diamond vs naniwa super vs ceramic vs shapton etc

Posted by KenBuzbee - 31 Aug 2012 16:24

_____

Okay, I know this has been discussed in bits here and there but can anyone generalize the differences in the edge obtained from the various materials? For this discussion, I'm talking about at the same basic grit. Say, all at 1000...

I know (well, I think I know;)) some of this but a general comparison would be helpful, both in what the edge looks like and how it performs in various scenarios.

Like you can get an 800 grit diamond plate and an 800 grit Naniwa Super, why would you choose one over the other?

Now I "think" the 800 grit diamond plate will cut faster but leave deeper scratch lines for the next progression to deal with (true or not true?)

Related to this, I've frequently read that if you plan to use a Naniwa for your finishing stone you should use it for the 2-3 prior grits too so you have fewer deeper scratches to deal with (true or not true?) If true, same for Chosera/Shaptons etc?

And where do the ceramic stones fit into all this? Scratches deeper than a Naniwa Super but shallower than a diamond plate?

Now I know the final results are what YOU want in your edge and ultimately only you can find the progression that works for you but some theory on what should be expected is a good thing to have.

Lastly, if ALL this has been beat to death in a thread I've missed, please post a link!

Thanks to all!

Ken

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by jendeindustries - 03 Sep 2012 00:38

---

jendeindustries wrote:

Here's where we begin to search deeper into the rabbit hole

Before I define "Robustness", it would be better to answer about the smoothness of an edge and its impact on durability.

As with all things sharpening, it depends. Smoothness is only one of several factors that will determine the outcome to whether or not a smoother edge lasts longer. Geometry plays one of the largest roles, as well as the steel characteristics.

That's all I can say for now - I will be back in a few hours to further answer!

OK - I'm back

Smoothness has two roles. The first, is when one sharpens for perfection. When removing all previous scratches at each level, the edge of the edge will ultimately become thinner and thinner while the "teeth" from the scratches become smaller and smaller (or less deep). This makes the edge feel smooth, as in approaching a shave-ready edge. Let's call this a "true X grit edge". For example, when sharpening for perfection up to 8K, this would be a "true 8K edge" because most/all of the scratches are 8K or 2 micron in size. That would also determine the the thinness/thickness of the edge of the edge at a given angle.

However, as the edge of the edge becomes thinner as the tip approaches the theoretical 0 width at the apex of the triangle, the steel and geometry characteristics kick in. Softer steel will roll with more ease, as will more acute geometry, giving the perception that the edge has been lost. While the edge of the edge of a "true higher grit" edge will be more fragile due to its thinness, rolling may not necessarily ruin the edge. Straight razors, for example, are easily refreshed/straightened out with a few ultra light passes on a strop. The trick with more refinement is to reinforce the geometry with microbevels and/or convexing to get them to be more sturdy. Then you run into the problem of having your edge geometry too obtuse for the task, which leads us to role #2.

The second role of smoothness is literally "polishing the grooves", and would be the definition of a "more robust" edge in my mind. In this manner of sharpening, the idea is that the edge is

shaped with coarser grits, and then those coarse grit scratches are then polished with the paste, slurry or mud - which is a mixture of loosened abrasive, binder and metal, but without the intention of establishing a "true" higher grit edge. For example, at 1K, the edge of the edge is theoretically ~16 microns thick. This is too thick for comfortable face shaving, which needs an 8K or ~2 microns thick edge to cut hairs without pulling. The 1K edge is a decent working edge because it is thick enough to withstand more of a beating without rolling (+ proper geometry and steel). If you polish the grooves of a 1K edge, you can push cut, and shave arm hair (AKA - *Smooth*), but under the scope, you still have a very toothy 1K-ish edge. We have seen this with the 1K WEPS edge followed by the 1K WEPS diamond PASTE.

So if you're still with me... Here's how we can put some of it together in a VERY general statement.

WEPS Diamonds are "true" grit.

Shapton Pro stones are "true" grit.

Chosera stones create ~90% "true grit with about ~10% polishing of the grooves.

Naniwa Super Stones are about 90% polishing the grooves and 10% true grit.

With understanding the general "philosophies" of the stones, you can now begin to pick and choose series/stones based on what you intend to do and how you want you finished edge.

So a more robust edge could be a 1K edge stropped with some 0.5 micron paste or spray.

A better slicing edge would be step by step or small leaps up to 5K or more.

And everything in between!

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by KenBuzbee - 03 Sep 2012 08:32

_____

That us the best, most concise explanation of an edge I've ever read! Thank you!

jendeindustries wrote:

WEPS Diamonds are "true" grit.

Shapton Pro stones are "true" grit.

Chosera stones create ~90% "true grit with about ~10% polishing of the grooves.

Naniwa Super Stones are about 90% polishing the grooves and 10% true grit.

....and this is exactly what I was "trying" to ask in my origional post. So easy to understand but so hard to find. I'm making a document out of this post to file away.

As a follow on, I'm assuming the WEPS ceramics also rank as "true" grit? And loaded strops as 98% polish?

Ken

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by cbwx34 - 03 Sep 2012 08:57

_____

jendeindustries wrote:

jendeindustries wrote:

Here's where we begin to search deeper into the rabbit hole

Before I define "Robustness", it would be better to answer about the smoothness of an edge and its impact on durability.

As with all things sharpening, it depends. Smoothness is only one of several factors that will determine the outcome to whether or not a smoother edge lasts longer. Geometry plays one of the largest roles, as well as the steel characteristics.

That's all I can say for now - I will be back in a few hours to further answer!

OK - I'm back

Smoothness has two roles. The first, is when one sharpens for perfection. When removing all previous scratches at each level, the edge of the edge will ultimately become thinner and thinner while the "teeth" from the scratches become smaller and smaller (or less deep). This makes the edge feel smooth, as in approaching a shave-ready edge. Let's call this a "true X grit edge". For example, when sharpening for perfection up to 8K, this would be a "true 8K edge" because most/all of the scratches are 8K or 2 micron in size. That would also determine the the thinness/thickness of the edge of the edge at a given angle.

However, as the edge of the edge becomes thinner as the tip approaches the theoretical 0 width at the apex of the triangle, the steel and geometry characteristics kick in. Softer steel will roll with more ease, as will more acute geometry, giving the perception that the edge has been lost. While the edge of the edge of a "true higher grit" edge will be more fragile due to its thinness, rolling may not necessarily ruin the edge. Straight razors, for example, are easily refreshed/straightened out with a few ultra light passes on a strop. The trick with more refinement is to reinforce the geometry with microbevels and/or convexing to get them to be more sturdy. Then you run into the problem of having your edge geometry too obtuse for the task, which leads us to role #2.

The second role of smoothness is literally "polishing the grooves", and would be the definition of a "more robust" edge in my mind. In this manner of sharpening, the idea is that the edge is shaped with coarser grits, and then those coarse grit scratches are then polished with the paste, slurry or mud - which is a mixture of loosened abrasive, binder and metal, but without the intention of establishing a "true" higher grit edge. For example, at 1K, the edge of the edge is theoretically ~16 microns thick. This is too thick for comfortable face shaving, which needs an 8K or ~2 microns thick edge to cut hairs without pulling. The 1K edge is a decent working edge because it is thick enough to withstand more of a beating without rolling (+ proper geometry and steel). If you polish the grooves of a 1K edge, you can push cut, and shave arm hair, but under the scope, you still have a very toothy 1K-ish edge. We have seen this with the 1K WEPS edge followed by the 1K WEPS diamond PASTE.

So if you're still with me... Here's how we can put some of it together in a VERY general statement.

WEPS Diamonds are "true" grit.

Shapton Pro stones are "true" grit.

Chosera stones create ~90% "true grit with about ~10% polishing of the grooves.

Naniwa Super Stones are about 90% polishing the grooves and 10% true grit.

With understanding the general "philosophies" of the stones, you can now begin to pick and choose series/stones based on what you intend to do and how you want you finished edge.

So a more robust edge could be a 1K edge stropped with some 0.5 micron paste or spray.

A better slicing edge would be step by step or small leaps up to 5K or more.

And everything in between!

Hey Tom...

I'm puzzled by some of what you say. I've seen you mention before that the thickness of the edge is based on the stone grit. If you look at some of Clay's recent microscope pics... and also the pictures in Verhoeven's study... www.bushcraftuk.com/downloads/pdf/knifeshexps.pdf ... this doesn't seem to be the case. For example, an edge sharpened on a 1000g Truhone wheel is 1m thick (p. 9), while you seem to indicate it has to be 16m thick. There are other examples throughout the paper. I do agree that a thinner edge is possible at finer grits (which the paper also supports), but maybe not to the level you describe? The edge doesn't have to be as thick as the stone rating... it does "cut thru to the other side" (which I think is your reason that it should be this way)... but the result of this is why the edge is more jagged at higher grits... not necessarily thicker (at least not the thickness of the actual grit level). More of a "side view" vs. a "straight down view" way of looking.

Part of what makes an edge cut better is reducing this jaggedness... which is why honing a coarse edge will make it cut better. You can actually make a coarse edge cut better by making a 90 deg. pass over a fine stone (Harrelson Stanley from Shapton talked about this in a sharpening session I attended, and mentions it in one of his videos). Of course the tradeoff is you make the edge thicker, so a coarse edge cut across an 8K stone wouldn't be as sharp as an edge sharpened to an 8K finish.

The other part that I wonder about, is that a fine edge is weaker, and has to be "reinforced" or made "more sturdy". The perception is that a finer edge "dulls quicker"... but the argument could also be made that it merely "dulls down to the level of the refined coarse edge"... and will then dull at the same rate. In other words, an edge that is shaving sharp will, to the user, dull faster than an edge that would never shave to begin with, because the perception is less obvious. Also, while you mentioned convex edges more in passing... most are "stronger" simply because they're sharpened at a much higher angle than a flat bevel. Obviously, a thinner profile is weaker than a thicker one, but it's not as related to the finish level that you describe? Also, a finer edge will be more influenced by any burr or wire edge that remains, that wouldn't be as noticed on a coarse edge. To put it another way... yes an 8K edge at 20 deg. may last longer than at 15 deg., but so will a 1K edge. (Both will cut better at 15 deg. though). This also helps answer the question of what angle to sharpen at.

It is obvious that an 8K edge will shave or cut better than a 1K edge... no doubt about that. Maybe, (and perhaps BassLakeDan's testing machine will show... especially if it could be combined with some actual measurements of the edge) there is higher level of sharpness achieved across a smaller width of edge? In other words, maybe it's possible that a .5m edge cuts 50x better than a .8m edge? (Just throwing

numbers in as an example). So, while there's not necessarily as great a change as you describe... even the smaller change results in a more obvious result? This combined with reducing the jaggedness of the coarser grit, is why it will cut better. Just food for thought.

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by jendeindustries - 05 Sep 2012 07:38

_____

CBW - those are some great thoughts.

I had a really great answer with quotes and everything that just got wiped out. 😉 😉
So I will give the short answer..

The edge doesn't have to be as thick as the stone rating... it does "cut thru to the other side" (which I think is your reason that it should be this way)... but the result of this is why the edge is more jagged at higher grits... not necessarily thicker (at least not the thickness of the actual grit level). More of a "side view" vs. a "straight down view" way of looking.

You are correct that my reasoning is because it cuts through the other side. This visual example has worked well, and is theoretical. The biggest flaw with using this example is that a 1K edge is not always a 1K edge due to all the factors such as polish vs true grit, grit concentration, etc. Verhoeven's pictures don't lie, and I might just have an explanation for it (this is the brilliant part that got axed 😉)

1. The True hone has 2 wheels that overlap, and theoretically terminate at a near ~0 width.

2. ANSI Grits on the true hone (which we don't really know of for sure) would give us somewhere in the 2K-3K Range (or ~6-8 micron area) for the 600 wheel. Since it was run dry, and there was no indication of Verhoeven cleaning or dressing the wheels during the experiments, we can assume that the wheels became loaded with metal and abrasive dust, thus making them finer. Verhoeven inadvertently points that out on p.8, when he claimed no real difference between the 200 and 600 stones.

3. The 1K wheel was used wet, and due to their "smoother appearance", that tells me the 1K wet wheel formed a paste, increasing the polishing of the grooves effect. Furthermore, he "found that the edge width was increased over these values if the 1000 grit wheels were used dry" (p.8).

4. Since the true hone is mechanized, any polishing of the grooves effect actually becomes an act of creating a "true grit" finish, as concluded on p.36 with the buffing wheel section, so the paste from the 1K wheel actually acted like a very fine abrasive.

So put it all together and throw in with a little technique, and I think that's how he got his 1 micron wide edges.

I need to address the rest of your post... soon!

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by cbwx34 - 05 Sep 2012 08:26

_____

I'll wait for the rest of your reply... but don't get too caught up in the Tru Hone itself. That was just an example... there are numerous ones with different methods throughout the paper. (Also don't forget Clay's pics.). (I was afraid the TruHone would become the focus... that's why I added "other examples" in my first post).

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by jendeindustries - 06 Sep 2012 07:32

_____

I won't get too caught up in the Verhoeven or the True Hone - The Verhoeven is a great starting point. His first few pages are spot on with my experiences with sharpening, but I see some flaws and lacking to the experiments, especially the water stone section. On the other hand, he probably gets the best True Hone edges in the world!!

Part of what makes an edge cut better is reducing this jaggedness... which is why honing a coarse edge will make it cut better. You can actually make a coarse edge cut better by making a 90 deg. pass over a fine stone (Harrelson Stanley from Shapton talked about this in a sharpening session I attended, and mentions it in one of his videos). Of course the tradeoff is you make the edge thicker, so a coarse edge cut across an 8K stone wouldn't be as sharp as an edge sharpened to an 8K finish.

Right - and this is a very good example of "polishing the grooves" IMO.

The perception is that a finer edge "dulls quicker"... but the argument could also be made that it merely "dulls down to the level of the refined coarse edge"... and will then dull at the same rate. In other words, an edge that is shaving sharp will, to the user, dull faster than an edge that would never shave to begin with, because the perception is less obvious

Agreed. Even amongst straight razor shavers, there is a debate about edge retention being longer on lower grits (8K-10K) than on higher grits, despite the shaves being much closer and longer lasting off the higher grits. This is where the "pencil point" theory enters the game - in which every edge of the edge, no matter what the geometry, will ultimately approach the point of 0 width, and just like a freshly sharpened pencil, the fresh point/edge is ohh-so good, but quickly degrades to a "work sharp" that lasts considerably longer than the fresh edge.

Also, while you mentioned convex edges more in passing... most are "stronger" simply because they're sharpened at a much higher angle than a flat bevel. Obviously, a thinner profile is weaker than a thicker one, but it's not as related to the finish level that you describe?

This is a very interesting aspect that I've been having thoughts about for some time now and would have now to agree with you and now the Verhoeven about reduced jaggedness. Geometry helps to influence the ease of cutting, with more acute geometry cutting with greater ease than more obtuse geometry, and refinement doesn't necessarily play as major a role in most cases. I believe that technique trumps refinement 90% of the time. But the technique in being able to get that is another issue. Since I've been involved in sharpening, it's almost always been the case with less advanced sharpeners that refinement fills the lack of technique gap.

It is obvious that an 8K edge will shave or cut better than a 1K edge... no doubt about that. Maybe, (and perhaps BassLakeDan's testing machine will show... especially if it could be combined with some actual measurements of the edge) there is higher level of sharpness achieved across a smaller width of edge? In other words, maybe it's possible that a .5m edge cuts 50x better than a .8m edge? (Just throwing numbers in as an example). So, while there's not necessarily as great a change as you describe... even the smaller change results in a more obvious result? This combined with reducing the jaggedness of the coarser grit, is why it will cut better. Just food for thought.

I think thinner width edges will cut better because of less surface area/resistance to sever into and cut the material/fibers, but that increases the amount of force put on a smaller area the edge, which could help to explain why thinner edges seem to degrade faster.

The next area to look into is what is the "optimal" thickness of a given edge for a given task.

For example, food prep doesn't require the thinnest edges (ask any wife!), and many butchers actually prefer a very coarse/toothy saw-like edge to rip the meat rather than slice.

Great Stuff, CBW!

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by PhilipPasteur - 06 Sep 2012 11:12

_____

Tom,

hit is a different subject, but I am curious about what you mean when you say techique trump refinement 90% of the time. Maybe I am not getting the "Zen" of sharpening. At the risk of showing my ignorance, I would like to ask you to explain why this would be so. I have aloways thought that the goal of technique was simply to get a knife sharp. If we define sharp as cutting well, and as has been discussed here, as least for some tasks a refined edge cuts better (therefor is sharper)I don't quite understand how technique trumps refinement. Technique, it would seem is the process of getting there, refinement is a result of the process. Or so I have thouhgt. Perhaps my problem is with the concept of refinement versus sharpness or cutting ability. I would enjoy reading your thoughts on this!

Phil

jendeindustries wrote:

This is a very interesting aspect that I've been having thoughts about for some time now and would have now to agree with you and now the Verhoeven about reduced jaggedness. Geometry helps to influence the ease of cutting, with more acute geometry cutting with greater ease than more obtuse geometry, and refinement doesn't necessarily play as major a role in most cases. I believe that technique trumps refinement 90% of the time. But the technique in being able to get that is another issue.
Since I've been involved in sharpening, it's almost always been the case with less advanced sharpeners that refinement fills the lack of technique gap.

Great Stuff, CBW!

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by jendeindustries - 06 Sep 2012 19:21

Hey Phillip!

The process for getting a knife sharp is the easy part of the technique side, but maximizing the stone's potential is the more difficult part, IMO.

This goes back to understanding the "philosophy" of each stone as to whether it is a polisher or a true grit type, but also to understanding how pressure plays a role, and how to utilize the mud/paste, if at all. For example, using the WEPS stock ceramics clean makes them more aggressive while letting them load up with dust makes them act finer. Neither is wrong, yet neither is always right. Knowing the different ways to approach a given stone, and knowing when and how to employ these different features will make your edges that much better at a given grit.

In my own sharpening, I can get the 1,500 Shapton Pro stone to push cut paper and shave hair. Adding the 5K at the same angle only improves the slicing ability. Just to brag
I have a friend who is quite capable of sharpening his own woodworking tools, but he has told me that my 1,500 grit edges are still better than his 8K edges. This is simply because I have a lot more time in on that stone than my friend does, and know how to maximize its potential.

In the mean time, in order to match my 1500, it's taking my friend an 8K stone, or more refinement. With Verhoeven's edges being 1 micron wide at lower grits, the idea that the shape is more important than the smoothness aligns with my thoughts.

==========

Re: diamond vs naniwa super vs ceramic vs shapton etc

Posted by cbwx34 - 07 Sep 2012 12:06

StevenPinson wrote:

Nania SS will form a paste or will not form a paste depending on how "YOU" use them. They are a splash and go stone. Keep them wet and they will provide a nice paste base that will polish very well. Let them dry as you use them, and they will start to cut and impinge.

I have used the SS line for quite a while now and for the cost/performance they are very tough to beat.

Hey Steven...

I wanted to revisit this, after having a chance to use the ones I have again (been a while). I have these...

www.toolsforworkingwood.com/store/dept/T...-Stones%22_by_Naniwa

Are these the ones you were referring to when you said they made a paste? They're good stones... but no matter how wet I keep them... they don't create any paste... maybe a little on the lower grit, but nothing on the fine ones. They do sharpen and polish well though....

Maybe you, or someone can tell me if these are the stones you're referring to, and/or are they different on the WE?

Thanks

==========