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Handmade Custom Knives

In the world of handmade custom knives, there are many makers that consistently produce knives that are superior to the machine-made counterparts that so many people have come to despise. After using cheap, China-made knives and having them fail again and again, I have come to realize the need for knives that are both reliable in their functionality and simplicity but also beautiful in their design. As a custom knife-maker myself, I understand and have implemented the steps we will discuss today, many times while making knives for myself, friends, and customers.

There are 5 major steps involved to make a knife from start to finish. These steps are design, rough grinding, heat treatment, finish grind, making the handle, and the final finish touches to the blade before it is shipped to a customer.

Design

When talking about design, there are many things that can be implemented to attain a desirable finished product. What will be the intended use of the knife? Is it going to be used in the outdoors, bushcraft/survival, is it to be carried as a self-defense blade, or for kitchen cutlery? At this point is when I will decide what I

want (or the customer decides for me). If it is to be an outdoor knife, will it be used in a saltwater environment and will it need to have stainless qualities? In normal environments, a carbon-steel blade is usually desirable because of the ease of sharpening, but in a saltwater environment, it may very well need the rust resistant, stainless qualities of certain stainless steels. Will it need to be a certain length or blade design? If it is a knife designed for a specific purpose then yes, absolutely. A bushcraft knife is usually designed to be a knife that can be used to serve many purposes, but in order to have that versatility, there are multiple things that must be considered. When I have chosen the pattern that the knife blank will become, I will scribe that pattern onto the blank and prepare to rough grind.

Rough Grinding

When rough grinding, there are several important things to be done. The line that was previously scribed onto the stock must have all the material around it ground away- basically I take away everything that doesn't look like a knife. I normally do this with a 36 or 80 grit belt for the fastest stock removal. Rougher grits also grind cooler than finer ones so I do not have to dunk the blade in water as often. When the blade has been ground to this rough contour, I drill the holes in the tang of the knife for the pins that hold the handle scales to the blade. There are several different ways to hold the handle together including rivets, bolts, and pins. Pins are what I usually use. After the tang is drilled, I rough in the bevels of the

cutting edge. This is a very important part of making the blade a good looking piece. If the grind lines of the bevel are not perfectly even and symmetrical, they look tacky and unprofessional. The area of the knife where the handle transitions into where the cutting edge starts is called a plunge line and this is one of the most difficult places to have even grinds. Good clean, even, symmetrical grind lines are really what separates the men from the boys in the custom knife world and is something that only comes by lots of practice. The cutting edge must remain a little bit thick because the best heat treat lies just below the surface and also when left oversized, it helps to prevent warping during heat treat. There are many that use jigs to hold the blades in place and I can get very consistent results doing it that way. I also use jigs to help me but mostly I am still working on perfecting my freehand grinding skills. There is something simply incredible that speaks to the skill of a custom knife-maker that can belly up to the grinder and make it do exactly what he wants.

Heat Treating

Now that the blade is roughed out, the knife will continue on to the heat treat phase. Heat treatment is probably the most important part of the whole knife making process. Heat treating is the process used to impart special qualities to metals and alloys (hardness, strength, ductility, flexibility etc.). It changes the molecular structure of the steel. Heat treating determines hardness of the blade

which directly translates to edge holding ability. If blade is too soft, the knife will not hold its edge and will not have a springy characteristic; if it gets bent, it will stay bent. If it is too hard, the edge will chip and will be very difficult to sharpen. It will also snap under stress instead of being resilient like a knife should be. A properly heat treated blade will hold its edge well under normal use and also maintain its toughness (flexibility/strength). Hardening is accomplished by raising the steel to a temperature around 1500-1750 degrees Fahrenheit and then quenching in oil, water or air depending on the steel type. There is also a way to heat treat a knife to have different hardness's throughout the steel-hard at the cutting edge, springy in the middle, and soft at the spine. This is called differential heat treating and is accomplished by controlling the rate the steel quenches. Usually this is done by putting tempering clay on the areas of the blade you want to be softer or by only allowing the cutting edge to be quenched in the oil and when the cutting edge has been quenched, then you lower the remainder of the blade into the oil.

Tempering is what is done to soften the steel or "draw" the steel back down to a usable hardness. This is done at a lower temperature that is usually around 375-500 degrees and holding at that temperature for a proper amount of time. This ensures that the steel is not brittle and too hard. While there are compromises to be made in determining the exact hardness of the steel, heat treating is down to a

precise science and will deliver desirable results if done properly. I normally want a Rockwell hardness of no less than 58 and no higher than 62 with 59 being ideal for a hard-use knife. When heat treating is finished, the knife will be ready for finishing.

Finishing

Finishing the blade is done after heat treat and is the point where I put the handle scales onto the tang of the knife. To do this I trace the handle shape from the blade to the handle material and saw it out close to the line. I will then transfer the previously drilled holes in the tang of the knife onto the roughed out handle material and drill those holes through the handle material. After this is done, I make sure that all of the holes align properly and epoxy the handle scales to the blade with the pins in their holes. When the epoxy has dried, I grind the pins down till there is only about 1/16" left on each side and then peen the heads over with a ballpeen hammer to form somewhat of a rivet and to permanently bond the scales to the knife. After this is done, I begin to finish the shape of the handle to make it comfortable to use by using my grinder and then if necessary, hand sanding to attain the finest possible finish that I can.

Now, the whole reason I finished the handle first is so that I am not working on the handle with a potentially sharp and dangerous cutting edge on the blade. When the handle is finished, I begin to finish grind the bevels on the blade. When I

rough the bevels out, I do so with an 80 grit belt. That does not leave a desirable finish on the steel because of the roughness of the grit lines. So, I begin to thin down the cutting edge that was left thick during heat treat, down to a cutting edge using finer and finer grits until I have the desired results. The whole time I am finish grinding, I have to be aware of the temperature of the blade- it cannot get too hot! Allowing it to do so will ruin the tempering at the point where the heat was. This is easily prevented by continuously dunking the blade in water after each grinding pass. When the bevels and grind lines are as I want them and the knife is pretty much finished, I will either polish the blade or blue it depending on customer preference. The bluing looks good and also adds to the rust and corrosion resistance of the steel. I will then sharpen and strop the blade to have a shaving-sharp edge and add my logo/maker's mark to the blade. If the customer has ordered a sheath with the knife, I will begin to make it at this point because the knife is finished.

In conclusion, I would like to quote Elbert Hubble; "One machine can do the work of 50 ordinary men. No machine can do the work of one extraordinary man." In this paper I have covered the major steps involved in making a knife from start to finish. The design, rough grinding, heat treatment, and finishing are all critical steps in making a knife a usable work of art and no machine's ability can impart the personality into a handmade blade that a skilled custom maker can.