

Author: Joe Talmadge jat@cup.hp.com
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Sharpening FREQUENTLY ASKED QUESTIONS

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I. Introduction

A sharp knife is a joy to use, and being able to sharpen a knife is not only very satisfying, but done properly, can confer significant performance advantages. Unfortunately, many people not only don't see great performance advantages when they sharpen themselves, they sometimes see their knives get less sharp! I was once in the same boat. This FAQ will hopefully help the reader to correct that

situation.

We'll start off by reviewing the basics of what makes a knife edge perform well. Then we'll discuss how to sharpen an edge, going over the basics of the technique, sharpening angles and grits, and other interesting topics.

II. The High-Performance Edge

Once you've gotten your sharpening skills down, you might want to re-read this section. Obtaining the basic mechanical skills to sharpen is one thing. But to really get the best from your knife, it's important to optimize your sharpening plan. Don't underestimate the impact that picking the right sharpening angle and grit can make -- depending on the type of cutting, 10x performance improvement is perfectly reasonable.

- Why does the edge stop cutting?

There are a few properties that affect how long an edge will cut. The dominant ones are:

1. Wear: As a knife blade encounters abrasive materials, the edge can wear away. Wear resistance is primarily determined by the type, amount, and distribution of carbides in the blade steel.
2. Indenting and rolling: As pressure is put on the edge of the blade, the edge can indent, impact, or roll. All of these compromise the edge. For many types of cutting, this is actually the dominant cause of edge degradation. The strength of the steel is what determines the edge's resistance to indenting and rolling at a given angle, and since strength is well-correlated with hardness, the hardness of the steel is important.
3. Chipping: The edge itself can chip and crack under pressure. This can obviously be a problem with chopping, but "micro-chipping" can become an important factor of edge degradation when cutting any material that has embedded hard impurities -- cardboard, for example. The steel's toughness determines the resistance to chipping at a given edge angle.

How well your blade holds its edge at a particular angle is determined by the properties of the steel and the particular job the knife is being used for. Depending on the job you're doing, the steel's wear resistance, strength, and toughness can all come into play. Don't make the mistake of thinking that wear-resistance equals edge holding; wear resistance is often not the primary factor in edge holding.

- Thin = high performance

We want our knife edge to cut as easily as possible, while maintaining integrity (not being damaged) and staying sharp.

To cut well, a knife edge should be as thin as possible. To see why, imagine a woman steps on your foot -- if she's wearing stiletto heels, it will hurt more than if she's wearing

sneakers. Why? Because when the same amount of force is applied to a smaller surface, it penetrates better. So it is with knife edges: the thinner the edge, the less metal, the more efficiently it cuts.

To thin a knife's edge, we lower the angle that the edge is sharpened at. The details on how to do this will be in the later sections of the FAQ.

- Challenges with the thin edge

The problem, of course, is that as you thin the edge out, it becomes more susceptible to damage. As the edge becomes thinner with less metal to support it, it can roll, indent, and chip, and these can cause the edge to degrade rapidly or even harm the edge itself.

Combining the points above leads us to our first general sharpening rule:

For top performance, thin out the edge as much as possible, but not so thin that the edge gets damaged through impaction or chipping for your hardest possible use.

- Steel and the high-performance edge

So, how does steel affect the performance of your edge?? The stronger, tougher, and more wear-resistant the steel, the longer you can expect your edge to last. Steels, and the particular heat treat they are subject to, are often compromises of one of those properties over the others; the trick is to find the one that has the right properties for your cutting jobs. For more discussion on steels, please see the Steel FAQ.

To really bring out the performance of a particular steel, you need to take advantage of it in your sharpening plan. If a weak, brittle steel can perform the job when sharpened at 25-degrees-per-side, a strong, tough steel might give you some marginal performance improvements if it, too, is sharpened at 25-degrees-per-side. However, to really bring out the performance of the better steel, try bringing it down to 20-degrees per side, or less. The advantage of the better steel is that it is strong and tough enough to hold up with a small edge angle -- and smaller edge angles radically out-perform bigger edge angles.

This leads us to the next general rule:

What really makes a better steel worth it is the fact that you can sharpen it for more performance. To get the most out of a better steel, be sure to take advantage of the steel in your sharpening plan. If you're going to sharpen all your knives at the same angle regardless of steel, you might de-emphasize the steel somewhat in your knife choice.

- Myths: Do thick edges last longer?

You'll often see the advice that thin edges perform better, but degrade quickly, whereas thick edges don't perform as well at first but last longer. Intuitively, that seems to make sense, but is it really true? My experience has been that a thin edge, as long as it's not so thin that it suffers damage, not only performs better than a thick edge, but keeps performing better for longer.

How can this be? Experiments by Mike Swaim a few years ago, and more recent experiments by Cliff Stamp, have given us some theories. It's possible that all of the following explanations help contribute to the endurance of the thinner edge.

1. The thinner edge starts out performing much better than the thicker edge. So even if it does degrade more quickly, it has to lose a lot of metal before it catches up even to the performance level where the thick edge started.
2. The thinner edge cuts more easily. This means that on any cut, less stress has to be put on the edge. So to cut through a rope, the thin edge might take 3 slices, the thick edge might take 10 slices. So the thick edge has to undergo 3 times as many slices to do the same amount of work, and as a result it degrades more quickly.
3. Because the thinner edge cuts better, it can be used with more control. Lateral forces on an edge are a significant cause of edge degradation. The more accurate cut with the thinner edge puts much less stress on the edge than the less-accurate, stressful cut with the thicker edge.
4. The thinner the edge, the deeper the "teeth" formed by micro serrations from the sharpening stones. The deeper the teeth, the more aggressive the cutting action, and the more metal that has to be removed from the edge before the teeth are gone. The coarser the grit, the more this effect is seen.

This isn't to say that you should thin out all your knives recklessly. Thinning the edge out definitely reduces the strength of the edge. The edge can be damaged badly if you thin it out too much. The trick is to get the edge as thin as you can, without sustaining damage. That is the point where you will see maximum performance and edge life.

II. The Fundamentals of Sharpening

- Getting a Sharp Edge

Here is the basic process:

You grind one edge along the stone edge-first until a burr (aka "wire") is formed on the other side of the edge. You can feel the burr with your thumb, on the side of the edge opposite the stone. The presence of the burr means that the steel is thin enough at the top that it is folding over slightly, because the bevel you've just ground has reached the edge tip. If you stop before the burr is formed, then you have not ground all the way to the edge tip, and your knife will not be as sharp as it should be. The forming of the burr is critically important -- it is the only way to know for sure that you have sharpened far enough on that side. Once the burr is formed on one side, turn the knife over and repeat the process.

To re-cap, you've sharpened one side only until you felt a burr along the entire length of the opposite side, then you switched sides and repeated the process. I suggest you do not follow the directions that come with many sharpeners, of the form "Do 20 strokes on one side, then 20 strokes on the other". You go one side only until the burr is formed; if that takes 10 strokes or 50 strokes, you keep going until you get a burr, period. Only then do you flip the knife over and do the other side. [Actually, I'm being a bit too strict here, to make the point. In real life, I sharpen one side only for a few minutes. If there is no burr raised, I switch to the other side and repeat. Every few minutes I switch sides until a burr finally starts getting raised. Once that happens, then I keep to that side until I get a full-length burr].

Having raised a burr, our job now is to progress to finer stones, in order to make the edge smoother and remove the burr. So now we run the blade along the stone from end to tip, this time alternating sides with each stroke. Switch to a finer stone, and then do it again.

Sometimes, the burr is turned directly downwards during sharpening, and since it is very thin and razor sharp, it seems like an incredible edge. This is called a "wire edge". But being fragile, it will break off the very first time you use the knife, leaving you with an extremely dull knife. If you seem to be getting good sharpening results on your knives, but they are getting dull very quickly with little use, you may be ending up with a wire edge. If that's the case, you'll need to be careful and watch out specifically for a wire edge; you should try progressing down to finer stones, try double-grinding the edge, and give the knife a quick stropping once you're finished (all these terms are explained below). If your knife is fading fast as you're sure it's not because you left a wire edge, steeling between uses may be what you need. My last few strokes on the stone become progressively lighter, to avoid collapsing the edge and raising another burr.

On a badly-worn or damaged edge, I'll typically start with a medium (300-400 grit) stone, then move to a fine (600 grit) stone, and then sometimes I'll finish on an extra-fine (1200 grit) stone if I want a more polished edge. However, once my knife is sharp I try to re-sharpen before it gets too worn down. In that case, I can usually start on the fine stone. But be sure to read the important notes on grits later in the FAQ.

Lastly, I may use a leather strop on the knife.

On other sharpening systems, the same fundamentals as laid out above still apply. For example, on a V-type sharpener, I'll start by sharpening one side only against the right-hand stick until a burr forms. Then I switch to the other stick until a burr forms. Only after I've raised a burr from both sides will I follow the manufacturer's directions and alternate from one stick to the other between strokes.

- What Angle?

The smaller the angle, the sharper your knife will feel. But the smaller the angle, the less metal that's behind the edge, and thus the weaker the edge. So your sharpening angle will depend on your usage. A surgeon's blade will have a very thin, very low-angle edge. Your axe will have a strong, thick, high-angle edge.

Something like a razor blade will have an angle of around 12-degrees, and it's chisel-ground so that's 12-degrees total. Utility knives will have angles anywhere between 15- and 20- degrees (30-40 degrees total). An axe will have something around a 25- to 30-degree angle.

For double-ground utility knives, a primary edge of 15-18-degrees, followed by a secondary grind of 20ish-degrees, works well. Make sure that at whatever angle you've chosen, concentrate on holding it precisely. Remember, though, the stronger and tougher the steel, the more you can reduce the angle.

See also the sections on convex edges and chisel-ground edges.

- What Kind of Stone?

Basically, a stone needs to cut metal off the edge. The stones below do this well, and for most of us our time would be better spent actually learning how to sharpen than worrying too much about the minor advantages of one stone vs. another. Get the biggest stones you can afford and have room for. Big stones make the job much easier.

The time-honored stone is the Arkansas stone. Soft Arkansas stones provide the coarser grits, with harder stones providing finer grits. Many people use oil on these stones, ostensibly to float the steel particles and keep them from clogging the stone. John Juranitch has popularized the notion that oil should absolutely not be used when sharpening, and indeed results from people using Arkansas stones without oil have sometimes been positive, but sometimes not. The Arkansas stone I have clogged much too quickly when used without oil. And if you have ever used oil on your Arkansas stone, you need to continue using it, or it will clog. If you never put oil on your Arkansas stone, you will never need to.

Synthetic stones are very hard, and won't wear like natural stones (a natural stone may get a valley scooped out of it over time). They clean well with detergent-charged steel wool, I use SOS detergent pads, they clean very very fast and very well. I know you're thinking that cleaning with steel wool will cause the stone to shear off the steel wool and fill up the stone even worse! But I assure you that is

not the case, for whatever reason SOS pads clean synthetic stones, they do not make the stones dirtier. Spyderco and Lansky are some manufacturers who sell synthetic stones.

Stones with diamond dust embedded in them cut aggressively. You can remove metal very quickly if you need to, but be careful lest you remove too much too fast! DMT, Eze-Lap, and Lansky are some manufacturers who sell diamond-based hones. Some diamond stones have the problem that the diamond dust wears off quickly, leaving you with a useless stone. I have experience with the DMT stones, and can say that they do not have this problem.

Japanese water stones come in some very high grits -- I've seen all the way up to 8000! The grit system on these Japanese stones is different than that found on American stones, but 8000 grit Japanese still comes out at over 2000 grit American. The stones sit in a water bath, and a slush forms on top that helps the final polish.

Both Japanese water stones and natural stones will eventually dish out in the center with use. To flatten them back out, put some sandpaper on a flat surface and rub the stone top on it. Wet/dry 400 grit sandpaper mounted on a table top or glass is reputed to work well.

- Should I Use Water or Oil on My Stone

John Juranitch has popularized the notion that no liquid should be used on the sharpening stone. Since oil has been used for many years on stones, this leads to some confusion.

Basically, the purpose of the stone is to rub against the blade and remove metal. Slippery liquids, like water and especially oil, make the rubbing slicker, causing less metal to be removed, causing sharpening to take longer. On top of that, Juranitch claims that as your edge is being sharpened on the stone, the oil-suspended metal particles are washing over the edge and dulling it again.

On an Arkansas stone, the oil is supposedly needed to float metal particles away from the stone surface, lest the stone clog and stop cutting. Some people on this group have used their Arkansas stones without oil or water, and have reported good results. However, if you've already used oil on your Arkansas stone, you'll probably need to keep using oil forever on it, because an already-oiled stone will clog up if not kept oiled. If you have a fresh Arkansas stone, go ahead and use it without the oil, and things should be okay.

I've used diamond and synthetic stones without liquid, and they worked just fine.

Japanese water stones are the one type of stone that need water. The stones are designed to work with water, and as you sharpen a small amount of the stone's material breaks off and forms an abrasive slurry along the top.

In any case, the bottom line is: use liquid or don't. Using the liquid will make the sharpening process slower and messier, but if you insist on using liquid and are willing to spend more time, that's your call. If you don't have the skill to hold a consistent angle,

it's all moot anyway!

- How Fine Should My Stone Be? Important notes on grits!

The finer the stone, the more polished your edge will become. The rougher the stone, the more the scratches in the edge function as "micro-serrations" (see also the serrated vs. plain edge FAQ).

The more polished the edge, the better your edge will work for doing push-cut applications like shaving, whittling, peeling an apple. Also, your cut will be more clean and precise with the polished edge.

A rougher, more micro-serrated edge will work better for slicing-type applications like cutting through coarse rope, wood, etc. The serrations present more edge surface area, and tend to "bite" into the thing being cut.

It is possible to get an edge that will shave hair with a medium (300-400 grit) stone, with practice [I specifically mention stone grits because many manufacturers call the 300-400 grit stones "coarse" rather than "medium"]. The medium stone will have pretty big micro-serrations. In previous version of the FAQ I stated that I find this too rough a finish for my general utility edge. However, I've since found this to be a really nice edge finish for utility work -- it won't shave great, but it does a really nice job on cutting coarse materials.

Anyone should be able to get an edge that shaves hair easily with a fine (600 grit) stone. I find this to be a pretty useful finishing stone, leaving enough micro-serrations for general utility work but still being hair-shaving sharp.

An extra fine stone (1200 grit) should start polishing the edge, and you should end up with a hair-popping sharp edge. This is also a good choice for a general utility finish, especially on a partially-serrated blade, where the serrations can be used when the slightly-polished main part of the blade becomes less effective.

One can buy Japanese water stones with grits up to 8000, which leaves a polished edge that's so sharp, your hairs will jump off your arm when they see the edge coming. I would question this finish on an everyday utility knife which might be called upon to cut through a thick rope or what have you, but it is a finish that works well when a polished edge is called for.

A good comparison of stone grits is available on:

www.ameritech.net/users/knives/grits.htm

***** IMPORTANT TIP *****

Many treatises on sharpening tend to focus on getting a polished, razor-like edge. This is partially the fault of the tests we use to see how good our sharpening skills are. Shaving hair off your arm, or cutting a thin slice out of a hanging piece of newspaper, both favor a razor polished edge. An edge ground with a coarser grit won't feel as sharp, but will outperform the razor polished edge on slicing type

cuts, sometimes significantly. If most of your work involves slicing cuts (cutting rope, etc.) you should strongly consider backing off to the coarser stones, or even a file. This may be one of the most important decisions you make -- probably more important than finding the perfect sharpening system!

Recently, Mike Swaim (a contributor to rec.knives) has been running and documenting a number of knife tests. Mike's tests indicate that for certain uses, a coarse-ground blade will significantly outperform a razor polished blade. In fact, a razor polished blade which does extremely poor in Mike's tests will sometimes perform with the very best knives when re-sharpened using a coarser grind. Mike's coarse grind was done on a file, so it is very coarse, but he's since begun favoring very coarse stones over files.

The tests seem to indicate that you should think carefully about your grit strategy. If you know you have one particular usage that you do often, it's worth a few minutes of your time to test out whether or not a dull-feeling 300-grit sharpened knife will outperform your razor-edged 1200-grit sharpened knife. The 300-grit knife may not shave hair well, but if you need it to cut rope, it may be just the ticket!

If you ever hear the suggestion that your knife may be "too sharp", moving to a coarser grit is what is being suggested. A "too sharp" -- or more accurately, "too finely polished" -- edge may shave hair well, but not do your particular job well. Even with a coarse grit, your knife needs to be sharp, in the sense that the edge bevels need to meet consistently.

- Stropping

Stropping consists of running the edge along a piece of leather charged with some kind of abrasive like stropping paste or green chromium oxide (I had previously said jeweler's rouge is okay, but have since heard that a more aggressive cutter is needed). It is done for a short time to finish off the burr, or for a long time to give the edge a final polish. Stropping is an easy-to-use finishing step (as opposed to the difficulty in keeping a consistent angle on a stone).

Before you strop, remember to wash and dry your newly-sharpened knife. If you don't, you might grind leftover metal particles into the strop itself. If you need to charge your strop, put a little paste on your fingers and rub it into the leather.

To strop, you run the edge along the leather with the blade positioned spine first and the edge trailing (opposite way from sharpening on a stone). With a thin straight razor, the spine of the razor is always kept on the strop, and direction is switched by flipping the razor over along its spine. In my experience, this isn't necessary with a utility knife. You can strop with the blade spine raised above the leather (don't lift too high -- if the edge bites into the leather, that's too high), and change directions by lifting the entire knife up, turning it over, and placing it back down.

If you've never stropped your knife before, give it a try. It will

come out very sharp, but of course polished and so optimized for push-type shaving cuts. The strop to some extent can make up for less-than-perfect sharpening technique -- a sharp knife can be made extra sharp on the easy-to-use strop. However, I always tell people that they should be able to get their knife scary sharp without the strop; don't let the strop keep you from recognizing weaknesses and improving your technique on the hone!

In the absence of a strop (say, out in the field), many people use their jeans and then their palm as a strop. There's probably no need to point out the danger in this practice, so don't do it. That said, I must admit to having done this myself on numerous occasions, and having gotten good results.

A safer and more effective trick is to use cardboard (say, the cardboard back of a standard notepad). You can optionally charge the cardboard with metal polish, just rub it in with your fingers. Then strop as above. Even without the polish, the cardboard will strop acceptably. Stropping with cardboard has become a de-facto standard last step for sharpening chisel-ground (single-side ground) knives these days, for burr removal purposes.

- Using a Steel

The sharpening steel should be an important part of your knife maintenance strategy, and is maybe the most mis-understood part.

When you use a knife for a while, especially a knife with a soft, thin edge like that found on a kitchen knife, the edge tends to turn a bit and come out of alignment. Note that the edge is still reasonably sharp, but it won't feel or act very sharp because the edge may not point straight down anymore! At this point, many people sharpen their knives, but sharpening is not necessary and of course decreases the life of the knife as you sharpen the knife away. It's also akin to putting in a thumbtack with a sledgehammer.

The steel is used to re-align the edge on the knife. Read that last sentence again. Re-aligning the edge is all the steel needs to do. It does not need to remove any metal. Since the steel's only function is to re-align, the sharpening steel can be perfectly smooth and still do its job. You'll see many bumpy steels on the market, but this is almost certainly because consumers think that steels must have bumps to work. The bumps can actually mess up the edge, and make the work of steeling more difficult.

There are two schools of thought on steels. Some people use grooved steels, which align the edge more aggressively but are harder on the edge. I use a smooth steel, which is easy on the edge but may align the edge more slowly.

To use the steel, run the knife along the steel on one side using light pressure -- no more pressure than the actual weight of the knife is required! Then switch to the other side and do it again. Repeat a number of times until your edge feels sharp and nice again. I hold the steel in my left hand, the blade in my right, and lightly run the blade along the steel while keeping the steel stationary, but it's perfectly fine to move both steel and knife past each other at the

same time, or whatever works for you.

Most people run the knife down the steel edge first, the same direction you use when sharpening. This yields good results. However, theoretically going edge-first along the steel could bite into the edge while straightening it, and so many people like to go spine-first (like when stropping) instead. This method also works well, and I personally have begun to feel that steeling in this direction gets my edge the tiniest bit sharper. It is more awkward to go spine-first, so if you have any trouble with it switch to edge-first, and your edge will end up just fine.

If you steel your knife every time you use it, you will significantly lengthen the time between sharpening. I've found steeling to be critical on kitchen knives, but it's an incredible help even on ultra-hard ATS-34.

III. Putting it all together

- Some tips and tricks

If you want to determine if you are sharpening at the same angle that the blade already has, try this easy trick. Mark the edge bevel with a magic marker. Then go ahead and do a stroke or two on the stone (or take a stroke with your Lansky, or whatever). Now pick the knife up and look at the edge. If you have matched the edge angle exactly, the magic marker will be scraped off along the entire edge bevel. If your angle is too high, only the marker near the very very tip will be gone. If your angle is too low, only the marker near where the edge bevel meets the primary bevel will be gone.

Another trick is to use light and shadow to get the edge precisely. Using strong directly light, lay the edge down on the stone and watch the shadow below. As you tilt the spine up, the edge contacts more of the stone and the shadow disappears. As the shadow just disappears and the edge just touches the stone, that's your angle. If you go higher than that, you should be able to see the edge tilting over onto the stone.

One trick to freehand sharpening is to use your thumb as a guide. I'll place the spine of the blade against my thumb pad, and rest my thumb on the stone. That way, I can feel the angle between the knife and stone, and make sure that it is consistent. Typically, the hardest part to freehand sharpen is the curving belly of the blade, as keeping a consistent angle here is more difficult.

I use all these tricks extensively when sharpening freehand, and use the marker trick even when I'm using a sharpening rig.

One thing to keep in mind is that there's no reason you need to keep the factory edge. If you're happy with that edge, great. However, many factory edges are too thick to really cut well. If you're unhappy with the cutting ability of your knife, don't be afraid to try lowering the angle a bit.

- Why does my knife go dull so fast?

A frequent complaint I hear is, "I sharpened my knife and did a good job, it was really sharp. But then after just a few uses it went dull." Why does this happen?

One of the following factors -- and many times a combination of those factors -- is at play:

1. Wire edge

If the burr is not properly ground off, but is instead turned downwards, your knife will feel razor sharp. However, the burr quickly turns or snaps off, leaving you with a very dull-feeling knife. Be sure to use a light touch at the end of the sharpening process and make sure the burr is gone.

2. Thin, weak edge

If the bevel angle you chose for your knife is too thin for your usage, the edge can chip and get really wavy. Try using a larger edge angle, or at least double-grinding the edge.

3. Edge turning

In regular use, all edges turn to some extent. If your edge is much too thin, it will be damaged as above in #2. If it's only slightly too thin, it will quickly turn out. As long as the edge is not being damaged, but simply turning, you don't necessarily need to re-grind a thicker edge. Instead, see if frequent steeling will give you the performance you need, it can really work wonders. Keep in mind it's difficult to see a turned-out edge by eyeball -- only using the steel will tell you conclusively if this is your problem.

4. Thick edge

A thin edge will feel sharper than a thick edge. If your edge is too thick, when it starts to dull even the slightest bit it may no longer feel so sharp anymore. Consider using a lower angle and seeing if that helps. Of course, your thinner edge will be more fragile than the thicker edge, so you may end up chipping the edge out, and the thinner edge may not be feasible. I personally feel that this is rarely the real problem, so be sure to try the other solutions first.

5. Soft steel

Occasionally, a manufacturer or maker will make a mistake while heat treating, and the steel in the blade will end up too soft. No matter how well you sharpen, your blade will still go dull quickly. Often, soft steel is the first thing people point at when their edges dull quicker than expected. But this problem really is relatively rare; in the vast majority of cases, it is one of the above reasons rather than soft steel that's the problem. So if your edge dulls too fast, don't blame the steel until you've exhausted the above options. If it's still dulling quickly, contact the manufacturer, they are often interested in testing to see if they made a mistake.

- Keeping bevels even

With the burr method of sharpening, one side of the knife can end up

with more metal taken off it than the other side. This forces the edge to be not-quite-centered. This normally doesn't affect performance, but aesthetically it doesn't look quite right. This happens because as you grind the one side to create the bevel, it has to go far (that is, lots of metal has to be removed) to create the bevel on the other side. When you flip to the other side, the edge is already thin, so very little metal has to be removed to flop the burr back over. There are a few ways to avoid this.

First, you can just switch which side you start sharpening on. If you start with the edge that's on the right side of the blade, that edge bevel will be a little bigger than the one on the left side. So next time you sharpen, start off on the left side. You can pick which side to start your sharpening on by just using whatever side seems to have a smaller edge.

The method I use is to switch sides while trying to get the initial burr. If I start on the right side, I'll sharpen for a few minutes and then check for a burr. If no burr is found, I switch to the left side and repeat. I keep doing this -- sharpening one side for a time, then the other side -- until I finally start to feel a burr. Then I just follow the normal directions: I keep sharpening that side until the burr goes the entire length of the edge, then flip and get a burr along the entire length of *that* edge. The fact that I'm flipping the knife keeps the edge bevels even.

- Putting it all together

As you use your knives, you may see your sharpening strategies change. Many of us seem to be homing in on the philosophy that you should choose the thinnest, coarsest edge possible that can do your job without the edge being damaged, especially in the context of general usage.

Thin blades and low-angle edges seem to cut better than thick ones. They slide through the material being cut with less effort. Which makes sense -- the wider the V that your edge forms, the more metal you're pushing into the material. However, go too thin and your edge can chip out. So go as thin as you can without damaging your edge, and use a steel often to touch it up. Obviously, what "thin" means depends on usage. "Thin" means one thing when the job is slicing soft materials, something else entirely when chopping hard materials. Lightly double-grinding a shallower bevel on a thin edge may help give you the best of both worlds. If your first bevel is a thin 15-degrees (say), try doing a few light finishing strokes at a stouter 24-degrees.

Coarser edges slice better than polished ones, but a polished edge will laterally push-cut (e.g., shave) better. If you find yourself doing a lot of lateral push cuts, then you'll obviously want to polish your edge more. However, most people do much more slicing than push cutting, and as a result end up with a much more polished edge than optimal. You should play around with coarser grits. The edge won't do as well shaving hair, but unless this particular knife is a razor blade, who cares? You may find the knife cutting through other materials much better than usual.

Lastly, I have become something of a steel fanatic. Steeling your knife frequently -- even if the blade is of really high-hardness steel -- works wonders on the edge. It also allows you to have a slightly thinner (and hence better-cutting) edge, because if you steel frequently you'll keep the edge aligned. If you don't steel at all, you'll have to use an edge that's thick enough not to turn, and that may negatively affect sharpness and cutting power. Remember to steel frequently, because if your edge's shape gets too bad, the steel won't work and you'll have to go back and sharpen.

IV. Sharpening The "Differently-Ground" Blade

- Those Pesky Serrated Blades

It is not that difficult to sharpen the Spyderco-type serrations, or the typical serrations on a bread knife. Both the Lansky rig and Spyderco's Triangle-Angle Sharpmaker have special hones meant to sharpen serrated blades. A triangle-shaped hone rides along the grooves. Although I can't quite get my serrated knives as sharp as they come from Spyderco's factory, I do get them extremely sharp, and am satisfied with the results. Don't let fear of sharpening scare you away from serrated blades.

I have not tried it, but the above systems supposedly work for Benchmade-type reverse serrations. Cold Steel's tighter serrations would seem to present more of a problem. Cold Steel sells Spyderco's Tri-angle Sharpmaker as the solution to sharpen their serrations, so this would seem the logical system to try.

Others claim to get excellent results from the tapered diamond-coated rods that are being sold to sharpen serrated knives. The disadvantage of these is that you have to sharpen each serration separately.

For those curious about how a custom maker might serrate an edge, here's a quote from A.T. Barr:

When I make a serrated blade, I first grind the cutting edge down to approximately .020. I then use two files. A 1/8" round file and a 3/16" chain saw file. I then use a course DMT diamond rod that is tapered from about 1/16" to 1/4". I use that to put the final edge on before heat treating. After heat treating I again use the same DMT rod to clean up the scale. I put the blade (if a folder) or wrap the handle (if a sheath knife) in a vise in a horizontal position. You're right, it is not easy, but you can do it.

- The Moran (Convex) Edge

Named after Bill Moran and featured on many of Blackjack's knives, the Moran edge (aka convex edge) is, well, convex. Usually, an edge is a straight bevel over the last millimeter or two of the knife. With a convex edge, the edge continuously curves towards the very point. The advantage is that there's more metal behind the edge, so you end up with a very sharp but strong edge, which needs to be felt to be believed.

Knifemakers grind in a convex edge with a slack belt grinder. If you

don't have a slack belt grinder, you can simulate this by using wet/dry sandpaper on a piece of leather. The leather under the sandpaper will buckle, creating the kind of curvature that the maker got from his slack belt. This is tricky, but plenty of people report success sharpening convex edges this way.

Some people simulate a convex edge by double- or triple-grinding the edge. That is, after they've ground the edge, they change the bevel angle and grind a bit more. This is easy to do with Lansky-type rigs and the Razor Edge type clamps. It results in a superb edge. But it is not quite the same thing as a convex edge.

Some people use the term "rolled edge" to mean a convex edge. As such, a "rolled edge" is a good thing. But most people use the term "rolled edge" to mean a wire edge -- that is, an edge that is not an edge at all, but a burr that's been turned down. A wire edge will be razor sharp, but will break off and leave your knife dull the first time you use it. When used this way, "rolled edge" is a bad thing. So when you hear the words "rolled edge", you'll need to listen carefully to the context. If the speaker is using the term approvingly, a convex edge is meant; if the speaker is using the term disapprovingly, a wire edge is meant.

- The Chisel-ground Edge

Phil Hartsfield has for years been making tantos with a chisel grind, but Ernest Emerson's CQC-6 design and Benchmade's Emerson-designed 970 have really popularized the grind. Typically, the blade is an Americanized tanto format that's ground on one side only (the other side comes straight down). An edge bevel is ground from the middle of the blade and goes all the way through the edge. It is extremely sharp.

The chisel ground edge owes its sharpness to the fact that the edge bevel is typically ground at around 30 degrees. Since the opposite side of the blade is essentially at 0 degrees (it comes straight down with no bevel), that's a total of 30 degrees + 0 degrees = 30 degrees edge angle. With a more traditional edge, you'll typically have each bevel being ground at around 20 degrees, so that's 20 degrees + 20 degrees = 40 degrees total edge angle.

To sharpen the chisel-ground edge, you'll place the entire edge bevel on the stone and grind it until a burr is formed. Many people then strop the edge on a piece of cardboard on the other side, to remove the burr. Optionally, you can lay the flat side *flat* on a fine stone and do a little grinding from that side as well (something guaranteed to mar the finish). If you can't bear to mar the finish that way, lay the flat side as flat as you can -- maybe 5-degrees off the stone at most. What is critically important is to not grind a big second angle into the back (flat side) of the blade. The chisel grind's sharpness arises from the acute angle formed between the front bevel and the flat back. You can then try to use decreasing pressure to grind off the burr, and finishing with a steel provides really nice results.

Hartsfield and many others believe that for a right-handed user, the edge bevel should be on the right side of the knife (that is, the side

that faces you when the knife tip is pointing to the right). Following Emerson's lead, most makers are grinding the left side of the knife instead, apparently because that's where the maker's stamp is traditionally positioned, and advertisements look better if the stamp and edge are on the same side.

To see why the grind should be on the right side for a righty, think about trying to make a precise cut in, say, a carrot, or a piece of material, or whatever. If you're like most righties, you want to hold the work in your left hand and cut with your right hand. If the knife is ground on the right side, then the flat part of the blade is the part you can see, and you can make sure the flat part of the blade is exactly along the line you want to cut. If the grind is on the left side, the material is diving underneath the bevel, and it's difficult to eyeball whether or not you're cutting in the right place. This adds to the chisel-ground tanto format's existing problems: 1) no belly, and as such not the best general utility format, and 2) unsymmetrical grind, making precise cutting difficult.

The most popular chisel-ground folder, the Benchmade 97x series, uses a 30-degree secondary grind to form the edge [Note: Benchmade uses a secondary bevel; most custom makers bring the primary bevel all the way down to the edge]. The Lansky system includes a 30-degree position, but for some reason most users have found that the angle is not quite right (it's unclear at this time whether it's Lansky or Benchmade whose angle is not precisely 30 degrees). Some Lansky users on rec.knives has fashioned an extension to the Lansky system to get the proper grind angle for the 97x, by extending the post using plastic from a milk carton. The Edge Pro, a similar but much more expensive system, will get the 97x's angle properly.

- The Recurvedd Blade

The recurvedd blade poses special sharpening challenges, because of the difficulty of getting an accurate or even sharp edge at the recurvedd itself. The key to sharpening a recurvedd blade is to use a sharpening device that is much smaller in diameter than the diameter of the recurvedd. This means either one of those freehand sharpening rods, or a system like the Spyderco Sharpmaker or other V-stick system, or less optimally a Lansky-type or Edge Pro rod-type sharpening system.

I tend to use the v-stick type systems, and get extremely good results. One trick is to make sure the edge of the blade is always perpendicular with the v-stick. Since a recurved blade is almost completely one big curve, you'll constantly be raising or lowering the handle to keep the edge perpendicular with the stone. The spine of the blade always stays vertical, of course.

V. Overview of Sharpening Systems

The first three systems discussed below all give outstanding results, if the enthusiasm of rec.knives people is any indication. Some other methods of sharpening are discussed in the miscellaneous section. The last section discusses the advantages of freehand sharpening, and why it's worth attaining this skill even if you're happy with whatever system you have.

- Clamp-on sharpening guides (Razor Edge, Buck, etc.)

The clamp-on guide fastens to knife blade itself. It is used in conjunction with a standard stone (Arkansas stone, diamond stone, synthetic stone, etc.). It is used with the exact same techniques as you would use to sharpen freehand, the guide making sure that all your angles are held perfectly. If the blade has a belly, the guide should be positioned in the right place in order to keep a consistent angle through the entire edge grind; the instruction booklet should illustrate that.

The most popular clamp-on guide is the Razor Edge guide. I've already told you that the Razor Edge sharpening book is indispensable, but it's especially important if you decide to use this system. Actually, on top of that, buy the Razor Edge video as well. It is a huge advantage to actually see someone on video applying the techniques, and I can't recommend the video highly enough.

An advantage of this system is that because you are using the exact same motions as you would during freehand sharpening, proper motion is put into muscle memory. After several months of using this system, I found that even the mechanically-inept (like myself) could do a good job sharpening freehand. See below for the advantages of freehand sharpening.

The disadvantage of this system is that one never knows at what angle they are sharpening. For most of us, knowing the exact sharpening angle probably isn't an issue.

- Clamp-and-Rod rigs (Lansky, Gatco, DMT, etc.)

Very popular are the Lansky-type clamp-and-rod rigs. The knife is held in a clamp, and the back of the clamp protrudes upwards and has a number of holes in it. The hone is attached to a rod. By putting the rod through one of the holes in the clamp, you can control the sharpening angle you're using. Most of these systems have around 5 holes, corresponding to 5 different grind angles. Double-grinding your edge should be very easy with this system.

One problem with these rigs is that while sharpening a very long knife, you may need to unclamp it and move it several times during sharpening. The system works extremely well for short knives, however.

A number of hones are supplied, corresponding to different grits. Flat hones are used for plain blades. Some rigs have a triangular hone available to sharpen serrated blades.

The Edge Pro Apex system is roughly this type of system, but is of higher quality and price (retailing around \$125). It also provides greater angle granularity than the rest. The system can be used for any knife size and any blade shape, and is extremely accurate. The only disadvantage is that setup-time is longer.

- V-type sharpeners (Spyderco Triangle, etc.)

Typically the V-type sharpeners have ceramic sticks stuck into a plastic base at a preset angle. The knife is held perpendicular to the ground (a position which most people seem to be able to do easily), and ground down the side of the sharpener. The system is easy to use, but obviously the angle is preset. If you want to use a different angle, you're out of luck. If your knife's edge has been ground at a different angle than the V, the first time you sharpen it the new angle will be ground in.

Different ceramic sticks are supplied corresponding to different grits. One Spyderco Tri-angle Sharpmaker model also has diamond sleeves that fit over the sticks and function as a coarser hone.

- Other miscellaneous

A number of ceramic or diamond-coated sticks are available. They are often marketed as steels, but since they remove metal they do not actually function anything like a proper steel, and should be considered sharpeners instead. Since there's obviously no angle guide of any kind, some skill is needed to keep the angle consistent. If you've got the skill, these sticks work just fine.

There are a number of gadgets with pre-positioned round "hones" (like Accusharp) that meet to form a V. You draw the knife straight through the sharpening mechanism. Your knife will come out sharper, but some believe that repeated use of these products will harm the edge, as they often work by chipping out the edge. If that's true, your knife will be hurt in the long run. In addition, because no relief is ground into the blade each time, it will gradually become harder and harder to sharpen your edge with these gadgets, until finally you must spend some time on a bench stone thinning the edge back out properly.

There are electric sharpening machines that have rotating stones, sometimes in a water bath. They supposedly work fine. Be *very* careful, however. With some steels, it is very easy to heat up the steel and ruin the temper of the blade on these electric machines, even in the cold water bath. Pull the blade off the machine and check it for warmth frequently. In addition, these machines can remove metal very fast. It's easy to sharpen your knife away.

- Freehand sharpening, and its wondrous advantages!

Sharpening freehand has some advantages to it, provided you have the skill to actually get a satisfactory edge. Perhaps the best advantage is that you don't have to go hunting around for hex keys, screws, nuts, or any other little thing that might get lost from of your sharpening rig. Nor do you need to waste time clamping, screwing, and bolting your knife into various rigs. If your knife just needs a quick touch up, swipe it on a stone and you're done.

More importantly, if you're doing something where weight becomes an issue (backpacking, etc.), you probably aren't going to want to lug around your sharpening rig. I go out into the backcountry with my knife and a small lightweight 3"x1" diamond hone, confident that I can use my knife hard and touch it up no problem.

Lastly, there's a certain satisfaction in attaining the skill to sharpen a knife hair-flinging sharp, especially when previously your sharpening efforts seemed to make the knife duller!

Happy sharpening!

Joe Talmadge
jat@cup.hp.com