

## My Hartman Electric Furnace

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In 1984 David Gingery published a little book called "Li'l Bertha". In it he detailed an electric furnace design with many attractive features. Fast forward to 2002. Dan Hartman published "An Improved Electric Radiant Shop Furnace" which is the next generation. I built Dan's design with a few minor changes.



Here you see it in operation. Except for the set of handles attached to the bottom section, it looks identical to Dan's design.



If you look into the body section, you will see that I used 9 firebricks. These are soft firebricks, which are a better insulator than hard bricks plus are extremely easy to cut. Between the firebricks and the outer skin is a layer of 2300 degree F castable refractory. It is 5 to 20% perlite and very delicate. It is also an excellent insulator.



A close up of the brick face shows the grooves cut for the heating element. I painted the surface with a ceramic paint that provides a harder surface plus is highly reflective to the heat.



Here you see the heating element terminating on one of the stainless steel terminals before the paint is applied.





One thing I learned the hard way is that the commercial refractory I used is very fragile. You are looking at the bottom of the top. I used Black Fireplace Cement on the contact surfaces to minimize wear. The trick here is to put the cement on this surface and on the top of the middle section. Then place a layer of cardboard down on the top of the middle section. Place the top down next. Then bring up the temperature. The heat will turn the cardboard into ash, which will prevent the two surfaces from fusing together.

The castable refractory came with a "heat-up schedule". It detailed how to bring up the temperature over a span of 36 hours. I ran the first 12 hours over the span of 2 days but the last 24 hours was without a break. It is essential that the temperature not be increased too quickly or moisture in the refractory will turn to steam and cause a blow out. The furnace controller permitted me to closely control the temperature but I still had to check on it every 15 minutes to stay on track.

A description of the furnace controller can be found elsewhere on this web site.

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