



Cement Dome Garage

by [Thinkenstein](#) on March 11, 2012

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Author: Thinkenstein [author's website](#)

I'm a refugee from Los Angeles, living in backwoods Puerto Rico for about 35 years now and loving it. I built my own home from discarded nylon fishnet and cement.

Intro: Cement Dome Garage

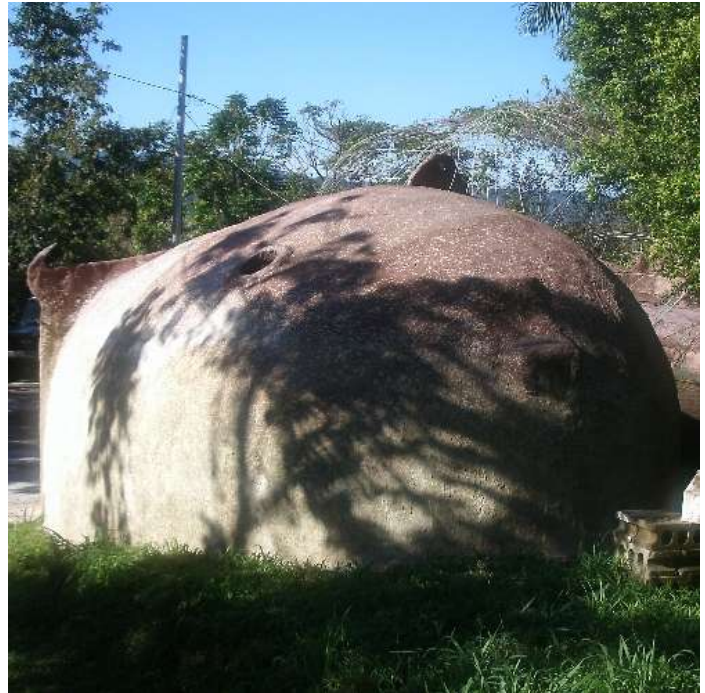
My old garage was too low for my latest vehicle to fit through the door. I decided to do a more tried-and-true design with a simple dome, using rebar and nylon-cement (nylon fishnet and cement).

The floor slopes a little, so I can roll out of the garage before starting up the engine. One avoids breathing some exhaust that way. Also, if the battery is low, I can push start it easily just letting it roll out of the garage.

The roof is treated with a cement-base sealer called Thoroseal, which is then protected by a layer of colored cement. The sealer and color coat can weather away slowly, but they doesn't peel or blister like paint and elastomeric sealers can. I am very happy with the longevity of that system.

I decided not to do an electrical installation, since I have electricity nearby and extension cords. There is a round skylight, a recycled glass table top.

I decided to not put any doors on the garage, but I did set gate hinges into the sides of the door opening in case I change my mind in the future.



Step 1: The Old Garage -- demolition

The old garage was made for a lower vehicle than my present one. It was an experiment, using "nylon-cement" (nylon fishnet and cement) to make a roof without using iron rebar. The fishnet was stretched out like a tent. Peaks were formed where the tent poles were. After plastering the fishnet, the poles were removed.

Cement is good under compression and bad under tension. A dome is all in compression. This old roof had a complex form, like an egg crate, that was not as simple to visualize. There were complex curves everywhere, but cross-sections sometimes resulted in lines that arched upward (resulting in compression) and sometimes downward (resulting in tension). Any point on the surface was often a result of both factors.

Just like an egg's membrane can hold all the broken pieces of eggshell together, I imagined the fishnet would be strong enough to hold the form together in case of cracking. It did. There were a lot of big cracks, though. Since my present vehicle didn't fit in the door anyway, I decided to scrap the old garage and build a new one.

In order to drop the roof, I broke the cement all around the top edge of the walls. It didn't fall until I went back around and cut all the fishnet with a machete.



Step 2: Site Preparation

I was nearing the end of my fishnet reserves, discarded cargo nets used by tuna boats for unloading their catch to the docks. Starkist Tuna, my source for fishnet over the years had moved off the island, so no more netting could be expected. Fortunately, the old nylon-reinforced floor was still useable. I eventually just did a mortar topping over the whole floor area, without using more fishnet. On the walls, I had to use some sun-damaged fishnet, but it was still strong enough to support the wet cement until it hardened.

You can see how I cut into the dirt to extend the floor area. The shallow trench is for the foundation. It doesn't need a massive foundation, because the thin-walled construction is relatively light weight. The walls will be only about 1 1/2 inches thick.



Step 3: Painting the Rebar

One problem with iron-reinforced cement construction is that the iron can rust, expand and break the cement. To help minimize that problem and add longevity to projects, I paint the rebar now. Best is to use a coat of rusty metal primer, and then a good rust paint top coat.

Painting rebar with a brush can be very tedious work, so I invented a way to run the smooth 1/4 inch rebar through a paint bath to quickly paint it. The dip tank is made of 3/4" PVC pipe. The rebar enters one end, is forced to pass through the paint, and when it exits the other end, it passes through a silicone rubber tip that scrapes the excess paint off and keeps it inside the dip reservoir. (See: <http://www.instructables.com/id/Put-a-Rounded-Roof-on-a-Square-House/step2/Painting-the-Rebar>).

For heavier rebar with the textured surface, I put it on a waist-high work rack and paint them with a small paint roller.

The 3/4" EMT drying rack is made of welded "H" sections of pipe with vertical "hinge pins" to connect them. The units can be reassembled into other configurations for craft fair displays, etc.



Image Notes

1. I support the dip reservoir from the top of pipe sections hammered into the ground.
2. The exit end of the pipe, with the silicone tip, attached with a hose clamp.

Image Notes

1. This is the entry end. When not in use, I capped it with a plastic bag and a bottle to keep the paint from drying out.



Image Notes

1. This is the conical silicone tip, with a nail in the end as a temporary plug



Step 4: The Rebar Goes Up

The rebar is tied together at intersections with galvanized wire. I buy the wire in rolls by the pound and use a good pair of lineman's pliers for cutting and twisting the wire.

Basically, you just start at the bottom and work up. The more rebar and the more tie wired intersections, the stronger the structure becomes.

I do all the wire twisting on the inside, to prevent wire snags on the topside, that interfere with stretching out the fishnet later.

If you want to put in electricity or water lines, now is the time. I decided not to. There is electricity nearby, and I have extension cords, if I ever need work light at night. There are lots of rings in the ceiling from which to suspend lights, so the situation is very flexible.



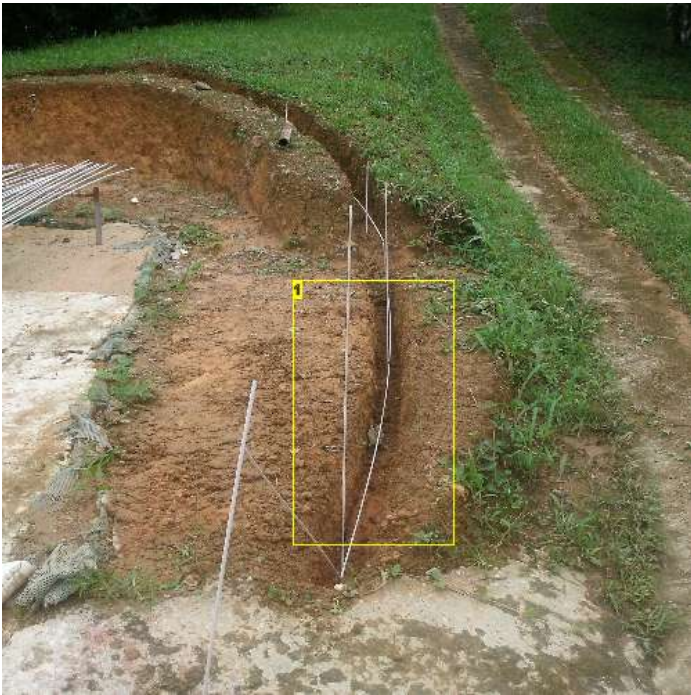


Image Notes

1. One rebar in the trench. The others work up off of it.





Step 5: Temporary Roof Supports

I used bamboo for temporary roof supports. You need the supports in order to walk on the rebar to stretch the fishnet, and plaster it. Basically, you step from the top of one bamboo pole to another. It's a bit like standing 10 ft. up in the air.

There is some danger involved, so move carefully.

I notched the tops of the bamboo for the rebar to fit into. I also drilled the bamboo and wired the tops to the rebar, to make sure the bamboo stayed in place.





Step 6: Stretching the Fishnet

It is easier to cover large areas with one huge piece of fishnet, than to patch with smaller pieces. A friend helped me pull it tight and wire it down to the rebar. We spread out a big piece on top along the center line and rolled it down over the sides.

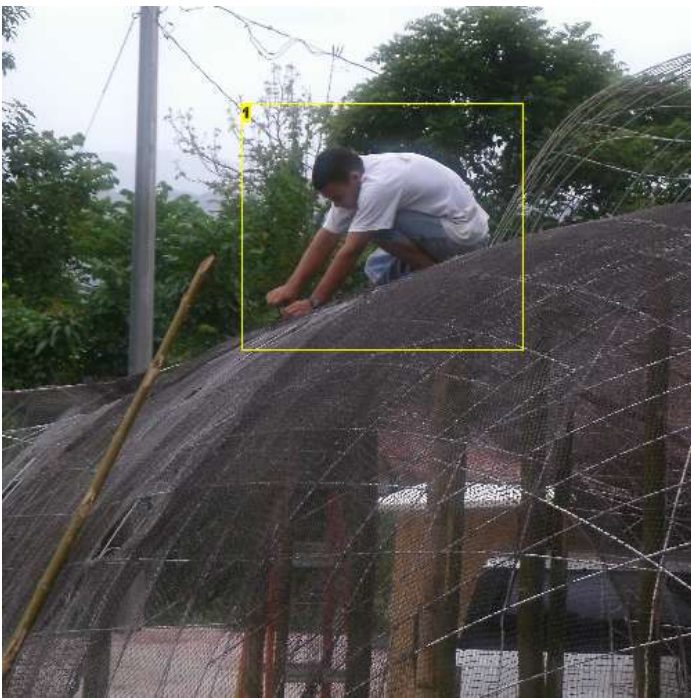


Image Notes
1. A friend helps out.





Step 7: Plastering

Plastering is done in stages; usually two coats inside and two coats outside. The mix is three parts of sand to one part of cement. A 50 pound sack of cement roughly equals one 5 gallon plastic bucket, or 6 shovels full of sand. Add more, or less water to get the consistency you need. Wear rubber gloves, because wet cement is caustic to the skin. Everybody around here mixes cement on the ground with a shovel.

The first step, using rubber gloves, is to rub cement through the fishnet from the outside to stick it to the rebar. That way, whatever you do to one square in the grid doesn't affect the neighboring squares.

Day one: plaster the outside as high as you can reach. Day two: plaster the inside. Day three: stand on a drum and plaster the outside as high as you can reach. Day four: stand on a drum inside and plaster, etc.

When you get to the roof, you have to start walking on the tops of the bamboo to spread out the cement. Little by little, work toward the center.

You don't have to finish the first coat completely before starting the second coat, from the bottom up. Eventually, you can start walking on the cement.

The skylight has clear silicone rubber stippled to the bottom side to make a frosted glass effect. The topside of the glass gets algae growing on it in our climate, so keep the topside free of silicone for easier cleaning. The glass is just glued in place with silicone. If you set it directly in the cement, heat expansion differences may cause the glass to crack. (A photo of the skylight will be added soon.)













Step 8: "Painting" the Structure

I have found that, indoors, spiders don't like raw cement. If you paint the interior with house paint, the spiders come and you have cobwebs to deal with. I just mix cement (gray or white cement) with powdered pigments (sold for tinting cement) and use that instead of paint. It lasts a lot longer and is a lot cheaper than regular paint.

I hate elastomeric roof sealers. Once you paint your roof with elastomeric sealer you can never get cement to stick to the roof again and you are trapped into potential elastomeric nightmares over time. Instead, I use a cement base sealer called Thoroseal. It never peels or blisters, but does weather away gradually from sun and rain. The Thoroseal is expensive. To protect it, I then put a coat of colored cement over it, like paint. The colored cement is a cheap, sacrificial layer. When I see white Thoroseal showing through it, I know it is time to apply more colored cement.

I use broom heads as brushes to paint with. For the final touches, I sometimes splatter on more diluted solutions to get mottled color effects.

For more painting-with-cement info see: <http://www.instructables.com/id/Painting-with-Colored-Cement>





Related Instructables



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by Owen Geiger



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