of melamine that were screwed together. We then took the two side pieces of melamine that connected to the curve and used a table saw to cut a 1 1/8" by 2" notch in each of them. We cut a piece of 1/8" piece of plexiglass down to 2" then prepared to glue the plexi into the notches we cut in the 2 side pieces. Before you try gluing plexi to anything, it needs to be sanded so the glue will stick. We used 5 minute epoxy to glue the plexi in the notches and clamped them. After that set, we had 2 side pieces with a flexible piece in the middle that would conform to the curve we needed to make. We screwed in the curved melamine into place and spread epoxy over the back side of the plexi. We then bent the plexi around the melamine, clamped it into place, and then screwed the 2 side pieces into place.

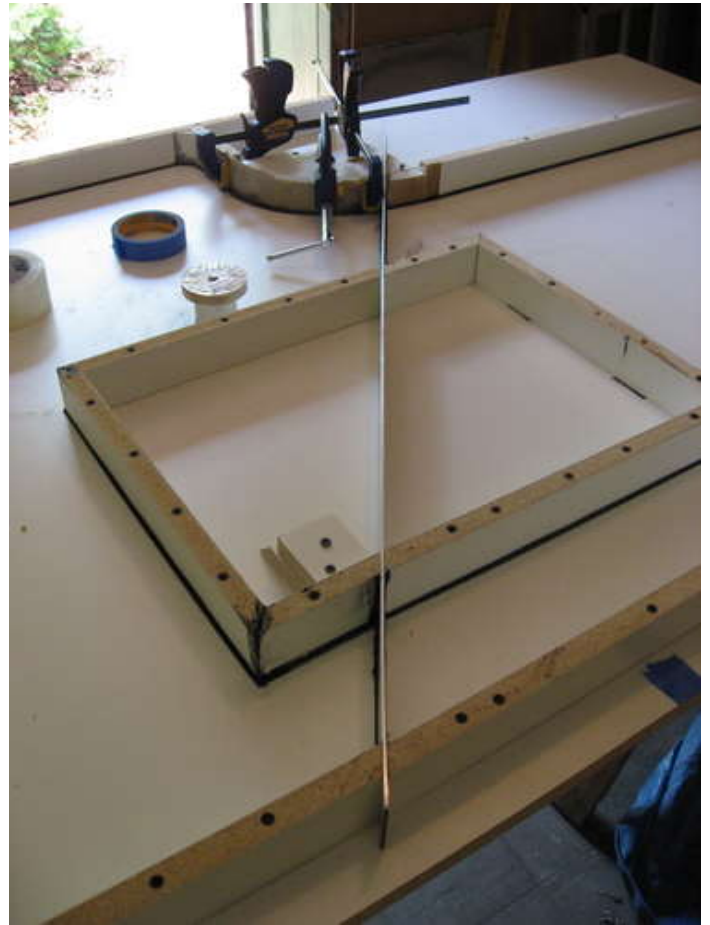
I wanted to have curved corners on the island so you wouldn't impale your gut if you walked a little too close. To do this, we took 2" PVC pipe and cut it into 1/4th with the band saw. By using a belt sander, we were able to sand down the edge till they were paper thin on either side. We then used epoxy and taped them down in the corners. This worked like a charm and was part of Mr. P's evil genius showing through. Mr. P Note-Evil is as Evil does-etoN P .rM

The last detail is a cutout hole for the faucet. One thing to keep in mind is that most kitchen faucets are made for 1.5" countertop depth. Not only is my countertop 2", but there's another 3/4" of plywood below that. For the cutout, I used PVC that the OUTSIDE diameter was smaller than the base of the faucet, but was big enough to get the hoses through. I cut it to 1.5" in length and then used a piece of 1/2" plywood circle so that when they were attached, they would be 2" tall. This allowed for a proper depth for the faucet, while also giving access for wrenches to screw it down.











#### Step 4: Preparing The Mold For A Pour

Preparing the mold properly for a pour is essential for many reasons:

1. It needs to be watertight so that it will hold the wet concrete without leaking.
2. Every detail in the mold will transfer to the countertop. Even the slight texture on the melamine will be the same texture on the countertop when you first break the mold.
3. It must be supported well and level. You will be pouring hundreds of pounds of concrete into the mold, so you must make sure it doesn't buckle or bend under the weight. Also, you're going to need to vibrate the concrete, so it needs to be screwed to its support.
4. The concrete will start setting in 30 minutes. You'll need to work fast once the concrete is mixed so you'll want to make sure the mold is fully prepared.

I don't have any pictures of this, but you'll need to properly seal the mold using silicone caulk. I used black caulk so you could see it against the white melamine. You want the caulk to have extra clean edges, so I used blue painters tape on either side of the seams, backed off about an 1/8". After you apply the caulk, carefully remove the tape before it dries and you'll have super clean edges that will require minimum grinding. You'll want to let the caulk dry overnight.

You also need to make sure that any cut sides of melamine that will be exposed to wet concrete need to be sealed so they won't swell up with moisture. To do this, I sprayed spray adhesive on the exposed edges, then put down clear packing tape on it. I trimmed the excess tape with an exacto. To avoid getting excess spray adhesive in the mold, I used a straight piece of cardboard to shield the overspray.

The tape covered up most of the screw heads in the mold, however there were some that were still exposed. Since you need to remove the screws to break the mold, make sure that any exposed screw heads are filled with some type of clay or putty (plumbers putty, plasticine clay, etc.). This will avoid the concrete getting into the screw heads, making it next to impossible to unscrew them.

To support the mold, I used 2 very stout sawhorses with 2 sheets of 3/4" plywood stacked on top of each other and then drilled into the sawhorses. I then laid the mold on top and screwed the edges of the mold into the plywood. For added support, I took some scrap pieces of wood, cut them to size, and screwed them in around the edges of the mold.

I didn't have any significant overhangs with my countertop, so I didn't use rebar to support it, however I wanted more support, so I used 2 flat sheets of concrete wire mesh. I cut them to size then stacked and offset them, tying them with wire. You'll also notice I stacked two pieces of styrofoam to make 1" spacers off the bottom of the mold. Remember that if the wire mesh gets too close to the bottom or sides of the mold (which is the top of your finished countertop), you will have problems with Ghosting. By using spacers, we're ensuring that the mesh will be halfway in the middle of the countertop. Also make sure the mesh is 1" away from all edges of the mold.

Now that I had the support cage made I lifted it out for final preparation. First off, I vacuumed the mold and cleaned it thoroughly with rubbing alcohol. To add further personalization to the countertops, I wanted to embed coins from places that my wife and I had traveled to. This was easily accomplished by rubbing a bit of caulk on the side of the coin I wanted exposed and arranging them face down on the mold. The caulk gives just enough adhesion to keep the coin in place during the pour and I didn't have to wait for it to dry. Mr. P Note-Remember the side of the coin that is facing down will be exposed when the countertop is finished-in other words the side you put the silicone on will be exposed.-

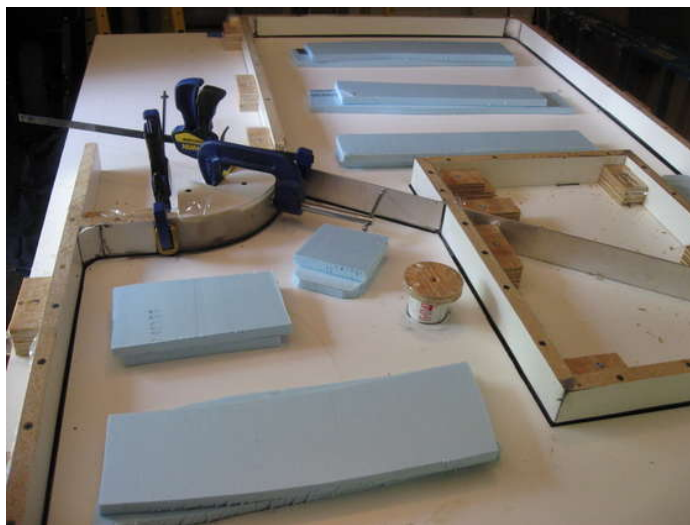
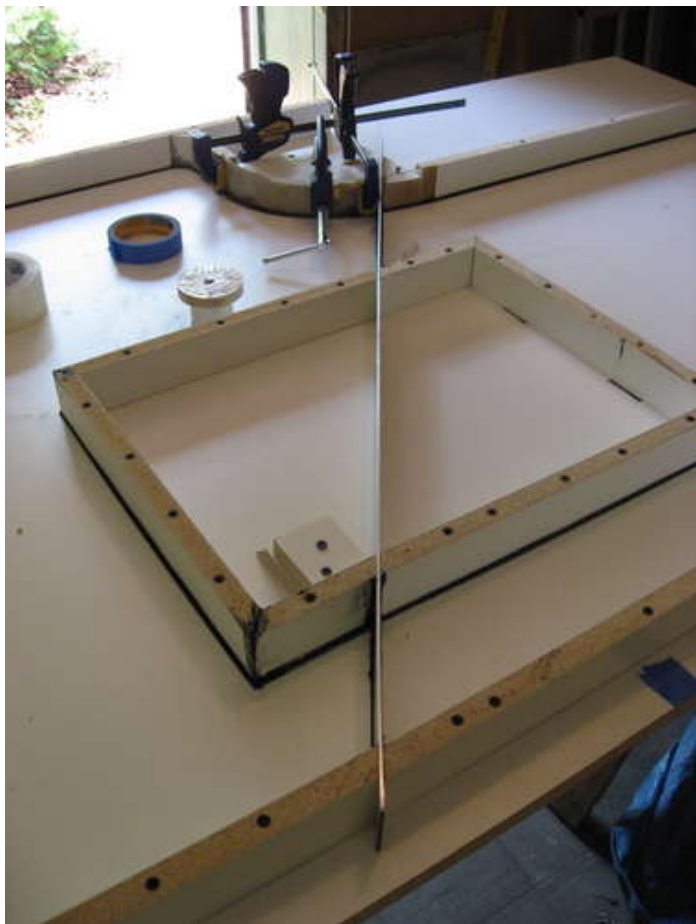
The next step was to put the styrofoam spacers back in the mold, lay the cage down, and then tie wire to support the cage once the spacers were removed. I put screws around the outside edges of the mold so I could tie the wire around around the heads and then wrap them around the edge of the cage. Once all tied off, I slid the spacers out from under the cage which wall now suspended off the bottom of the mold.

<http://www.instructables.com/id/Concrete-Countertops-for-the-Kitchen---Solid-Surfa/>

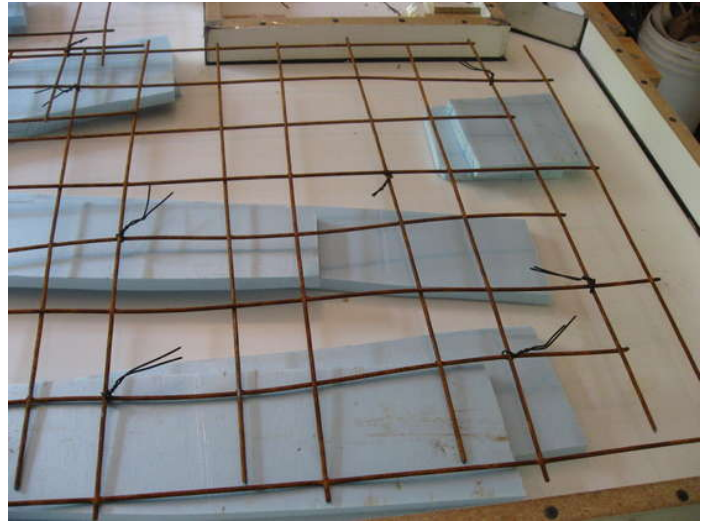
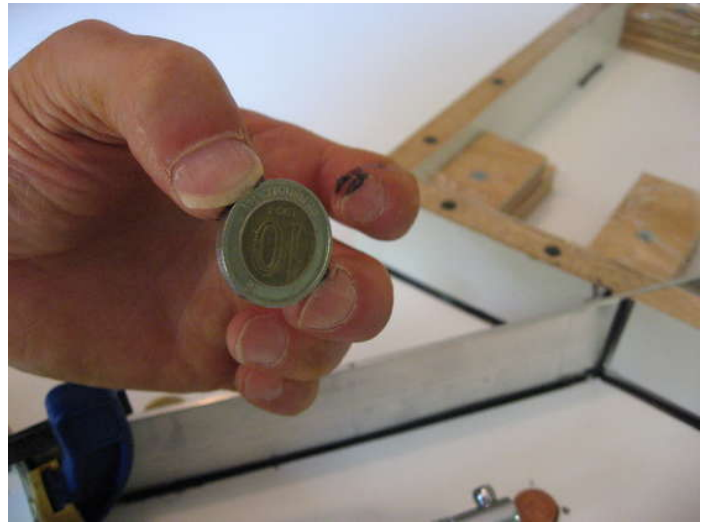


The other addition to my countertop was to have crushed blue glass in it which matched my blue glass mosaic tile in the kitchen. I purchased the glass from Cheng, however you could crush your own glass if you like. The directions suggested spraying spray adhesive on the mold so it will be tacky before putting down the glass. I did this and even though it doesn't stick the glass very hard, it makes it tacky enough so the glass won't pool together when the concrete is poured. Also, make sure the tip on your can of spray adhesive is clean. Mine wasn't and it put little bubbles on the mold which transferred to the countertop. I then dispersed the glass as evenly as possible.

I was now finally ready to pour!









### Step 5: Pouring the Concrete

The day of the pour has finally arrived and to top it all off, our friendly neighborhood Home Depot rented us this beautiful, brand new virgin concrete mixer for 50 bucks for the day. That's right, we were the first ones to use this fine machine and Mr. P was anxiously awaiting to put it through its paces.

I ended up buying Cheng Pro-Formula Mix off the website because this was my first pour and I didn't want any surprises. The kits come with everything you need, minus bags of Quickrete 5000 that you can buy at any Home Improvement store. It has the color tinting, support fibers, and water reducers to make the concrete perfect for countertops. I highly recommend this for first timers.

You'll want to make sure to have gloves and masks while your mixing concrete since it is very dusty and messy. It's also a good idea to have 3 people during the pour so one person can be cleaning up the mixer and tools while the others are pouring it.

We followed the instructions that came with the kits to mix the concrete and then started rolling wheelbarrows of concrete into the garage. At first, we gently put in the concrete with our hands so that we wouldn't disturb the crushed glass. Once the glass was covered, we used a shovel to load it in. Only fill the mold half full before you stop to vibrate the concrete.

You must vibrate the concrete if you want to avoid air bubbles that will create voids in the countertop. There are commercial concrete vibrators, however I found that rapping rubber mallets along the bottom and all around the mold seems to work best. It really wears you out using the mallets, but you'll soon see air bubbles popping out along the surface, so you'll know it's working. Cheng also recommends using an orbital sander with no sandpaper on it to vibrate the concrete. I tried this and it worked ok around the sides of the mold, but didn't do much along the bottom.

Now go ahead and fill the mold with the rest of the concrete making sure to add a bit more than the mold can hold. Use a straight piece of lumber or melamine that is long enough to span the mold to screed the concrete. Start on one side and push the screed back and forth along the sides till you go all the way across the mold for a level finish. Make sure you fill any holes where the concrete might have been low and re-screed it. Go ahead and start vibrating the concrete again. Make sure you've vibrated it as good as possible...it took me about 10 minutes of swinging the mallets before I felt that it was vibrated properly.

Now you wait...and watching it doesn't make it dry any faster.

The ideal curing conditions are in a humid, shaded area between 70 and 90 degrees fahrenheit. I chose to have it cure in my garage, since it stays in those conditions through the summer. It's recommended that if the temperature is below 50 degrees, you get some sort of heating for proper curing. It's also not good to cure in the sun because it will dry out too quick and be more likely to crack. I waited 4 days before moving onto the next step. Can you imagine Mr. P's anticipation?Mr. P Note- Unbearable!!-







## Step 6: Curing and Finishing

There's a window of time that is ideal to take advantage of if you're going to be grinding and polishing your countertop. After 4 days, the concrete is stiff enough to break the mold. After 10 days, the concrete has reached 95% strength and will be more difficult to grind. Concrete reaches full strength after 28 days. I made sure that all my grinding and polishing was done within that 6 day period which made my job easier.

After 4 days of curing, I started unscrewing all of the screws in the mold. Make sure that you get all of them and it should go fairly smooth. Don't put any pressure on the green concrete by prying against it, as you will risk chipping or cracking. Once you get all the sides off, you'll need at least one other person to lift it off the bottom of the mold. It should pop of the bottom fairly easily, then prop it up on it's edge. I then laid down strip of the styrofoam and laid the countertop right side up on top of it. This props the countertop off the bottom so you can get your fingers under it and it also makes it easier to grind the edges.

If you want your countertop to be a solid color, you can skip the grinding process and move right on to polishing. Both processes require using diamond coated grinding pads with a wet grinder, however there's less time involved in polishing. I wanted to expose the aggregate and glass in my countertop, so I chose to grind first. There's ways to get around using a wet grinder, like using a regular grinder/sander with the diamond pads and having someone else use a hose, or poking a hole in a gallon jug and letting the water run out as you grind. If you choose to take shortcuts, PLEASE make sure you are on a properly grounded electrical circuit and you're plugged into a GFCI socket. This is an extremely wet process - you will be soaked from head to toe - and as we all know, water and power tools don't mix.

There's also the option of using air tools to avoid the problem of electricity which I thought was the perfect (and cheaper) solution. So I bought [this air wet grinder](#). It seems like a great little tool, but I never got a chance to use it because I failed to realize it requires 8 SCFMs to operate. For those of you who aren't up on your air compressor lingo, which I obviously wasn't, that's ONE BIG HONKIN' AIR COMPRESSOR. The only air compressors I could find that could push that much air were in the \$550 to \$800 range. My little pancake compressor wouldn't even get close. The good news is that for anyone who does have an air compressor that can push 8 SCFMs, I'll sell you my air grinder....cheap.

So I went the pro route, I bought a Hellcat Wet Grinder. Not only did this make a rather time intensive job much easier, but it's double insulated from water and has an additional GFCI on it for added protection. Of course, you'll need a set of diamond pads, [which I found very cheap here](#). The only pads didn't use were the 3000 grit and buffing pads, so I found this to be a really good value. They will also last for multiple projects, so you may want to talk a buddy who also wants new countertops if he wants to split the cost of the grinder and pads. I tried that with Mr. P but he didn't fall for it...curse him for his evil geniusness. Mr. P Note-Beelzabubba didn't raise no fool.-

Again, this is an extremely wet process. Water mixed with ground concrete dust flies everywhere, so I chose to move the countertops outside. You'll want to wear rubber gloves and rubber boots to give added protection from shock. Mr. P Note-Some people consider this a fashion forward look, not many, but some do.-

I started grinding with a 50 grit pad. I slowly moved it forward and backward, then from side to side. Almost as soon as you grind, you'll start seeing aggregate being exposed. The first pad is the most difficult because your grinding down the most with it. Continue grinding until you have the desired aggregate exposed. One thing that is important is to keep your grinder as flat as possible on the surface, especially with the rougher grit pads. You can get some deep marks in the countertop if you don't keep it level.

I then went with the 100 grit, then 200 grit, then 400 grit. 400 grit is considered to be the last pad that's considered "grinding". Finer pads start adding more of a sheen to the countertop. I then used a concrete slurry to fill any holes or tiny gaps that were in the countertop. This slurry came with the Cheng Kit and was colored the same as my countertop. I just mixed it up with a bit of water and used a putty knife to apply it on the countertop, wiping off any excess with a damp sponge. After it dried, I then went back over it with a 400 grit pad.

I finished out the last 2 pads, which were the 800 and 1500 pads. Even though I had the 3000, Cheng doesn't recommend using it, as the sealer that comes with the kit needs a little bit of "tooth" in the countertop to penetrate and adhere. By the time you seal it and polish it with wax, it has the same or more sheen than using a 3000 grit pad.

The grinding and polishing is done! Almost.



### Step 7: Installation and Final Finish

I can't mention enough that concrete is heavy and you'll need people to help you with the final installation. I was able to move all of my countertops with 3 people, however that's because I did my biggest piece in 2 pieces. Make sure you have a battle plan of how you'll move it and set it down.

The weight of the countertops will keep it in place if you just apply a generous amount of caulk on your plywood top. If you'd like added support or live in an area where earthquakes are prevalent, you may decide to drill underneath into the concrete and use tapcons to secure it further.

I also wanted to hide the 3/4" plywood top that supported the countertop, so I bought 3/4" by 4' strips of galvanized steel at Lowe's. I just cut them down to size and glued them onto the plywood edges using Liquid Nails. It adds another decorative touch and looks great!

If you remember, I had that aluminum strip that I wanted to be an accent where the 2 island pieces came together. To do this, I cut the aluminum down to the proper length allowing it to stick up (and out) just slightly from being flush. I applied caulk to both sides of the aluminum and pressed the countertop together, sandwiching the aluminum and hold it in place. I then used 2 part concrete epoxy, which I spread over the aluminum and onto the concrete. After it dried, I ground it down with the wet polisher until it was perfectly flush with the 50 grit, then worked back up to 1500 grit to match the finish.

The Cheng Pro-Formula kit came with a penetrating sealer, which I applied according to the directions which were simple. I chose to add extra shine and protection by using polishing them with carnuba wax. The wax is heat resistant, so you can still put hot pans on the countertop without it burning, and gives added stain protection from acidic foods like wine and citrus. The wax needs to be re-applied about once a month in order to keep up the shine and protection.

So now I've got beautiful new countertops that I made myself! It was a lot of work and a fair amount of expense, however it was so much cheaper than granite and I was able to add details that you can't find in any other solid surface countertops. I'm going to enjoy my fruits of labor for now, but eventually I'd like to do an outdoor kitchen which will need countertops as well. I'll document that process as well when I get around to doing.

I hope this helps you with your project and I'll be more than happy to answer any questions you have, so feel free to ask. Major thanks goes to Mr. P and my brother who helped me with this project, I couldn't have done it without them.





