Joe Finch Clay Kiln

As with any kiln care must be taken in the construction, sighting and firing of this kiln. For the first firing (if you are firing to biscuit or glaze) you must take the first 700c slowly as you are firing the kiln clay structure (which is like a huge pot).

Method:

Sawing toilet rolls or tearing paper to make the paper pulp. Mix fireclay, kyanite, molochite & paper pulp. I used my large dough-mixer to make the clay but with some effort it can be done by hand. I have not tried but it may be possible to mix the clay in a cement mixer.

Make catenary arch former (65cm wide, 65cm high and 85cm long)

Cut canvas and boards for the two sides of kiln. 90cm x 50cm
Cut canvas and boards for the next two layers of the sides of kiln 90cm x 30cm
Cut canvas for the top crown of kiln
Cut canvas and boards for the front and back of kiln.

Beat clay onto canvas and boards approximately 2cm thick.

Smooth off top surface.

Dry top surface with gas burner.
Make flat level floor 150cm x 110cm (minimum)

Lay out the hollow concrete blocks to cover an area approximately 150cm x 110cm
– In the photo the blocks were 44cm x 21cm x 15cm (you can use 44 x 21 x 21 size) and were laid three deep as the kiln was for wood firing and needed to be lifted for easy stoking. For gas firing you can just put down one layer.

![Concrete blocks](image1)

Cover with tin foil or 6mm ceramic blanket or both to protect the concrete blocks.

Lay out bricks 4 (long) 3.5 (wide) plus chimney. **On the I.C.F. kiln I added an extra half brick to the width making it 4 bricks wide which I think is an improvement.**

![Brick layout](image2)

For a gas fired kiln build 4 layers of bricks leaving holes on the 2nd layer for the gas burners. The firebox openings are on opposing sides so that the burners produce a swirling flame pattern.

![Brick layout](image3)

Replace 4 bricks with half bricks cut lengthwise to allow for wood plank to lower. (The photos below show only three layers, this was an earlier kiln but I feel that adding the forth layer of bricks is an improvement.)

![Brick layout](image4)
Place wood plank on top of kiln bricks.

Put cut strips of 6mm ceramic blanket on top of the side walls so that the clay shell will be able to move as it shrinks. Although I have not tried, it has been suggested that placing a leather-hard strip of the refractory clay on top of the brickwork would help during the shrinking of the kiln shell.

Support the top two layers of brickwork on each side with metal iron-work.

Place arch former on top of wooden board.

Using jacks lift arch former 3” above side walls of base of kiln

When dry enough (stiff and firm) carefully lift, using a board, the two 90cm x 50cm x 2cm clay side wall and put onto the 6mm ceramic fibre and against the arch former.

Wet and soften the top edge having placed a strip of polythene behind the top edge to stop sticking to the former.
Lift second two pieces onto former and beat joining edges together. These pieces are softer than the first sections so will gently bend to the arch former.

The ‘crown’ piece needs to be quite soft so it will bend to the shape of the arch former. Sacking is attached to the top surface to stop the clay breaking up when it is bent over the former.

As the clay dries the jacks are very gradually lowered to allow for the clay shrinkage. In the photo below I have removed the former before fitting the back wall but it is better to join the back to the arch before you remove the arch former.

Once the clay arch is dry enough to support itself remove the former (be careful not to remove the arch former too soon or the kiln can collapse).

Remove the plank and replace the half bricks with full bricks.
Put cut strips of 6mm ceramic blanket on top of the brickwork at both ends.
Wet score and slip both end of clay arch and the clay piece to be fitted.
The clay back, chimney end, then can be lifted on its board and attached to the clay arch.
The front end is fitted in a similar fashion.

Cut a section out of the front that will be the door to the kiln.

Attach strips of clay to the outside of the door so when it is put back in place will not fall into the kiln and also covers the joints around the door. The spy holes should be cut at this stage.

Drill hole to take the thermocouple.

When the ‘clay kiln’ is fully dry place the two 30cm x 28cm (12” x 11”) shelves on the central brickwork, above the central flue, leaving a gap of 40mm at the back and 60mm in the middle and front.
Place cut bricks as shown to prevent flame and hot gases taking a ‘short cut’ into the flue.
You are now ready to start packing your kiln.
Once packed cover the dry clay kiln structure with at least two layers of 50mm ceramic fibre.

For the first firing extra care must be taken with the first 700c. The firing taken slow and steady as the ‘clay kiln’ is itself being fired. (Subsequent firings can be taken as you would any kiln.)

From about 300c the paper starts to burn out of the clay and can produce unpleasant fumes and staining the ceramic fibre brown. (This only occurs during this first firing.)

When the smoke and fumes have stopped, cover the ceramic fibre with a layer of 100mm ‘Rockwool’ and hold in place with chicken wire. Bend the wire so it forms steps that will help hold the vermiculite concrete.
Build up the vermiculite in layers until you have a thick coating covering all the fibres.

Vermiculite covering painted white.

Results from a soda glaze firing of a 'clay kiln'.

This project was supported by The Arts Council of Wales.
Soda Slips.

1. **Brown**
   - 100% - Fire clay

2. **Shiny White**
   - 54% - Hyplas
   - 11% - Whiting
   - 27% - Potash Feldspar
   - 8% - Titanium Dioxide

3. **Yellow**
   - 40% - Hyplas
   - 20% - AT ball clay
   - 20% - China Clay
   - 10% - Potash Feldspar
   - 10% - Titanium Dioxide

4. **Blue**
   - 200 parts by weight – Hyplas
   - 1 part by weight - Cobalt Oxide
   - 4 parts by weight - Black Iron Oxide

Above slips used on their own or one over another.

Vermiculite concrete.

- 10 parts by volume - Vermiculite
- 2 parts by volume - Cement
- 3 parts by volume - Water

Plus a desert spoon of washing-up liquid.

Kiln clay recipe.

- 50kgs Fireclay
- 25Kgs Kyanite
- 25kgs Molochite 16/30#
- 3kgs Paper

Wadding mix.

- 3 parts by volume - Alumina (calcined)
- 2 parts by volume – China clay
- 1 part by volume - Flour
<table>
<thead>
<tr>
<th>Time</th>
<th>Temp. C.</th>
<th>Comment</th>
</tr>
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<tbody>
<tr>
<td>00:00</td>
<td>85</td>
<td>Lit back gas burner on low.</td>
</tr>
<tr>
<td>00:15</td>
<td>110</td>
<td>Lit front burner on low.</td>
</tr>
<tr>
<td>00:30</td>
<td>160</td>
<td></td>
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<tr>
<td>00:45</td>
<td>220</td>
<td>Turn up burners</td>
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<tr>
<td>01:00</td>
<td>320</td>
<td></td>
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<tr>
<td>01:15</td>
<td>410</td>
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<tr>
<td>01:30</td>
<td>495</td>
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<tr>
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<td>565</td>
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<tr>
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<td>650</td>
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<tr>
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<td>700</td>
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<tr>
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<td>750</td>
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<td>805</td>
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<tr>
<td>03:00</td>
<td>890</td>
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<td>935</td>
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</tr>
<tr>
<td>03:30</td>
<td>980</td>
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<td>05:45</td>
<td>1190</td>
<td></td>
</tr>
<tr>
<td>06:00</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>06:15</td>
<td>1210</td>
<td>Cone 9 bending. Pyro reading low real temp. approx. 1260</td>
</tr>
<tr>
<td>06:30</td>
<td>1220</td>
<td>1st 1kg soda introduced - Temp droped to 1190</td>
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<tr>
<td>06:45</td>
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<td>07:00</td>
<td>1215</td>
<td>2nd 1kg soda introduced - Temp droped to 1195</td>
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<tr>
<td>07:15</td>
<td>1200</td>
<td>Cone 9 down 10 bending</td>
</tr>
<tr>
<td>07:30</td>
<td>1215</td>
<td>3rd 1kg soda introduced - Temp droped to 1190</td>
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<tr>
<td>07:45</td>
<td>1205</td>
<td></td>
</tr>
<tr>
<td>08:00</td>
<td>1215</td>
<td></td>
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<tr>
<td>08:15</td>
<td>1225</td>
<td>Turn off gas - Crash cool</td>
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<tr>
<td>08:30</td>
<td>1090</td>
<td>Close firebox doors. Shut slide damper to chimney. Clam up. Clear around kiln. Check there is nothing combustible within 1M.</td>
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</tbody>
</table>

This firing was not the first firing (which needs to be taken much slower) but a subsequent one with the 'clay kiln' structure already fired.
Approximate Costs:

100 HTI26 insulating bricks £200
100 Firebricks £160
50kgs Fireclay £40
25kgs Kyanite35# £40
25kgs Molochite 16/30 £25
1 roll of 100mm Rockwool £20
6mm ceramic blanket £30
2 x 50mm ceramic blanket £60
2 x 100 ltr. bag vermiculite £40
1 bag of Portland cement £5
House bricks or metal chimney
15 concrete blocks

(The last 4 items can be purchased from your local builder’s merchant. Other items can be purchased from Castree Kilns.)

Also needed:
Kiln shelves
Props
Pyrometer
Gas burners.