Clay heat treating for a Hamon

This is what I do:

Step 1: forge blade to shape, but leave the dimensions of the edge (thickness) at least as thick as a dime and usually that of a nickel

Step 2: grind off the decarborized residue on the sides of the blade as well as profile the blade to the shape you want it. I use a 4 1/2" electric die grinder (from Harbor Freight Tools HFT) with a grinding wheel to clean up the sides of the blade as the scale build up will eat up an expensive ceramic 2"X72" belt VERY fast. When the the blade is down to bare metal, even if there are some dents and pits, I move to the belt sander.

Step 3: I clean up the flat sides of the blades until there are no dents of pits using a 60 grit 2'X72" belt. The edge should still be about the thickness of a dime if you stopped forging at the thickness of a nickel (ideal for me) This is when I get my plunge lines established at the riccasso and make sure the riccasso is flat. Everything is a little oversized as you are going to have more decarborized steel to remove after heat treating.

Step 4: Normalize the blade to reduce the stress and reduce the grain size of the steel. Heat to non-magnetic and let it air cool until you can pick it up. Repeat this 2 more times. This leaves some surface scale/grey color that I remove with the 60 grit belt again.

Step 5: With the 60 grit grind lines even over the surface of the blade, clean it of any hand oil using 90% denatured alcohol. It leaves very little residue when it dries and is fairly cheap (BiMart).

Step 6: Mix Rutland's Furnace Cement (Ace Hardware) to a very thick pancake batter consistency with water. There are lots of other types of clay and clay mixtures that other makes use, but this works well for me and it's very cheap.

Step 7: Heat the blade with a heat gun (HFT) until it is warm to the touch but not too hot to handle. Make sure to include the riccasso area.

This is where there are LOTS of different ideas on how the cement is applied!!!

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REMEMBER! ANYTHING THAT IS COVERED WITH CLAY WILL NOT BE AS HARD AS THE BARE METAL WHEN YOU HEAT TREAT IT.

Step 8: I wear latex gloves when I apply the clay. this keeps any finger oil off the blade and keeps my hands clean. I start with a thin layer of clay along the spine and sides of the warm blade, about 1/2 way to the edge. keep the tip free of clay also or you will have a soft tip on your blade. I like to use my finger to make the edge of the clay into a wavy line to add some character to the hamon.
Make sure to include the riccasso area to be covered by the clay. I leave the very corner of the riccasso, that is next to the edge of the blade uncovered.

Step 9: With a pallet knife (a kitchen knife or even a thin piece of steel would work) I apply thin ridges of clay from the spine to the edge of the clay I just applied. These ridges are thicker (taller) than the first clay so they leave a of hills and valleys across the surface of the blade.

Step 10: Let the clay dry. NO DON'T TOUCH IT YET! IT'S NOT DRY ENOUGH. Did you leave it alone over night? Do something else until tommorow. if you try heat treating your clayed blade when there is any moisture left, it will bubble and pop off which gives you the opportunity to start over!

Step 11: Heat the blade to critical temperature, for 1080 about 1500 degrees F. Make sure the whole blade, including the clay is the same temperature.

Step 12: Heat your canola oil to about 120 degrees F. if it's cold it will not cool the blade quick enough because of the vapor jacket it creates around the blade. I know, colder oil should cool the blade down faster, but it doesn't.

Step 13: Once the blade is at it's critical temp (non magnetic) about 1500 degrees for 1080, plunge the blade tip first into the warm oil. Make sure you get it from the forge to the oil as fast as possible. 1/2 second would be best from forge to quench. Some steels are a little more forgiving on this time, but if you get into the habit of doing it quick, you shouldn't have as much problems with your blades being less than their highest potential hardness.

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I like to make sure I get the whole riccasso in the oil, even though it's covered in clay. I also DO NOT put very much of the tang in the oil because I don't want the tang to be hard.

Step 14: Leave the blade in the oil until it is cold enough to touch without discomfort. For me, thats about 130-140 degrees F.

Step 15: Scrape off the remaining clay from the blade with an old shop knife (Mine is an old failure that I keep for that purpose and to remind me to do better). You should see some hamon in the transition between the grey edge area (1/2 the blade width) and the spine area. I wipe off the remaining oil with a shop rag until it's mostly clean.

Step 16: Back to the belt sander with a 60 grit belt to clean off the blade surface to bare metal. The black oxide from the quench is very thin and fragile, so it comes off VERY easy. Your going to want the blade clean, so a couple passes on the 60 grit belt does the trick without any extra steps or tools.

Step 17: Clean the blade again with alcohol.

Step 18: Temper the blade in the toaster oven, or whatever heat source you have with a consistent temp. The kitchen oven varies quite a bit where a toaster oven doesn't, especially if it is insulated on all around. Also a plate of steel in the bottom of the oven to absorb heat and keep the temp a little more even is not a bad idea as long as it doesn't touch the cal-rod heating element.

415 degrees F seems to be a good tempering temp for 1080. Let the blade soak in the oven for one hour. Take it out of the oven and let it air cool. Repeat this tempering process for a total of 3 times to bring the hardness down to a working hardness.

Step 19: Grind the blade clean with a 120 grit blade

I know you want to see if you got any kind of Hamon activity, so go ahead and dip the blade in a 3/1 solution of ferric chloride and water for about 30-45 seconds. You should have a very different look to the blade where the clay was verses where the clay was not. The more you refine the sanding

on the blade, the more the hamon will show. I belt sand to 400 grit, then hand sand to 2000 grit.

I have just started using vinegar and hot lemon juice to develop the hamon to a greater degree than with ferric chloride. Also very fine loose abrasive in the 9 to 3 micron range makes an amazing difference. Since I am new to this last part, I won't go into any real details, but you can read more about this on BladesmithsForum.com
http://www.bladesmithsforum.com/index.php?showtopic=30677