Unwanted tempering while sharpening by hand...?

Posted by razoredgeknives - 04 Feb 2013 21:20

Ok, so lately I've been trying to investigate something that I came across on one of the forums (forgot which one) and wanted to bring it "home" here on WEPS

Here is the quote by a guy named Roman Landes (I don't know much about him, but apparently he is a dutch metallurgist?)

"Grinding generates energy (heat) and every step of sharpening is grinding even the strop.

This heat can be sucked away by the right coolant such as water.

If the grinding action lacks the coolant, the heat goes mostly into the torn out part and the body (blade/edge) it was torn off.

It becomes obvious to see the induced energy when you see the sparks fly (Burning steel!!).

Depending on how hard you go over the piece the more energy is induced the hotter it gets, thats basic physics.

Than the guys come and say but I can do it so sensitive that the edge will not suffer and I'm dipping the blade each run into cold water....

Well that is a nice effort, but when it comes down to the very edge this tiny fraction is overheated faster, than the eye can see or the wrinkled fingers can feel.

Unfortunately the edge becomes thinner the close you come to the very edge/point means generated heat will get jammed in the tip.

In addition to that tempering colors that would visually proof this are ground away immediately when they appear.

and Stainless steels need a higher temperature to generate tempering colors and longer time to build them up.

Nevertheless one can do metallurgical examination that can proof the issue testing micro hardness

There are some old german study's that examined this issue in the very detail.

I had a book dedicated to general grinding methods, in this book i found a test application.

A normal steel block apx. 2"x2"x4" that had a large number of highly sensitive

thermocouples integrated in the surface.

The block was slit dry by hand over a 1000grit grinding paper.

The peak temps measured, walked up to 2000°C for split seconds in the very surface (some microns).

Of course the block did not melt since the volume fraction of induced heat was to tiny to affect such a large solid piece of steel.

But the effect was there and proofen.

In a edge we just talk about some microns of material, here the effect is solid an clear.

Every manufacturer of razorblades knows this and does excessive cooling whilst grinding and polishing edges, that need to hold an super sharp edge for very long.

It seems just some the magic makers out of the custom knife scene think, the physical principles like this, do not apply to them...."

So if this sample was done on a block of steel (not even a thin knife edge) by hand, dry, is this a concern on the WEPS? And if it is, they wouldn't (as others have asked) you damage the temper in your edge each time you cut through abrasive cardboard? Should we start using water on the stock diamond stones?

I hope some of you can chime in in this "investigation" with scientific/metallurgical facts

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Re: Unwanted tempering while sharpening by hand...?

Posted by razoredgeknives - 04 Feb 2013 21:27

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I have also been told by a friend who knows a metallurgist, that to temper or damage temper in a knife it takes 2 things: time and heat. When you sharpen something, even on powered equipment, you have not met the time element to actually damage the steel molecules.

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Re: Unwanted tempering while sharpening by hand...?

Posted by blacksheep25 - 05 Feb 2013 01:28

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Are you changing the temper, even with a Japanese water stone? Very likely yes. To what degree would be determined by how much heat is applied, the Japanese water stone applies the least; a belt sander throwing white hot sparks, probably lots. The Wicked Edge system is likely closer to the water stones. But the more important question is, what are you going to do about it? A simple solution would be to immerse your WEPS in a huge tub, and sharpen everything completely covered in water.

The next question would be how are you going to measure how much you've changed the temper? There's probably a microscopic hardness tester that measures down to the atom level, but sounds like a great topic for a doctoral thesis!

I tend to believe that sparks coming off from a blade on belt grinder WILL meet the time requirement to change the temper, especially at the microscopic level. No hard scientific data, just a hunch. IMHO, life's too short for "molecule polishing". =)

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Re: Unwanted tempering while sharpening by hand...?

Posted by cbwx34 - 05 Feb 2013 10:23

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Hey Josh,

I've read this before. While the test was hand rubbing a block of metal on sandpaper to generate heat, if you read Landes posts on Bladeforum, his concern or issue seemed more related to the heat generated in power sharpening. My impression was that it got translated into hand sharpening, because the metal block was hand rubbed on the sandpaper. Not that you can't heat a blade hand sharpening, but it's not that easy. If they had rubbied it with a machine, I'm not sure the leap would have ever been made. Plus, the test seemed designed specifically to see how much heat could be generated, so, not having read the test, I would wonder the duration, pressure, etc. used? Even in the quote, they were measuring this in microns.

Of the many dulling factors there are in sharpening, and the subsequent cutting, this factor would be pretty far down the list, and my opinion, would only matter in some pretty specific/technical cutting. Everyday use? I'd say no.

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