What is the use of a convex edge

Posted by mark76 - 17 Jan 2013 09:36

I moved Ken's question to a separate thread, since it is about a different topic that might develop into a whole new thread. Ken refers to the following thread: www.wickededgeusa.com/index.php?option=c...d=8534&Itemid=63

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Re: What is the use of a convex edge

Posted by PhilipPasteur - 18 Jan 2013 10:12

BluntCut wrote:

To me convex is more about no abrupt shoulder transition and bevel curvature. Curvature where could be optimize for max flow through material - think what shape a submarine/bullet/airplane-wing/etc yup mostly convex. Clear as mud

When you are talking about the shapes you mention, keep this in mind, thos designs are done using fluid dynamics as the basis. We typically are not cutting fluids nor gasses. The sharpest things I know of, microtome blades and obsidian scalples, used to part relatively soft solid material very cleanly and with low effort, they do not use a convex edge.

This is an interesting quote that sort of talks about cutting real world solids:

"I read a comment once where the writer had claimed the convex grind or rolled edge has less friction because it only contacts on a tangential point. This would be true if only the material being cut has no give, no movement, no springiness to it. Also, as that material is cut, it would just open up, not pinch, but contact rigidly at one single point. But just what material would that be?"

Jay Fisher

www.jayfisher.com/index.html

What contributes most to the amount of friction encountered in cutting is the

actual blade grind rather then the bevel... or so I think. This would be true especially when cutting

anything with a thickness that is an appreciable percentage of the blade height.

Yes, your explanation is clear as mud... but I think I got what you said anyway...

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Brought this over from the original thread

Posted by KenBuzbee - 18 Jan 2013 10:17

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leomitch wrote:

Hey Mark

I loved your blogs on the convex edge, excellent work my friend!

I wonder if this isn't good spot to pop in a little history of the convex edge.

It is probably the oldest method of sharpening around. Even in the early times of metal blades a la the bronze age, the easiest method of sharpening for the common fellow was to sit in his camp during the early evening passing his blade edge along a handy stone of suitable hardness creating or rebuilding the sharpest edge he could manage in the simplest way available. Another time stopping by a rocky stream tumbling down a mountain side for a drink, he might pause in his travels and again work on that edge. As Ken pointed out, a convex edge is a bit of a cheat since it is impossible to guarantee the angle when sharpening this way manually, but eventually the edge would obtain that wonderful bullet shape ogive that gives one a substantial edge for heavy duty tasks...for this bronze age fellow chopping wood, blazing a trail through those ancient tractless forests, killing and rendering after hunting down some animal or another and lets not forget self defense, for cleaving through bone and armour when the occasion arose.

For the guy who sharpens by hand , it is the natural product of sharpening and stropping manually daily, eventually the convex edge will appear.

Using the modern tools like the WEPS as Mark has described so beautifully in his blog, makes the building of this kind of well supported edge an easy task and it can be maintained easily and for a long time simply by stropping on something handy, be it a piece of leather with or without compound,on your jeans, a piece of sandpaper or even a piece of newsprint. Using any of these will keep that excellent round shoulder and ogive sharp and ready for cutting, slicing, chopping and whatever. Hopefully though, not for cleaving through armour and the bones of enemies! LOL!

So down through the ages the convex edge has been the useful companion of the ordinary man, simple and reliable...not always super sharp at first, but eventually through daily stropping, it becomes a strong and very sharp edge. An axe is an excellent tool that utilizes a convex edge and one can see in this useful tool a convex edge working at its strongest and finest.

Enough? I guess so, I do go on yes?

Leo

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Re: Brought this over from the original thread

Posted by KenBuzbee - 18 Jan 2013 10:40

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Thanks Leo,

Hope it's okay I brought this over?

You put into words what I'd always thought about convex edges. Heck, when I first started sharpening around age 8-9 I managed to convex my knife, and I didn't even know the word "convex" back then. Freehand on a cheap composit stone, it just happened. It didn't help that the stone got badly dished out, I didn't know the word "lapping" back then either

Anyway, for a knife you'll keep in the field and touch up by hand, I can see the use.

And I agree that whacking tools like them. My Granfors Bruks has a lovely convex edge.

As to the earlier statement of C inside V or V inside C, I'm not sure I agree with it. I guess I need pictures, but it seems either way the angle will be greater with a convex edge. Granted, you can mitigate this on a slicer by keeping the whole structure thinner, but it will never be as "sharp" as a pure V. And then we start getting into the micro convex (like a micro bevel) This has been discussed as rounding the edge while stropping. Generally referred to as a thing not to do but it may have it's place? No idea, really, just thinking it over.

Regardless, it seems trying to intentionally create a convex on the WEPS, setting 4-5 different angles along the way is way more complicated than putting a simple V on the knife and unless you're then maintaining it with a hand stone in the field, more work to maintain as well.

Great discussion guys,

Ken

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Re: Brought this over from the original thread
Posted by mark76 - 18 Jan 2013 13:22

Thanks for moderating, Ken. I'll recommend you to Clay

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Re: Brought this over from the original thread
Posted by mark76 - 18 Jan 2013 13:22

Thanks a lot, Leo! That puts things in historical perspective. I knew you are old and wise, but didn't know you are that old

It is interesting that you mention that a convex edge is the edge of choice on an axe. It is also used a lot on outdoor knives. (There was a reason I put it on my A1.) Interestingly enough it is not used a lot on kitchen knives. Would that say something about the use of a convex edge?

leomitch wrote:

Enough? I guess so, I do go on yes?

Leo

Can I stop you?

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Re: What is the use of a convex edge
Posted by mark76 - 18 Jan 2013 13:31

PhilipPasteur wrote:

BluntCut wrote:

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[...]

What contributes most to the amount of friction encountered in cutting is the

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Yes, your explanation is clear as mud... but I think I got what you said anyway...

Very interesting, Bluntcut and Philip.

I know little about fluid dynamics and how it compares to friction in a solid material (if anyone can explain me, that'd be great), but what strikes me is that indeed for cutting relatively soft materials (food, tissue) a V-bevel is usually preferred. And for cutting hard material (wood with an axe or an outdoor knife)) a convex bevel seems preferred.

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Re: Brought this over from the original thread

Posted by KenBuzbee - 18 Jan 2013 13:43

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mark76 wrote:

Thanks for moderating, Ken. I'll recommend you to Clay

I'm there for you, brother

Ken

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Re: What is the use of a convex edge

Posted by PhilipPasteur - 18 Jan 2013 13:51

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[quote="mark76" post=8587]**PhilipPasteur wrote:**

BluntCut wrote:

What contributes most to the amount of friction encountered in cutting is the

actual blade grind rather then the bevel... or so I think. This would be true especially when cutting anything with a thickness that is an appreciable percentage of the blade height.

Very interesting, Bluntcut and Philip.

I know little about fluid dynamics and how it compares to friction in a solid material (if anyone can explain me, that'd be great), but what strikes me is that indeed for cutting relatively soft materials (food, tissue) a V-bevel is usually preferred. And for cutting hard material (wood with an axe or an outdoor knife)) a convex bevel seems preferred.

After the blade cuts through the surface and penetrates more than the thickness of the bevel the sides of the material start sliding along the blade grind itself. For instance a full flat grind would have more of the main part of the blade in contact with the material at one time versus a hollow grind or a convex grind. If you are cutting something where a major portion of the blade is engaged with the material, the sides of the blade will contribute more friction or resistence to cutting to the overall effort required than the bevel. Maybe if you think about slicing an onion horizontally you will get the picture. If it is a large onion, at some point the entire height of the blade may be between the onion and the slice you are creating. At

that point the sides of the knife contribute more to the cutting effort by quite a bit than anything done at the bevel.

I was reading more of that article that I quoted before. Jay Fisher was talking about his preference for hollow ground blades for combat knives, particularly because the blade geometry itself provides less resistence in slashing or slicing actions.At least in his estiamtion. Admittedly this difference must be very small, but then the difference of cutting force produced at the edge between a convex edge and a V is likely even smaller... This was the point that I tried to make initially.

Is that clear as mud ??

BTW, here are some links to papers done that try to develop a model for sharpness (in the first one) and cutting resistence as it relates to bevel angle (sharpness) in the second one. A little off topic, but interesting just the same.

www.ucd.ie/mecheng/staff_pages/pdfs/Gilchrist_2007a.pdf

www.ucd.ie/mecheng/staff_pages/pdfs/EFM_2010_Sharpness_II.pdf

I though Bluntcut would find these fascinating...

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Re: What is the use of a convex edge

Posted by KenBuzbee - 18 Jan 2013 14:11

I like mud!
(and slurry!)

One additional thing (which is not actually very relevant but may be interesting to think about) I've found rarely discussed is the moisture and texture of what you are cutting (speaking mostly of food here) and the overall bade geometry.

With a typical FFG knife cutting a firm moist substance, I get a lot of resistance from (what in the

stropping threads we've termed stiction) the material.

Examples would be apples even more kohlrabi and even more sweet potatoes. The resistance goes off the charts as the cut goes deeper, regardless of how sharp the knife is.

One thing I've noticed here is using a thinner (spine to edge) knife with (essentially) parallel sides seems to make a huge difference. An example would be an Opinel carbon paring knife (only cited because it's one I use for this solution).

I think this is what some companies are trying to address when they put dimples or bumps on a knife's surface but I've never found those actually helped much.

We now return to our regularly scheduled discussion of convex edges....

Ken

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Re: What is the use of a convex edge

Posted by mark76 - 18 Jan 2013 14:40

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That's a nice level of quotes, Phil. Almost recursion
: The forum software apparently cannot keep up anymore

You make some very interesting points.

PhilipPasteur wrote:

If you are cutting something where a major portion of the blade is engaged with the material, the sides of the blade will contribute more friction or resistence to cutting to the overall effort required than the bevel. Maybe if you think about slicing an onion horizontally you will get the picture. If it is a large onion, at some point the entire height of the blade may be between the onion and the slice you are creating. At that point the sides of the knife contribute more to the cutting effort by quite a bit than anything done at the bevel.

I understand. Good point.

After the blade cuts through the surface and penetrates more than the thickness of the bevel the sides of the material start sliding along the blade grind itself. For instance a full flat grind would have more of the main part of the blade in contact with the material at one time versus a hollow grind or a convex grind.

I don't understand this. Why is this the case? Is it always the case, or does this depend on the type of material?

Also, you're talking about fully convex blades and fully flat blades. Before we were talking about edges only. Does you argument scale down to edges?

BTW, here are some links to papers done that try to develop a model for sharpness (in the first one) and cutting resistence as it relates to bevel angle (sharpness) in the second one. A little off topic, but interesting just the same.

www.ucd.ie/mecheng/staff_pages/pdfs/Gilchrist_2007a.pdf

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I though Bluntcut would find these fascinating...

Me too. Very interesting! Also outside the scope of our discussion. Many thanks, even though right now I don't have the intellectual energy to try and understand them.

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