

Recent Project by William Davenport, Turtlerock Masonry Heat

Location: Morrisville, VT

Project: Smaller contraflow retrofit into renovated and re-insulated VT cape farmhouse.

Background:

Over the last few years I have completed many heaters with veneers made from firebricks laid on shiners and finished in clay plasters. This is a fairly quick veneer to build, which can help to lower the installation costs for heater projects. It also makes for a responsive heater that performs well in the modern air tight and heavily insulated house envelope.

In this particular project I used some new techniques to help minimize the following critiques that I had observed in some heaters under use for several winters:

- hairline cracking in the thinly mortared joints running through to the plastered finish
- hairline cracking above firebox door resulting from spanning firebox door opening with angle iron

In this article I will give a short overview of methods to consider when laying firebrick shiner veneers as well as describe the newer techniques represented by the heater presented here.

Shiner heater design and basic methods:

Sizing of heater:

On the smaller to medium sized heaters (from 24" x 36" to 29" x 36"), I lay the firebrick on shiner directly against the core, without any mortar slush behind, leaving a veneer of just 2.5". I believe this is a very good wall thickness for smaller heaters. On the larger heaters, where a bit more heat storage is in order, I'll typically step the shiners out enough to allow a 1" to 1.5" mortar slush and so achieve a veneer thickness of 4". The larger heaters I build in this method have finished dimension in the range of 32" x 44".

Mortars:

When laying the shiners I have used Sairset, hydraulic refractory mortar (Heat-Stop), and common thinset mortar typically used for setting tile. The heaters laid in Sairset and Heat-Stop have had more hairline cracks than those laid in thinset, so now I am using thinset exclusively. The trouble is that it stays slippery for a longer time than one would like, and can cause frustration. To adjust this, I am having success by adding some Weld-O-Bond to the mix, and also a splash of water glass. With this blend, the bricks take a quicker set and allow one to move a little faster.

Reinforcement:

Once the shiner veneer is finished, it is ready for a parging reinforcement using fiberglass stucco mesh and structural bonding cement. This adds a significant amount of tensile strength to the brickwork and is highly recommended. First, mist the firebricks with a light spray of water, as they are normally very dry. Then, using a good flat plastering trowel, apply a fairly thin coat of bonding cement. Before it sets up too much, wrap the heater in stucco mesh and press it into the bonding cement with the trowel. Multiple pieces can be used as long as you are sure to overlap the edges by a minimum of 4". Press hard into the mesh with the trowel to set it in place, then apply a second thin coat over it, embedding it in bonding cement. You should cover the mesh completely. Trowel your surface relatively flat, but don't over trowel or obsess too much at this point. Return after about 45 minutes with a sponge and a bucket of water. Use a fairly dry sponge over the surface in a circular motion. When the sponge gets dirty, wash it out and wring it back to "dry". This stage is crucial- you can shape the corners and flatten the surfaces to a very good quality. It's a good idea to work the circular motions to the point where you see the sand come up out of the mix. Allowing the sand to come to the surface provides the grit you'll need to help achieve a mechanical bond to the clay plaster.

Image 1:

Core built to top of firebox lintel (Harbison Walker MC-25 castable). Shiner veneer on right and rear sides built ahead of the core, allowing the heater to be built into the corner of the room. Front and left side will be “toothed in” later. Butterfly damper control arm (air intake/ash dump) installed. Quarter inch cardboard slip joint between core and veneer firebrick. Harbison Walker Empire S 3” x 4.5” x 9” firebrick in firebox. Whittaker firebrick elsewhere. Damper and flue connect to exterior stainless steel chimney pipe located at rear of left downdraft channel base. Flue size is 7”.



Image 2:

Completed core, heated bench channels, and shiner veneer on rear and right sides. Heater core cappers are Harbison Walker Clipper DP, 3" x 12" x 24" slabs, cut to fit. Bake oven is constructed of pre-cast (Harbison Walker MC-25) slabs for hearth, back wall, and top [in the style of Marcus Flynn](#). Heated bench and side channels built with firebrick splits.



Image 3:

Front and left side of shiner veneer complete, with bench veneer finished with antique brick laid on shiner with sand and St. Astier NHL 3.5 semi-hydraulic lime mortar. Bench is capped in 2 layers of 2" bluestone.

Precast lintel over firebox door opening: this piece was prepared beforehand, cast at the same time as the core lintel from melamine forms. It has the same thickness as the Whittaker bricks (2 3/8"), and can be designed to fit into brick bond any way you like. Inside corners are on a radius (as opposed to square) for added strength. This precast lintel eliminates the angle iron lintels typically used here, and any expansion problems caused by them. The slip joint in this area between top of firebox opening and bake oven hearth is 1/8" ceramic paper, replacing the cardboard used elsewhere.



Image 4:

Heated bench detail. Bricks are re-claimed from a 150 year local farmhouse.



Image 5:

Bakeoven arch detail. Back of antique bricks must be clipped to mimic the thickness of the 2-3/8" firebrick, but cut at 2-3/4" so they sit a bit proud, allowing room for plaster coats to catch up. Bluestone keystone set off 1/4" from brick work for further relief.



Image 6:

First fire in completed heater. Plaster consists of 3 coats: first bonding cement with embedded stucco mesh, second American Clay Loma, third American Clay Porcelina finish. American Clay color is "Colorado Red". Crown courses of heater consist of one shiner course, one corbelled stretcher course, and one corbelled course of bluestone slabs.

Hardware by UPO.

