

HEAT TREATING – WHAT IT MEANS TO A KNIFE

1095, 5160, D2 or 52100.

by Newt Livesay

First I would like to say that the best knife makers in the country today is Bob Dozier. Bob, and I were talking one day in the shop while making knives. I worked in the Dozier shop for three years for those who were not aware of it. Bob was a perfectionist when it came to heat treating his knives. He would not hesitate to break or destroy a blade that did not meet his critical eye, and I have always admired him for that. One particular day he and I were discussing this very subject as this note addresses, and Bob said something that has always stuck with me. We were talking about the junk that many people consider as such a good knife.

Bob stopped grinding and looked over at me. “Lindsey,” he said as he seldom called me by my real name unless he said, Newt. “They have never really owned a good knife,” he added. I thought about that, and I have never forgotten that statement. I think of it when I see some of the remarks propagated from person to person on forums. How true the words, “They have never really owned a good knife.”

I have always maintained the fact that the heat treat is the heart of a knife. It could be made from 2,000 layers of steel hammer forged from the bowels of a buffalo dung fire by a guy wearing a dress and listening to Beethoven. Handled with some rare eco-friendly long dead tree, and shiny, but you would be about as well off with cat-scat in one hand, and can of Shinola shoe polish in the other if it is not properly heat treated. In reality you would be better off in the woods with a tuna fish can lid, after all you know it will cut. For some reason there is a small number of people who have knives made, (notice I did not say knife makers) and a few knife makers who have perpetuated the misconception of heat treating. What do I mean by misconception of heat treating? These so called self proclaimed experts use such superlatives in their advertisements such as, heat treated in the high 56, or high 57 referring to the Rockwell hardness. What? There isn't a high 56 or a high 57 Rockwell hardness, it is either 56 Rc or 57 Rc.

Let me back up here a little. Most of you I am assuming who are reading this know something about knives or own a knife, other wise you most likely would not be reading this. I am not going to go into a long diatribe about the Rockwell hardness process. If you want to know more about this method of measuring metal hardness, Google the words and hundreds of pages will come up. What I want to talk about here is heat treating relationship and its effects on performance. There is a lot of misconception about heat treating.

You and I both have seen post on web pages or forums about how well a knife performed in one situation or the other. The sad truth to a lot of this is dependent on peer-hype or more over appearance. Many end users buy a knife because it looks cool, manufacturers hype, or the knife looks exotic. After all the buyer just wants to be part of the crowd, and everyone on the WhiteDwaftsCuttingEdgeToad forum dot com, is constantly telling you how many two by fours their knife can chop through or how many times they can stab a steel barrels, or chop a rope into little pieces. This is all done and backed up while the user chants the mantra hype brought on by consuming too many Sudafed tablets. Oh! I forgot, when finished the knife will still cut a silk sow's ear adrift only on the wind, shave a goat arse bare, and spread peanut butter without making ripples.

So what makes it a good knife so to speak. Is it the fact that it looks cool because it is painted with camouflage paint, or it has a hole in the blade to straighten home made arrows, a screw driver in the

handle that doubles as a tool for breaking car windows. Maybe it was the serrated saw blade and the lanyard cord with a Swedish fire stick, compass, toothpick holder, salt & pepper shaker, and a mini parasol all packaged in a box with a picture of the “knife” designer sitting in a camp with the lost tribe of Bushguano.

Is that what makes a good knife? Of course not. A good knife begins with a practical and usable design followed up with a proper heat-treat for the type of metal used in the knife.

So why wouldn't a so called maker or knife designer heat treat a blade properly. Inferior tolerances are either a lack of experience with a blades' (metals) performance, regardless of their hype. Another reason is their total ignorance of the heat treat process, and the manufacturing cost. So what does all that mean, and does it come out in the wash?

Carbon steels such as 1095, 5160, 52100, and 01, does not perform to its optimum when heat treated 56, or 57 on the Rockwell C scale. 58 is better, and 59 or 60 is optimal. D2 stainless steel, when heat treated to 57 Rc is hyped by some of these people as the best overall hardness. These survival/designer/cutlery experts are spouting pure unadulterated Bravo Sierra. D2 when heat treated to a 60 Rc will wear better, and perform ten fold over the same blade that is improperly treated to an inferior 57 Rc. This is in comparison to the differences in a four point zero earthquake, to one that shakes out at six point zero.

Just as higher hardness numbers mean a harder blade, when *properly quenched* and drawn it will out perform (wear-ability) inferior heat treats. Now a harder blade doesn't mean that the blade is stronger, especially if the blade is not properly drawn. As a quick side note, D2 tool steel is not the optimum choice for a big blade such as machetes. It is a great steel for smaller knives, but in my opinion it is a poor choice for a large chopping type blades. The carbon spring series steels (1095, 5160, 01, 52100) when properly heat treated and drawn to 59, or 60 on the Rockwell 'c' scale will out perform the lower Rockwell numbers, regardless of the hype.

So why wouldn't these knife companies do a proper heat treat to maximize the performance of a steel, and max the higher Rockwell number if it would benefit the end user? Well like I said, it could be inexperience, ignorance of the process or a cost factor. Cost is the primary concern of most commercial companies. I once talked to the plant manager of a major cutlery factory, that is now sadly out of business after almost 165 years. They made some of the finest folders, straight blades, and had military contracts during both World Wars, Korea, and Vietnam. Their contributions to the cutlery industry will be ever lasting. Their steel of choice for over a hundred and twenty five years was 1095. I asked him why they did not heat treat their folder blades to a higher Rockwell. I was referencing the wear ability of old bone handle folders like those carried by my grandfather. Those old folders held their edge, much better than new manufactured folders. He said if they did it would cost them about ten cents more per blade to grind. A dime? Now their daily production of folder blades was about 13,000 blades per days. So, you may think a dime isn't that much money, yet it quickly add up to about 30,000 dollar per month. That round out to almost a half million dollars per year, and that doesn't include the cost of their fixed-blade production.

The other factor against hard blades is wear and tear on grinding machines. All commercial cutlery producers use automated machinery in their production any more, and most use '*stones*' to grind (stock removal) the metal. Custom makers over all use abrasive impregnated cloth or paper '*belts*' to do their grinding or stock removal. Commercial companies normally heat treat their raw blanks in large baskets in bulk using heat treat furnaces, before surface grinding the blank to the desired thickness. This

process eliminates loss of blades due to warping. The heat treated blade come out of the *'heat'* in a hard state, once drawn it is then surface ground to thickness, and finally ground to the finish specifications. Once surface ground blanks begin there trip to the big automatic grinders. A water base coolant, mixed with soluble oil is sprayed on the blank while they are being ground. This liquid coolant keep the abrasive stones from burning the blanks. This last process where the blade is ground is also a critical point in production, where the heat treat can be compromised. If the blanks are burnt or warped during the final grind process the knife blade are normally discarded.

“Heat treating is the heart of the knife, and the design is its soul. Once you fully understand this concept, then you will want to own a truly good knife.”

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