Angle changes on the Wicked Edge - blade curves

Posted by mark76 - 08 Nov 2012 13:26

Clay has written a few times already why the sharpening angle does not change on the straight part of a blade when using the WEPS (here and here). And in a brilliant post Anthony Yan recently even proved this mathematically.

However, this is all on the straight part of the blade. I wanted to know what the angle is on the curve towards the tip. As most of us probably know, the sharpening angle does change on this part of the blade.

Obviously the angle change depends on the form of the tip. Therefore I wanted to know what theoretically the maximum angle change is.

I thought this would involve some pretty complicated mathematics. But when I elaborated it, it appeared to be more simple than I initially thought it would be. The outcome is that if you are sharpening a blade at an angle x, the maximum angle change is:

x – arctan(tan(x)/sqrt(2)).

So, for example, at an angle of 25 degrees, the maximum angle change is about 6 degrees.

You can read all about it on my blog .

I am curious for your comments. Even though it involves high school mathematics only, my high school trigonometry is quite rusty

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Re: Angle changes on the Wicked Edge - blade curves

Posted by razoredgeknives - 08 Nov 2012 16:17

If I understand you correctly, I had the same question that Anthony answered in the thread you posted.... Look at the below post on that thread, is this what you werewwanting discussion on? I thought he explained it nicely!

www.wickededgeusa.com/index.php?option=c...0&Itemid=63#4229

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Re: Angle changes on the Wicked Edge - blade curves
Posted by Geocyclist - 08 Nov 2012 21:25

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Very nice piece of work (your blog).

Getting down to brass tax, I guess the big question is how to set the blade in the vice (length wise) bring the tip close enough to the pivot. Would it be as simple as making "a" = "a" (referring to "a" on your diagrams). Such that the distance to the flat edge is the same as to the tip (i.e. make the tip and the edge "points" on the circle).

If this is true it would be easy to set with a protractor, or other tool.

How did you check the angle at the tip?

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Re: Angle changes on the Wicked Edge - blade curves
Posted by PhilipPasteur - 08 Nov 2012 21:28

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Just curious Mark, how do you get to the theory?

Off reading your BLOG now..

edited out questions that might be answered there... until I understand your blog...

Phil

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Re: Angle changes on the Wicked Edge - blade curves
Posted by cbwx34 - 09 Nov 2012 09:10

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Hi Mark:

It must be right because I don't understand it!

I have a couple of questions for you to look at...

First is this quote:

Initially it may be difficult to grasp that the angle does not change along the straight portion of the blade, because intuition says that the further the sharpening stone is from the pivot point, the more acute the angle will become. If the stone were always perpendicular to the edge, this would indeed be the case. **H owever, the stone can rotate around its axis on the guide rod and the recent Wicked Edge version even has a ball joint.**

While it is correct that the angle doesn't change along the straight portion (that's well established), I don't think it has anything to do with the stone rotating around the guide rod. If you follow the stone movement as you sharpen the straight portion, it simply slides up and down. You can mark the stone and rod so that it's a straight line... it will always follow that line. You can eliminate the ball joint by simply doing this with the old arms. Rotation does come into play as the stone travels around the curve of the tip though.

2nd is this diagram...

While I understand why you picked the location of the knife... because the tip lines up with the vertical line, isn't that, in a sense a "meaningless" point? Since the knife can be clamped at any location... you can move the knife back so that the tip follows the circle, which, if I understand your diagram would mean a 0 degree change. OTOH, you can move it so that it's inside the circle, or beyond the point you did your calculations, which would result in a whole new set of calculations. Or am I missing something here?

If I'm reading it right, it does demonstrate why moving the knife along a horizontal axis does change how the stone sharpens around the curve of the tip... and how it can be changed, but not that there's a X degree change around every tip.

Thanks!

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Re: Angle changes on the Wicked Edge - blade curves

Posted by PhilipPasteur - 09 Nov 2012 09:41

I think that what Curtis said is what bothered me a bit. There is nothing that takes into consideration the actual tip distance from the pivot point in Mark's calculation.

I think that Clay's diagrams and discussion here:

www.wickededgeusa.com/index.php?option=c...eneral&Itemid=46

And above

Shows this effect well. I can say empiricaly I do not get anywhere close to this 4 to 6 degree variance on the tips of knives that I sharpen, even some that are 8 inches long. With proper blade placement I have a hard time measuring, with dial calipers, the difference in the bevel width. When I have run the calcs before that put the delta in the under one degree range.

The presentation was masterful, but I think that some varaibles are not accounted for.

Phil

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Re: Angle changes on the Wicked Edge - blade curves

Posted by Geocyclist - 09 Nov 2012 19:28

All very interesting here.

In Clay's article he says to verify the angle with a sharpie and adjust blade position in the clamp.

1. Does anyone have any other tricks?

2. Do you have any tricks to make sure you put the knife exactly back in the vice next time?

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Re: Angle changes on the Wicked Edge - blade curves

Posted by wickededge - 09 Nov 2012 23:21

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I do use the alignment guide every time now. CBW has a nice method of using the stone itself to measure the distance from from the pivot to the blade edge and then adjusting the tip to be at the same distance. I haven't verified his technique yet, but it makes sense. I'd love to hear peoples' results with CBW's technique.

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Re: Angle changes on the Wicked Edge - blade curves

Posted by PhilipPasteur - 10 Nov 2012 00:22

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I would love to understand what CBWs technique is....Did I miss something (again)...

Would be happy to try it out, once I understand what it is...

One other thing... again being stupid... or just asking to define terms.

What alignment guide are you referring to... the "length gauge"

Lost a bit here...

Phil

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Re: Angle changes on the Wicked Edge - blade curves

Posted by KenBuzbee - 10 Nov 2012 08:05

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PhilipPasteur wrote:

One other thing... again being stupid... or just asking to define terms.

What alignment guide are you referring to... the "length gauge"

You got it, Phil. It's the A,B,C... guide.

Ken

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