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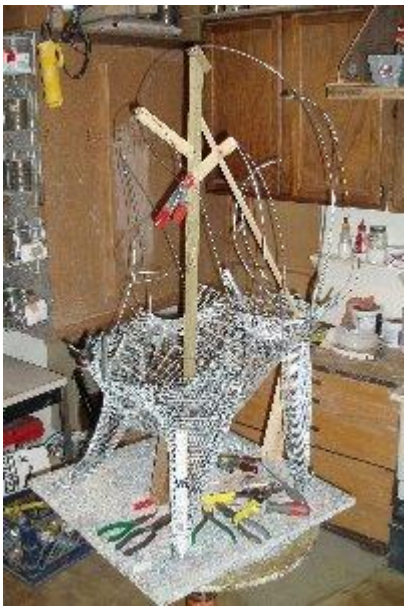
FERROCEMENT TUTORIAL #2

This second ferrocement tutorial expands on the methods used for producing more complicated and intricate pieces. Tools and equipment used are covered in the first ferrocement tutorial (ferrocement #1 Quasimoto) - either the video or the PDF document. "Gordian Not", used here, was in progress when the decision was made to document the process, so the preliminary construction for this sculpture is not included.

This sculptural piece has complicated and involved waterworks - well - the whole thing is complicated.



The armature for the legs and lower body are completed at this point, with jigging to hold some of the wires that will define the edges of the upper parts.

The white pipe in the left front leg is schedule 200 PVC pipe - no longer available - and is used for feeding the water pump power cord through the leg because it is very thin walled and after a bit of grinding of the plug it will fit through the pipe. The pump fits in the leg at the top of the pipe and the cord will be sealed at the top of the pipe with a split rubber plug.

The pump and output water line is set in place to ensure that everything fits. Later the water line will connected to a distribution manifold.

Styrofoam has been stuffed in both front legs to reduce the amount of mortar that will be used because stresses occur at the surface, so the insides do not require material.

The right front leg has a short piece of PVC pipe at the bottom to hide the 1/4” plastic filler pipe connection that feeds the modified toilet float valve that will be in installed in this leg.

Additional expanded metal for the upper portion has been wired in place with some of the water lines in place.

1/2” rebar has been formed and wired in each leg for strength.

This shows the modified toilet float valve set in place with the water feed tubing connected. This type toilet float valve operates on water pressure against a diaphragm that is open to the air, so it was extensively modified to work in this shallow environment. The bottom threaded part was modified to fit the 1/4” water feed line and the air hole was fitted with small plastic tubing that runs up the leg to a screened opening above the water line for air. The adjusting spring was replaced with a softer spring to accommodate the very shallow water level.

This shows a little more detail in the right leg, including the typical use of #9 wire used for reinforcing the leg surface.

The feet are supported on the heads of stainless steel bolts welded to 1/2” rebar reinforcement. For stability during construction, the feet are screwed to the work surface, which also helps to make the legs even when finished.

At this point, most of the upper expanded metal has been formed and fastened in place, although some remains to be trimmed and fastened to the edge wires.

The tubing that feeds the water spouts is in the process of being put in place.

More of the upper expanded metal mesh has been formed and installed, with some edge work remaining.

The water pump (removed here) feeds directly into a distribution manifold fabricated from PVC pipe parts. One of the outlet tubes feeds to another smaller distribution manifold (not yet installed) located in the upper part of the piece that feeds additional spouts.

The 1/2” rebar reinforcing is visible in the back leg.

This front view shows that the expanded metal panel above the right front leg is not yet installed and shows where additional #9 wire was placed for added reinforcement in the belly and other locations.

This is a rear view. The expanded metal is fastened to the edge wire with number 22 gauge galvanized wire before the expanded metal is trimmed and curled around the edge wire to provide strength. Curling also eliminates the razor sharp edges of the expanded metal from taking their toll in blood.

Progress has been made to where all of the expanded metal has been installed but the edges are not yet finished. Additional jigging is in place, getting ready for the first coat of mortar. Short pieces of 1/4” copper tubing are used to stand the wood jigging off the surface at some locations. After the mortar has set the copper tubing and jigging can be removed and the holes covered with mortar.

The water feed tubing is fastened in place on the various arms.

The screened air vent fitting is wired in place above the float valve area.

The two back legs are stuffed with styrofoam.

The tools have been removed, so we are getting ready for mortar.

This shows additional jigging on the front side, along with a support for the bottom.

The PVC pipe used for the pump electric cord is more visible. It extends to the work table and will be cut to fit the finished surface later.

This shows the setup for pouring the left front leg using a cut-to-fit cottage cheese container for a funnel to feed the mortar slurry into the leg.

To get the mortar to flow into the nooks and crannies, a suspended Foredom flexible shaft tool and zig-zag bent wire is used. The mortar is vibrated to make it flow by inserting the rotating wire through the expanded metal into the mortar.

This shows the results of the first application of mortar to the left front leg. It is smoothed to the surface of the expanded metal. Additional layers will get to the finish line.

The front leg is wrapped to keep the mortar wet overnight. Additional mortar has been applied to the rear leg on this side.

RapidSet mortar is the best material for making these type structures. It is fast setting – sets up in less than 15 minutes, is 3 times stronger than regular cement mortar and does not shrink, leaving micro cracks. So it is ideal for water sculptures. When this piece was made, RapidSet cement (the purple bag) could not be found retail and a wholesale pallet was not feasible. (It is now available retail at White Cap building materials outlets.) As a result, the RapidSet mortar was also used for the finishing coats – making it impossible to get a smooth surface. Using regular cement gets a smooth surface, but with lots of cracking.

The best method for applying RapidSet mortar to the expanded metal such as this piece is to use two vinyl faced foam sponges cut and shaped for easy handling. The mortar is applied from one side of the expanded metal and both sponges are pulled up with the trailing edges together to keep one sponge from pushing the mortar through the expanded metal after the other has passed. It takes a little skill to learn how to do this, but it works quite well.

These views show the sculpture after all of the expanded metal has been covered with mortar.

This first image shows the partially completed first color coat of mortar - properly named Ugly Frog Green.

The second image shows the sculpture as it appears presently – after several different color coats having been applied over the years.

Also of note is that this piece does not splash water, so the modified toilet tank float valve was not really necessary.

It was a very complicated project, but shows how far one can go using ferrocement to make art.