January, 2022

In August of 2021, I participated in the “Chopper” class, taught by Burt Foster, in Bristol, VA. I ended up making a large, chopping-style knife. It is 16” long by almost 1/4” thick, about 2” wide. It was made from 80CrV2 steel, which is a strong, durable steel that heat treats like steels such as 1075 (which is relatively easy to do at home).

The focus was on knife making, but many of the skills do transfer to general blacksmithing. Let’s start with the knife portion of this exercise.

I am writing about what I learned, but this paper is also like a step-by-step of the process.

This course started with forging a symmetrical tip on the far end of our flat stock, then hammering it downward towards the cutting side of the knife. This was done because during the forging process, metal is moved not removed, so it moves like a clay analogue. The hot, soft steel will move away when hammered, and create an arc opposite of the edge. This means the tip will move away from the edge, and can curl upwards, away from the hammered edge.

The method for starting the full tang location was somewhat based on Burt’s experience. We were given a length of flat stock, and we were not expected to know how long to make the tang. We were told to start it at a rough location on the bar. It was initially shorter than the ending handle length, but that’s because the process of narrowing and drawing the metal increases its length. A decent amount, by the way. 4” can easily become 5-1/2”.

The edge of the bar (spine side up) was placed extending over the edge of the anvil, with where the tang was to start, and then struck on the back. This drives down the blade side of the knife but narrowed the tang portion. We continued to draw that out over the length of the tang.

We hammered on the edges of the bar to narrow it, then used the hammer pein to draw it out. We worked a small amount of material at a time, at equal amounts per side. We flipped the metal over quite often.

We proceeded to hammer a choil/heel at roughly the location for where the handle would meet the blade. Burt called it a blister, but it was a defining point for the blade to start. I know the choil is actually a very small void, but when hammering the edge, it is created. This was the beginning of our bevel for the knife blade itself.

Holding the flat of the metal at a slight angle upwards, and with what would be our blade edge facing the edge of the anvil, we started hammering the bevels. This moved the metal and thinned it out for later grinding and sharpening. We worked from side to side, only for an inch or two at a time. Because we were forging and not grinding away metal, this also made the blade wider than it started.

The blade needs to be constantly checked for straightness. Holding the handle end, look down the spine then rotate it and look down the blade edge. Flip it end to tip, then look down the same way. 4 views of the metal in total. Sometimes an aberration is not noticed on one view but displays on others.

When the spine, blade bevels, and tang are about how you want them to be, hammer them back and forth, drawing out the same way as forging, but light blows and planishes, to straighten and parallel. Start on the spine, which is thicker, because it will affect the bevels. Proceed to the bevels.

Working and inch or two at a time allows for small adjustments without majorly affecting the rest of the blade. Also, heat goes away quickly, so you don't have much of a choice for areas of work. Higher carbon steels are less forgiving at lower temperatures, so it works out this way, too. Also, if using a coal forge, you only have a small area of heat, anyway.

We quenched the blades in a specific, pre-heated, oil. The blade temperature was achieved using a controlled oven. We only had a few seconds to complete the oven-to-quench process.

Burt oven-tempered them overnight, ready for our next exercise.

Using the belt grinders, we ground our profiles. This established the overall shape of the blade, spine, and handle area. It also removed various forging flaws and odd waves that happen during forging. At this point we are not griding on the flats. The intent is to keep as much of the forge finish as possible.

We then started grinding our bevels to create an edge. We first coated the blades with Dykem Blue, for contrast. We constantly examined the edges, back and forth, for symmetry and straightness. As during forging, we worked from the part close to us on outwards towards the tip.

Using a dial caliper on the blade bevel helps to know that your griding lines are parallel, as well as equal of equal width along the blade edge. The width will vary, depending on the blade being made, as well as your own style preference.

We eventually ground to a relatively sharp edge, but the final edge was done at the end. We taped up the blade to then focus on the handle making part.

We had drilled for pins and a lanyard loop (a large hole, really). I used stabilized wood for mine. Using the chunk of material, I outlined the handle on it with about an of eight inch extra. Cut on the band saw, then sliced in half on the band saw. Sanded flat and made parallel the portions going against the metal.

I lined up the holes on the blade with the wood, marked the locations, and thereafter drilled the wood. Using the actual pins/tube to make sure everything lined up and fit together (dry fit), I then used 2-part epoxy to put it all together. This was left to cure during lunch time.

Things to remember: the front portion of the handle needs to be finished prior to securing to blade. There is very little room for error that may cause scratching or other problems when against the blade. Stain/finish and buffing is almost impossible. Also, scuff the tang, inside of blade scales, and pins/tubes for extra bite to which the epoxy may stick.

Just like hammering stock in a square then octagon fashion, the same approach was used for the handle material. I started by sanding it close to the metal (but still leaving room for error). I then trimmed the corners to make a rough shape. Taking time, I machine sanded and felt the fit in my hand multiple times. When it was close, I then clamped the knife in a vise and used strips of sandpaper for the final shaping and sanding.

The handle finish is dictated by the material and purpose of it. I used a thin paste wax finish on mine, which is made from California Buckeye. Another student used a type of micarta, adding scallops for grip. That type of material did not need extra finishing coats.

Several things to remember during this entire process are applicable to blacksmith work:

Work close in, extending outward. Or start at an end and work along. Basically, predefine your area.

Work small areas at a time. Heat dissipation also does not give you a choice.

When working with two sides, work one part way along then the other, alternating back and forth.

Hammering hot, pliable, steel moves other parts of the project unintentionally.

You will be working all parts of the knife blank I would guess at least 3 times; lighter work each time.

Constantly check and correct errors as you work. Aim small, miss small.

Don't overheat the metal in the forge. Excess scale and other problems may arise.

Don't underheat the metal. Try hammering that! There is also a risk of cracking it (high carbon steels).

Don't heat the metal then let it cool by itself, without working it. Excess scale can develop.

Take breaks and drink fluids. Smithing is hot work.

Mark your parts – especially handle scales. Right is not always symmetrical to left!

A variable speed sander is better for shaping the metal and wood. At high speeds, wood tends to burnish and burn. You also may remove too much metal at the blade edge with higher speeds.

If you are grinding a point or other sharp feature, grind to it then back. Otherwise, it will be a little rounded.

When grinding the blade, it may get too hot and ruin the temper. Take it slow, and dunk in water often. The same goes when sanding down metal pins in the handle. They get hot quickly! Too much heat can also ruin your epoxy bond or synthetic handle, if used.

Thank you for this opportunity in learning,

Shawn Byrd