

The Use of Hanging Strop in Knife Sharpening and Maintenance

By Vadim Kraichuk

Australians are blessed to have Kangaroo tails readily available, unlike our overseas counterparts. To my shame, after using cow, horse and suede strops for years, it was only by chance, following a request from our overseas customers that I first acquired a couple of Kangaroo tails.

After I figured out how to make a hanging strop of the 'roo tail, I tested an assortment of carbon steel, stainless and wear-resistant knives I had around. I measured their sharpness using the BESS sharpness tester before and after stropping, and instantly became a convert. We have two videos on the Knife Grinders' YouTube demonstrating it better than words can say: *Kangaroo Tail Strop Effect on Sharpness*, and the stropping step in the end of the video *How We Sharpen Japanese Knives on Tormek*.

We are talking about two aspects here: what a hanging strop in general does to the knife edge, and what makes the Kangaroo **tail** strop so special among the hanging strops.

What does hanging strop do to the edge?

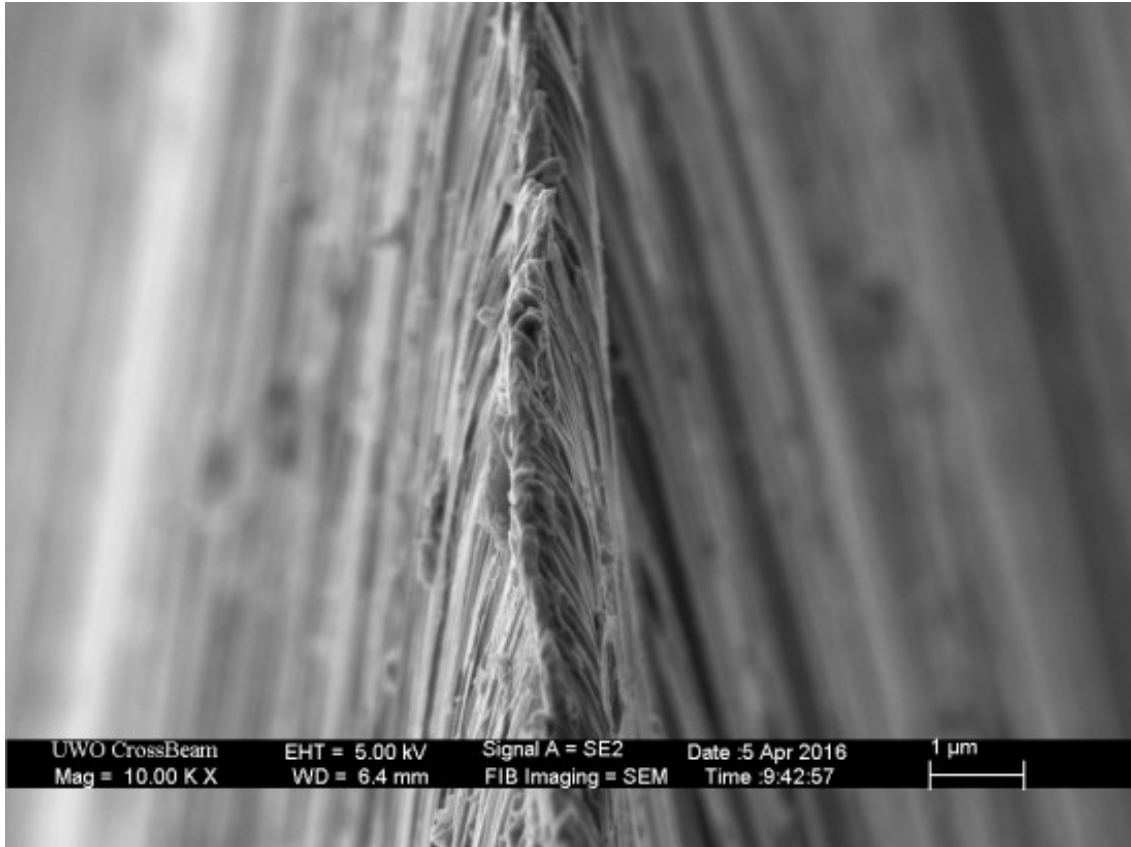
In our experiments we use the hanging strop "as is", without any honing compounds. After sharpening, very thin foils of the residual burr can easily flop back and forth. In order to remove these, you need to bend them further down into the apex where they break. For this, stropping is performed at a higher than the edge angle. The advantage of the hanging strop in high-angle stropping (as compared to a firm flat strop) is that by adjusting the tension on the strop and the downward force on the blade, we can increase the stropping angle at the very apex while stropping the bevels.

This study has helped to identify four aspects of the plain hanging strop effect:

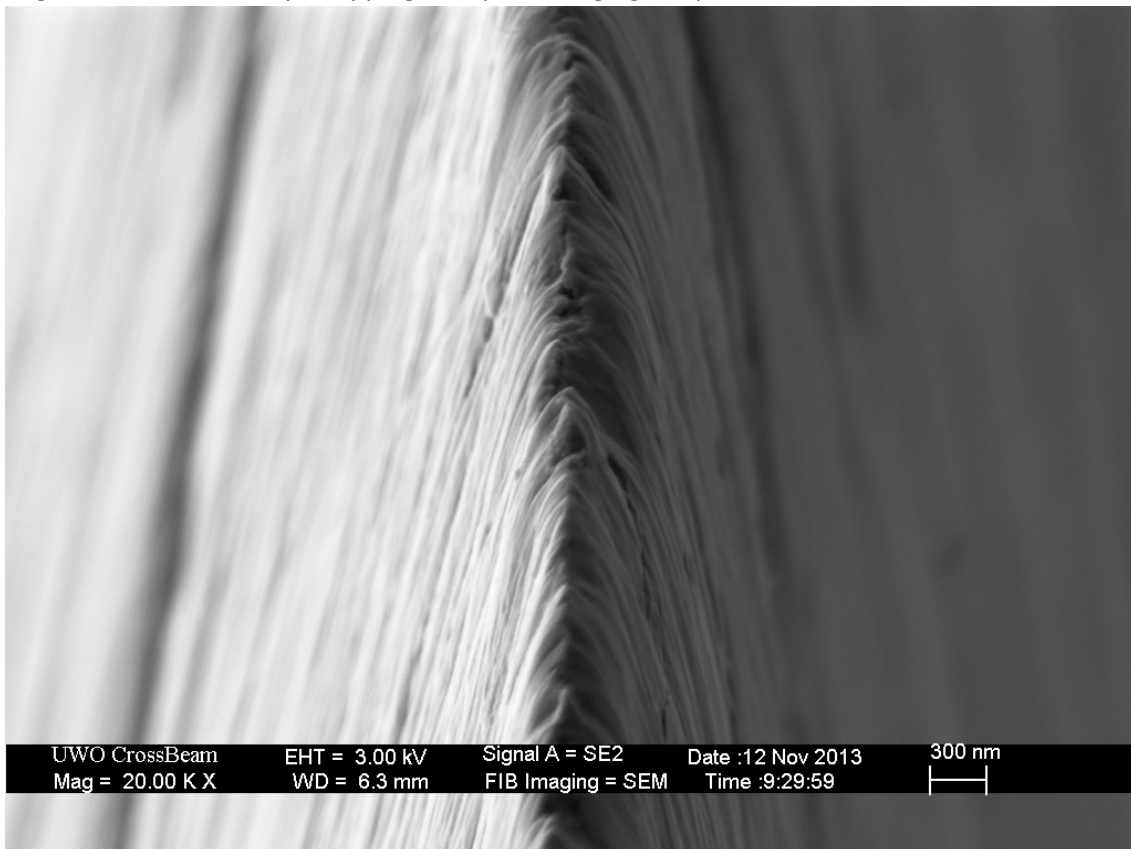
- High-angle stropping removes microburr and wire edge, resulting in a dramatic improvement of sharpness and edge retention.
- Hanging strop can realign the rolled edge, recovering its sharpness. Although knives are made of hardened steel, the very edge is malleable in mainstream knives, allowing us to reverse the rolling to some degree.
- On premium knife steels stropping can burnish a razor-sharp strip of steel over its wear-resistant carbides at the apex, making the edge hair-splitting sharp. As we know, burnishing displaces metal not abrading it.
- Stropping removes oxidation from the edge. Thanks to this, the edge yields extra 20 BESS improvement in sharpness.

SEM studies of the plain hanging strop effects show that the hanging strop not only cleans the edge of the residual burr and smoothes away scratches, but also imparts the edge apex micro-convexity, making it stronger without reducing the apex radius. The following SEM images are by courtesy of Todd Simpson.

Edge-on SEM before stropping:



Edge micro-convexed by stropping on a plain hanging stop:



The goal of this study is to compare a cow hanging strop to Kangaroo tail by testing edge sharpness before and after stropping. If we see a measurable advantage of the Kangaroo tail hanging strop over the cow, the next step will be comparing effects of the Kangaroo tail to the Kangaroo body skin strop to see if it is the tail that makes it so special.

Knives we use in the experiments are all identical, Victorinox Catalogue # 5.8401.14

Knife steel X50CrMoV15 - Carbon content 0.5% at HRC 56-58.

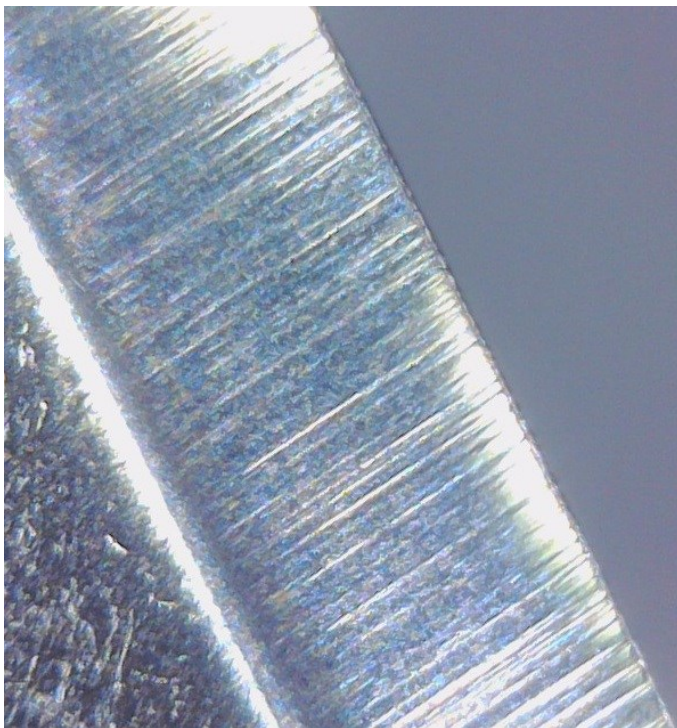
These are decent quality mainstream knives, the similar steel is used in Wüsthof, Zwilling Henckels, etc.

Experiment #1 – Effect of hanging strop in deburring

We set the edge at 12 dps using our CBN wheel #1000. Then honed on a rock-hard felt wheel with Autosol at the edge angle – this removes the burr, but usually produces a wire edge with some residual foil microburr.

We define **wire edge** as a product of burr honing, when the burr root is shaped into an edge rather than deburred. The wire edge is indistinguishable to the naked eye, you cannot feel the wire edge with your finger, and it is tricky to see under the microscope.

The following optical microscope image shows a wire edge.



We can recognise presence of the wire edge by the edge behaviour during cutting.

A seemingly ultra-sharp edge will be slicing with snagging, or start a smooth cut but end with tearing - indicating a weak edge folding in the process. This edge will dull quickly.

In our workshop we readily identify the wire edge by an abnormally poor score on the BESS sharpness tester.



In this experiment, the knife marked #1 is for testing the cow hanging strop, while the knife #2 is for Kangaroo tail.

Knife #	#1	#2
Strop	Cow hanging strop	Kangaroo tail hanging strop
Initial BESS score	240	230

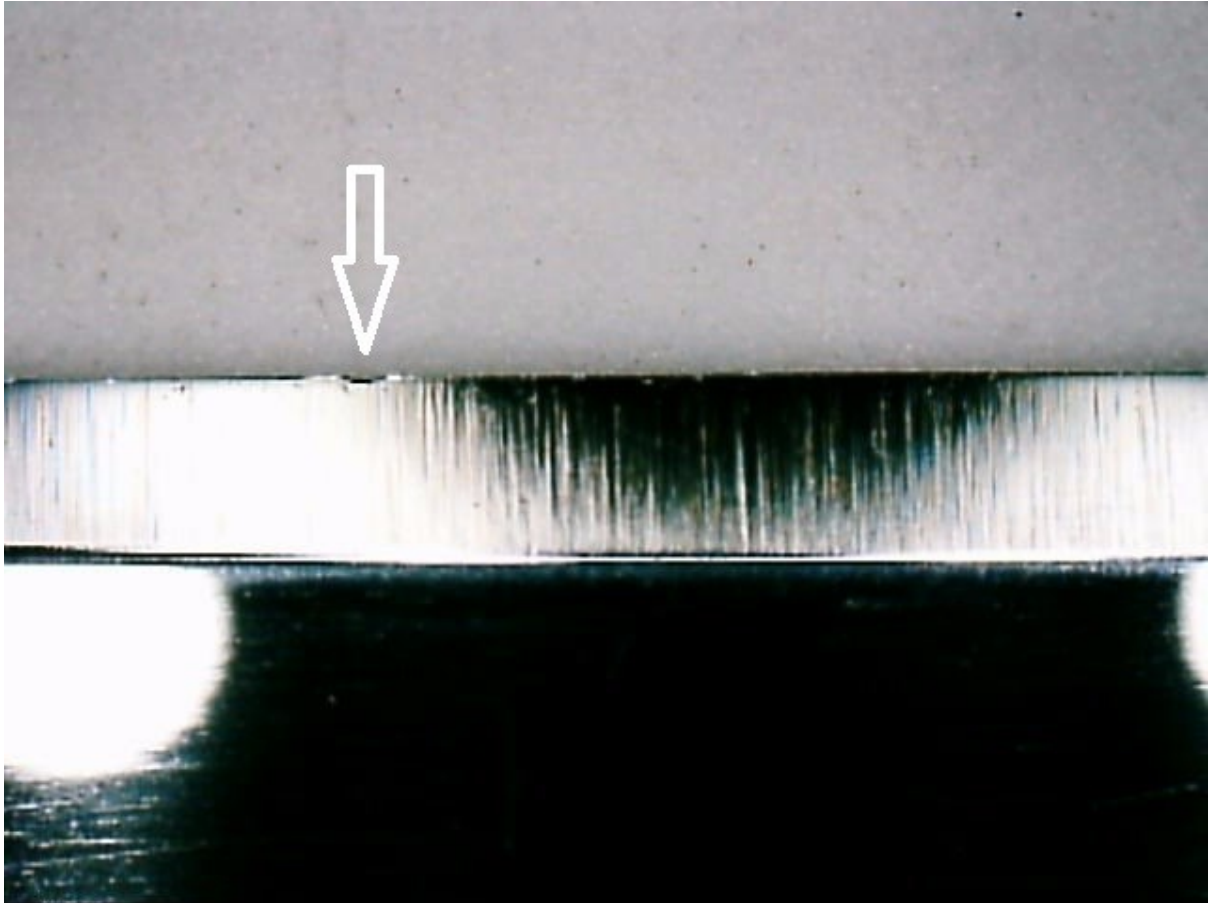
When I tried cutting the Tally-Ho cigarette rolling paper hold vertically, these knives could not push-cut, but could slice with some snagging. This tells us that the BESS score should be in the vicinity of 120 BESS. However, they score twice as dull on the tester.

Remember, on the BESS sharpness tester the lower the score, the sharper is the edge: e.g. disposable shaving razors like Gillette score under 50 BESS, and a dull knife scores over 500 BESS.



Because the wire edge is too weak to cut the test line, it crushes on it and, as we increase the downward pressure, mushrooms against the test line allowing to apply more pressure onto the widening point till the line gets finally severed. In the point of testing, we see a micro-dent in the edge with the mushroomed apex displaced to the dent bottom, and the sharpness reading is a level of magnitude worse than we would expect by seeing the same edge cut hair and rolling paper.

And fair enough, under the microscope I could see a tiny dent in the point of the test.



We then gave these knives 10 strokes on the cow and kangaroo tail hanging strops, measured sharpness, then gave 10 more strokes each, and tested the sharpness again. In doing so, we can get an idea how many strokes are needed to develop the refining effect in full.

The stropping technique

We strop with the bevel flat on the moderately tensioned strop, and downward pressure on the blade enough to curve the strop. This provides for the high-angle stropping at the apex. We do not use any honing compounds at all on the hanging strop, and let the natural leather do the burnishing work. Since the burnishing displaces metal not abrading it, we have no risk of abrading off the ultra-sharp apex of the edge, no risk of "rounding the edge".



Cow strop



Kangaroo tail strop

The sharpness BESS score is measured in 2 points on the edge, and averaged. The following table shows the results.

Knife #	#1	#2
Strop	Cow hanging strop	Kangaroo tail hanging strop
Initial BESS score	240	230
BESS score after 10 alternating strokes	100	80
BESS score after 20 alternating strokes	100	80
10-stroke improvement %	58%	65%
Tally-Ho rolling paper test after stropping	Slides vertically with some snagging	Push-cuts vertically and slides across

What conclusions can we draw from these numbers?

For mainstream knives, a sharpness score of 50 to 90 BESS is a reliable indicator of a clean apex. Yes, it is possible to hone a knife wire edge sharp enough to cut hair, but the edge not cleaned of the wire edge and weak microburr will not score under 100 BESS.

First of all, we see that both hanging strops improve sharpness. So, even if you do not have the exotic Kangaroo tail, your knives will still benefit from a regular hanging strop, and benefit significantly.

Next, we see that 10 alternating strokes are enough for the improvement to develop in full, while 20 strokes do not add anything measurable.

Finally, we see that the Kangaroo tail hanging stop works better, taking the edge sharpness under 100 BESS. As you will see later in our next experiment, the same knives deburred cleanly by our advanced methods score 60-70 BESS – the 80 BESS we gain with the Kangaroo tail stop is not as good, but very close.

Experiment #2 – Effect of hanging stop in the knife edge maintenance

Each knife was re-sharpened on our CBN wheel #1000 at 12 dps and cleanly deburred. Having taken the initial score, each knife was given 1000, 2000 and 3000 sliding cuts on an end-grain bamboo cutting board, using a test stand with 2 Kg load.

From our study ***Effect of Chopping Board Material on Edge Longevity*** we know, firstly, that the normal load on a knife in the kitchen averages 2 Kg, and secondly, that the end-grain bamboo cutting board is not edge-friendly and wears the edge. This way we emulate a “normal” knife wear in the kitchen.

The testing stand is shown on the photo. It has a linear roller resting on the knife spine, and a platen for adding weights to exert consistent load on the knife.



The following table shows the results. Through the experiment, the sharpness BESS score is measured in 2 points on the edge, and averaged.

Knife #	#1	#2
Strop	Cow hanging strop	Kangaroo tail hanging strop
Initial BESS score	70	65
BESS score after 1000 cuts on end-grain bamboo	98	175
BESS score after 10 alternating strokes	83	115
10-stroke improvement %	15%	34%
BESS score after 2000 cuts on end-grain bamboo	150	178
BESS score after 10 alternating strokes	135	108
10-stroke improvement %	10%	39%
BESS score after 3000 cuts on end-grain bamboo	233	217
BESS score after 10 alternating strokes	155	150
10-stroke improvement %	33%	31%

I drew a simple chart from these numbers for better visual clues:

Hanging strop effect on knife edge maintenance

Legend:

Cow strop

Kangaroo tail strop



As we see from the numbers, the knife #2 initially dulls faster than the knife #1, yet the Kangaroo tail strop recovers sharpness of the knife #2 so well that between the 2000 and 3000 cuts it becomes sharper than the knife #1.

Conclusion from the numbers and the chart is clear: both strops help maintain the edge shaving sharp, but recovery effect of the Kangaroo tail strop is more pronounced.

No wonder, we now have customers that keep our *'roo tail strop* in the kitchen to maintain the edge of their knives instead of steeling... and they say it is a kitchen talking piece for their guests.

By now we've seen that the Kangaroo tail strop has advantage over the cow, so let us do similar testing on a hanging strop made of the Kangaroo body skin, and compare the sharpness numbers.

Experiment #3 – Comparison to the Kangaroo body skin strop

Next, we test a hanging strop made of the Kangaroo body skin, and compare against the *'roo tail strop*. In this experiment, the knife marked #3 is for testing the hanging strop made of Kangaroo body skin.

Unlike the textured tail, the Kangaroo skin is smooth and noticeably thinner, not really suitable for hanging strops, but we made one for the purpose of this experiment.

This is going to be the most intriguing part of our experiment, as it will tell us whether it is something special about the Kangaroo skin properties, or only its tail that best recovers the edge sharpness.



Kangaroo body skin strop

The following table shows the results. As before, we measure the sharpness BESS score in 2 points on the edge, and record the average.

Knife #	#2 from the Experiment-2	#3
Strop	Kangaroo tail hanging strop	Kangaroo skin hanging strop
Initial BESS score	65	75
BESS score after 1000 cuts on end-grain bamboo	175	130
BESS score after 10 alternating strokes	115	97
10-stroke improvement %	34%	25%
BESS score after 2000 cuts on end-grain bamboo	178	113
BESS score after 10 alternating strokes	108	102
10-stroke improvement %	39%	10%
BESS score after 3000 cuts on	217	157

end-grain bamboo		
BESS score after 10 alternating strokes	150	112
10-stroke improvement %	31%	29%

Average of 10-stroke improvement % in 3000 cuts on end-grain bamboo cutting board (experiments #2 and #3)

Kangaroo tail hanging strop	Kangaroo skin hanging strop	Cow hanging strop
35%	21%	19%

CONCLUSION:

It is the **tail**, not the Kangaroo skin as such that provides the best stropping.

The edge recovery on the body skin of the Kangaroo is close to what we've seen in the cow stropping, and less than on the Kangaroo tail.

So what makes the Kangaroo Tail strop so special?

The Kangaroo tail is regarded the strongest animal leather on the planet, making it an obvious choice for hanging strops. However, efficacy of the Kangaroo tail strop comes from its texture. The wider and longer strops come from mature animals that had time to develop deep texture in their tails. Stropping on the textured Kangaroo tail strop removes all loose elements from the edge apex, like an old fashioned laundry washboard, making the edge stronger, and improving the edge retention.



If you have already had experience with cow or horse hide hanging strops, you will find that the Kangaroo tail strop feels very different:- as you stroke, the blade “rattles” on the strop texture, "drags" and feels "sticky" on the strop.

Hanging strop is not for deburring - it is part of finishing the deburred edge - cleaning the edge apex for better retention.

Hanging strop is good in removing the wire edge, not deburring as such. We therefore use no abrasives with it.

The Kangaroo tail is not as easy to obtain in Australia as one might think.

Commercial harvesting of Kangaroo is strictly regulated, and currently allowed in QLD, SA, WA, and a small area of NSW. Other States and Territories prohibit commercial use of any parts of Kangaroos, even if it is a roadkill. There are strict protocols regarding codes of practice at all levels that are heavily policed, and tails for our strops are responsibly sourced from a licensed ‘roo shooter in strict accordance with the legislation. Export overseas requires a Government permit.

It takes a whole kangaroo to harvest a single tail strop, and not every ‘roo is good for that. Our licensed ‘roo shooter says that he may skin 40 kangaroos, yielding only under 10 tails wide and long enough to make the hanging strop like the one on the photo:



A tail strip that long and wide comes from a Kangaroo over 2 meters tall - huge adult male Kangaroos very smart to escape the hunters for at least 15 years of harvesting.

