Maintaining Waterstones for use on the Wicked Edge

Posted by KenSchwartz - 05 Apr 2012 01:10

Well this may be a boring topic at first glance, but I assure you that for any serious sharpener it is one of the more valuable things to grasp thoroughly.

Diamond plates wear out. There's no getting around this. You can slow it down using plates wet to keep from abrading the substrate that holds the diamonds in place, but eventually they wear out. Sandpapers of all types wear out too. But they maintain their shape during this period. In part this is because they present essentially a single layer of abrasive and once it is gone, that's it. Diamond plates do wear VERY slowly, so it is certainly not a cause for panic or a reason not to use them. There are diamond 'stones' that have diamonds going through a depth of material but they aren't used by sharpeners for reasons beyond this topic.

Then there are sharpening stones. Some, like Arkansas stones wear slowly - but cut slowly too and are available over a relatively narrow range of grits, going as fine as the translucent stones with the surgical blacks next in fineness and other coarser ones available. They can be used with water (my preference), oil or plain. They are useful in some instances but primarily on knives of lower abrasion resistance - European kitchen knives, soft Buck knives, etc. There are also India stones etc but let's go on.

Next are both synthetic and natural Japanese waterstones a personal favorite of mine. These are available in a very wide range of grits from ~ 24 grit to 30,000 grit. Instead of a single layer of abrasive the whole thing has abrasive content so there is MUCH more abrasive present. Natural stones span an even wider range of grit sizes although not a lot more, primarily at the high end.

They do wear at various rates. In general softer stones and coarser grits wear fastest but this isn't a direct relationship. Thus several different waterstones, all 1000 grit will have different wear rates, different hardnesses, abrasive density, binding structures and so on. As you use these stones, you will find personal preferences for how you like them to wear and find that you will actually PREFER a faster wearing stone for some applications.

So stones wear. This is a fact of life that any even moderately serious sharpener must understand and work with.

Stones wear unevenly. Why? Because sharpeners (I include honers in this term) sharpen unevenly. For freehand sharpeners, this wear pattern is almost like a signature. For WE users, this is a property of the way the stone is used. For instance, the two far ends of the stone wear less because we don't run the edges to the very ends of the stone - nor should we as this risks damaging the edge we are working on. We don't press evenly throughout the length of the strokes of the paddles. You might press harder on

the left stone than the right or need to correct a bevel by grinding more on one side or the other or by twisting the stone, causing more wear on the right or left side of the stone. And on and on. I could spend a day with examples here.

So eventually we get our stones out of being 'square'. Typically they 'dish' or are thinner in the center and thinner to either side of center. In the extreme they start looking like a saddle. Similarly diamond plates will wear unevenly but just become less effective and aggressive rather than dish.

What to do? This is a key concept:

You MUST be able to keep the surfaces of a stone FLAT. This is as much a part of sharpening as anything else and a key to success. You will at times also need to readjust the stone to make the flat surface parallel to the back of the stone or plate. This is less critical, but still important.

Now before we delve into this topic, I need to address another very important topic of particular relevance to the Wicked Edge and other devices like the EdgePro - **stone thickness.** This is NOT a limitation of the Wicked Edge but rather a much more universal issue for ALL users of stones.

SO let's jump ahead and say that you are now a master flattener and truer of stones and that you now have in your possession a set of stones of IDENTICAL thickness - perfectly flat and true.

So you start out on a knife needing some serious work with a 'butter knife' dull edge and chips - the type your neighbor sends you. You start removing chips with a coarse stone and progress up once the knife is repaired up through a series of grits to say a 5000 grit edge. Or maybe you have a better knife and go all the way to 30000 grit.

Now lets say you do this to 10 knives. By now your stones have dished - not terribly but less than perfect (I promise to return to this more later).

You need to flatten the stones. Yes, you do. So you flatten and true them. Now you measure the stone thicknesses. Do you think that all these perfectly flat and square stones are the same thickness?

They will NOT be. WHY? Because they wear at different rates. This is a fact of life. In general, your finer - and most expensive - stones wear slowest. Thank God! You will completely wear out your coarser stones long before your fine ones. So stones like a 30k Shapton will probably never get replaced from

being worn out - and not used on 'lesser knives' or knives not requiring that level of finish. But especially if you do a lot of sharpening you will wear out your coarser grits first.

The solution to this is NOT, absolutely NOT, to grind down your 30k stone to the thickness of your coarsest stone. Your solution is to adjust for the difference. How? Use an angle cube to be precise. Got a softer knife and need less precision (but still FAR more than freehand sharpeners can produce)? Use a Sharpie permanent marker on the edge and using a light sweep of your next finest grit make a small lateral sweep over a small part of the edge and see where you are at. With a little practice you should get to within a few tenths of a degree in just a few swipes using the continuously variable adjustments - not the premarked notches. If you are off a couple tenths this next grit will fully compensate and give you a clean single bevel angle with just a few more strokes. Not perfect, but if you want perfect - measure.

The old adage 'measure twice, cut once' applies here very strongly. Perfection takes more time. With a device like the Wicked Edge, you approach perfection far more closely than freehand and you see things less than perfect more easily. Slop unnoticed by a freehand sharpener becomes obvious, much like seeing one item moved on a clean desk versus one item misplaced on a desk piled high with everything that hasn't been taken care of.

I'm going to stop here for now and continue this topic in subsequent posts on this thread for emphasis of this one point of stone maintenance - dealing with the variations in stone thickness as a stone is used when comparing coarse stone wear rates to finer stones.

Ken

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by jendeindustries - 26 Apr 2012 17:50

_____

Tom, have you got a clue why stones that require water seem to wear faster? (Or is it a wrong observation?) My el cheapo stones that require almost constant soaking/keeping wet wear down very fast, whereas the Wicked Edge ceramic stones don't seem to abrade at all. Does the water cause the wearing down (e.g., due to dissolving the resin bond), or is the wearing down the reason you want to add water (to create the slurry and remove the swarf)? Or do we need Ken to answer this question?

I'd say it is a correct generalization when you throw in the sheer number of "el cheapo" stones on the market

But Shaptons and Choseras are in a class of their own on the high end, and are designed to hold up longer while cutting faster, so I think you'd be wrong in this specific case.

Overall, I think wear rates are more dependent on the binding agent/matrix hardness. Ceramic stones like the WEPS ceramic and the Shaptons use a ceramic binder which holds the abrasives in place better and longer. Choseras use a Magnesia bond, which is a little softer and more "cushy" (hence the wonderful feedback).

In theory, by using water the wear rate is increased overall because the abrasion rate is increased as you are flushing the system of swarf, which is in contrast to stones used dry, which "loads up" the surface, slowing abrasion, thus slowing the wear rate down.

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by mark76 - 28 Apr 2012 10:29

Hey Tom, the picture is getting clearer and clearer!

What occurs to me is that the WEPS ceramic stones and the Shapton stones seem very similar. Both use aluminium oxide with a ceramic bond, both are hardly porous and very slow wearing.

Are there any major differences between them? Why is it that the Shaptons require some water (but only a little bit) and the WEPS ceramics stones don't (although a little bit of water might help)?

And now I am going to use my Chosera stones for the first time

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by jendeindustries - 28 Apr 2012 21:57

I feel the WEPS ceramics have a softer matrix than the Shaptons, overall. This makes sense because

you want the ceramic to be able to come loose on the WEPS ceramics, but the Shapton mentality is to keep on abrading at every level.

In other news, I will be making some lapping videos with my WEPS Shaptons and Choseras this weekend. Keep an eye on my Youtube channel !

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by mark76 - 30 Apr 2012 04:29

_____

That is interesting, Tom! After three months of use I am not able to observe any wear on my WEPS ceramic stones. So the Shaptons will show even less wear? (Though I am not quite sure what you mean by "you want the ceramic to be able to come loose on the WEPS ceramics". The abrasive ceramic stays right where it is on my WEPS ceramic stones.)

And have you got any clue why the recommendation for the Shaptons is to use a some water and for the WEPS ceramics is to use them dry? Is that something about the way the stones are constructed or is it more like the "cleaning philosophy" behind the stones? (The WEPS stones can be used dry, but they do collect steel dust and require frequent cleaning.)

Keep an eye on my Youtube channel! Subscribed! It's like Youporn, but your social environment won't complain

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by mark76 - 07 May 2012 05:20

_____

I did an interesting discovery during the last few days. When you add a little bit of water to the WEPS ceramic stones, the edge seems to come out much clearer than when you use no water!

You don't need to soak the stones: just a few drops of water to keep the stones wet are enough.

The edge even approaches the mirror you normally only get after the 5K/10K Choseras or after stropping with the WEPS stropping pastes.

I was wondering whether anyone has any ideas on why the is the case.

It might seem an obvious case of "facts fit theory". The theory here is that by keeping the stones wet, you prevent clogging the stones with metal filings. This prevents the filings to scratch the edge and makes the stones more effective.

However, I doubt whether this theory holds. The reason is that the stones get just as black when you use them with water as when you use them without water. So apparently steel filings are still accumulating in/on the stone. Or am I misinterpreting this?

Is there anyone who can shed more light on this?

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by wickededge - 09 May 2012 10:19

_____

I can't speak yet to why it works so well to use water with the ceramics, but I can attest to Mark's results; I get tremendous results by keeping the ceramic stones wet. I use a spray bottle with water and a few drops of dish soap and get great results - essentially a mirror polish. After the ceramics, a few strokes with the strops and the edges gleam beautifully. Here are the Kershaw blades I just completed with that exact method:

mark76 wrote:

I did an interesting discovery during the last few days. When you add a little bit of water to the WEPS ceramic stones, the edge seems to come out much clearer than when you use no water! 😐
You don't need to soak the stones: just a few drops of water to keep the stones wet are enough.

The edge even approaches the mirror you normally only get after the 5K/10K Choseras or after stropping with the WEPS stropping pastes.

I was wondering whether anyone has any ideas on why the is the case.

It might seem an obvious case of "facts fit theory". The theory here is that by keeping the stones wet, you prevent clogging the stones with metal filings. This prevents the filings to scratch the edge and makes the stones more effective.

However, I doubt whether this theory holds. The reason is that the stones get just as black when you use them with water as when you use them without water. So apparently steel filings are still accumulating in/on the stone. Or am I misinterpreting this?

Is there anyone who can shed more light on this?

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by jendeindustries - 11 May 2012 06:01

_____

Ytreich from the Knife Forums hits the nail on the head, IMO:

The metal that adheres to the surface of a ceramic piece galls your blade badly. I've seen it under a high powered microscope, and it's not pretty.

I've also witnessed this in person. Basically, the ceramic loads up with metal flakes, and those flakes stick out like cactus needles, adding stray divots to the surface of the edge. This is somewhat similar to metal burnishing, but its overall coarseness makes it less desirable at the WEPS 1200/1600 level of refinement. We've seen that than on higher grits, metal burnishing can be more beneficial.

Don't forget the flip side - if you let the ceramics load up, they do leave a more refined edge, even if it is less perfect.

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by mark76 - 11 May 2012 06:32

---

jendeindustries wrote:

Ytreich from the Knife Forums hits the nail on the head, IMO:

The metal that adheres to the surface of a ceramic piece galls your blade badly. I've seen it under a high powered microscope, and it's not pretty.

I've also witnessed this in person. Basically, the ceramic loads up with metal flakes, and those flakes stick out like cactus needles, adding stray divots to the surface of the edge.

How do you recognize that the ceramic loads up with the metal?

The point is, when I use the WEPS ceramics with water, the stones do not come out cleaner than when I use them without water. In both cases, there is a little bit of black stuff (metal, I assume) that remains on the stones.

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by jendeindustries - 11 May 2012 07:00

There will always be some residual "black" metal swarf on the ceramic stones/steel That's part of abrading. I think the water helps keep it from accumulating to the point where it begins to burnish the metal instead of abrading into it.

==========

Re: Maintaining Waterstones for use on the Wicked Edge

Posted by AnthonyYan - 11 May 2012 07:09

Hi Tom,

Kind of a hilarious request for you....

We all love your microscope pictures of knife edges, especially your grit progression photos.

But how about some microscope images of the ceramic stones before and after use? And then with and without water? I suppose it may look like a mess with all the swarf, and nothing beautiful like a refined edge. But I'm just curious to see what the swarf looks like on the stone, and maybe (maybe?) it would be interesting.

Sincerely,

--Lagrangian

==========