

**SHARPENING ESSENTIALS:  
PLANES, CHISELS AND SPOKESHAVES**

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## *INTRODUCTION*

Becoming an accomplished woodworker where importance is given to highly skilled handwork necessarily implies becoming accomplished at sharpening. The two go together.

From what I have seen, the frustration felt by many woodworkers boils down to not having invested the time to learn and practice essential skills. Unfortunately, the tools won't sharpen themselves; you must learn to like sharpening and to become good at it.

These notes are my effort to pass on some of what I have learned since I first attempted to sharpen a chisel nearly 30 years ago ... as well as some opinionated guidance to help you make decisions about sharpening methodologies and equipment. Bear in mind that this is a very personal activity. I'm going to show you the method that works for me and has worked for others. There are lots of approaches and variations. The best methodology, ultimately, is the one that works for you, suits your budget and allows you to get a good edge every single time.

## *OVERCOMING FRUSTRATIONS*

- Frustration while learning is inevitable and it is directly related to knowledge, guidance and the ability to visualize the potential end results. You simply must bear down.
- Many beginners have trouble visualizing the end result because they have not experienced a superbly sharpened tool and what it is capable of doing.

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- I've also discovered from my teaching experience that, with good information and guidance, it is actually easier than it looks to achieve excellent results.
- Simplification works – avoid getting too caught up in the minutia of tool steel, angles and various definitions of perfection. Focus on basics that get the job done. I've heard and read a lot of sharpening methodology. Avoid those who would make it excessively complex. Also avoid those who would excessively simplify it because that is the way they learned how to do it 40 years ago. Walk, then run.
- You must put in the time. The tools don't sharpen themselves.
- You must have the right tools but you don't have to break the bank.
- The woodworkers we admire; those who are consistently capable of producing top quality work, are all excellent sharpeners. They take sharpening very seriously and they are always open to learning. Why? Their livelihood depends on maintaining consistent quality.

## ***SYSTEMS AND TOOLS***

There are many sharpening systems or methodologies. They all work. They all have their quirks; their good points and bad points. Some work decidedly better than others.

- Oil stones
- Oil stones in combination with diamond paste (see comparison charts)
- Diamond stones
- Water stones – both aluminum oxide (King, Norton) and ceramic alumina (Bester, Sigma, Shapton)
- Sandpaper on glass
- Silicon carbide (SiC), chromium oxide  $\text{Cr}_2\text{O}_3$ , or the new diamond micro-abrasive sheets
- Horizontal wet grinders (Makita)
- Vertical wet grinders (Tormek)
- Horizontal dry grinders (Veritas)
- Traditional grinders but only with cool wheels; preferably slow speed
- Belt sanders (the Lee Valley 1" sander-grinder)
- Some combination

A good **sharpening system** should be ...

- Effective in producing the keenest possible edge
- Fast and convenient – slow and inconvenient turns people away from sharpening
- Consistent and repeatable

Not every woodworker needs to take every tool to the high levels of keenness (some might say perfection) that is possible. The energy directed to sharpening should be proportionate to the needs of the woodworker. Honing just to 1000 will serve the needs of house carpenters; to 4000 is adequate for many cabinetmakers and beginner furniture makers. 8000 is the minimum for furniture makers who do fine hand work. 8000+ stropping is for those who expect to do extraordinarily fine hand work.

The focus should be on solid principles and methodologies not gimmicks and gadgets. It isn't possible to avoid the reality that sharpening requires skill, knowledge and time.

The most basic **rule of thumb** for learning how to sharpen well is to choose from one of the various 'systems' (based on recommendations, preferences, expense, etc.) and stick with it long enough to be good at it and to master its nuances. Bouncing about from one method to another is usually frustrating and expensive. Consistency is important to good sharpening. Do your own research and be careful of the tool dealers advertising copy.

**Honing guides** are especially useful for beginners or those who sharpen infrequently. Advanced woodworkers will benefit from the speed and convenience of freehand honing if they are both committed and sharpen frequently (daily or several times a week). However, many very advanced woodworkers/sharpeners still prefer to use a honing guide for the consistency offered.

The Veritas honing guide is highly thought of and is especially good for plane blades and skewed blades. It doesn't work very well for narrow chisels. It's most positive feature is that it enables great precision and consistency. On the downside, and this is not really a design flaw as much as something in the nature of the beast, I believe it encourages

people to spend too much time perfecting their primary bevels on the stones. I think primary bevels should be done on grinders.

The side-clamp style, also known as the 'Eclipse' style, is also highly thought of, considerably less expensive and is especially good for narrow chisel blades and small plane blades because it does a better job of holding the blade square. The side-clamp style is also a great choice for those who are on tight budgets.

You should also remember that some blades cannot be easily held in a guide and some others not at all. Some blades simply must be done freehand.

I also suggest that serious woodworkers who want to master sharpening should use a motorized grinder to take the drudgery out of the task of repairing and shaping blades. With a grinder you will spend more time honing, which is relatively efficient, and less time grinding, which is not.

I grind and hone freehand. I've included a small sidebar explaining the basic technique. It's not for everyone and I'd like to explain my reasons.

- I have found honing guides to be less than perfect. I've spent too much time fiddling and not enough time sharpening.
- Many years ago I listened to a well known woodworker say that he makes money at his workbench, not at his sharpening station.
- Many of the woodworkers I admired, to the best of my knowledge, sharpened free hand.
- All the old-timers sharpened freehand. I figured I could do it too.
- I had the right attitude for it. I don't worry about the exact angle of my micro bevels and other minutia.
- I do a lot of sharpening. I needed a more efficient way to work. I decided to make freehand sharpening work for me. It does.

## ***UNDERSTANDING ABRASIVE GRITS***

Waterstones cut by continuously abrading and releasing particles quickly, revealing fresh, sharp particles. The mix of water, steel and ground up waterstone is called swarf. Waterstones have **three characteristics** affecting how that process happens:

- **Particle size** – it is very important to look at particle size in microns, as reported by objective testing, rather than nominal grit size. In other words, one cannot assume that all 1000 grit stones are the same, or 4000 etc.
- **Durability of the abrasive particles** – tough abrasives cut quickly and lose aggressiveness slowly.
- **Strength of the bond** – stones with strong bonds wear slowly, releasing sharp, fresh abrasive at a slower rate than those with weaker bonds, which release abrasive at a faster rate but wear more rapidly.

These three characteristics determine what I call the personality of the stone.

The normal terminology we use for denoting grades of sharpening media is grit size. A stone is only *nominally* named a 1000, 4000 stone, etc. Grit size refers to grain size and can be very subjective it seems. The common language that seems to work best is the more objective metric terminology of microns. One micron = one-millionth of a meter. The symbol is:  $\mu$ . A typical human hair is approximately  $40\mu$ .

When converted to microns, it becomes apparent that particle size can vary greatly between brands. Recent testing reveals that not all 1000 grit stones (or 4000, or 8000) are the same. Lee Valley Tools has updated the grit comparison chart and it has been included in the 2011 woodworking catalogue. (p. 119).

It is apparent that choosing waterstones has become more technical than it used to be. Not only are there many choices of stones but premium tools are now offered in a choice of metals. The various brands of stones abrade the different metals with different levels of efficiency. It is becoming increasingly important to match the stones to the types of metal you will be sharpening and the volume of sharpening you will be doing. This is, of course, exactly what Japanese craftsmen have been doing for generations.

## ***METHODOLOGY***

The essence of sharpening is about grinding and then honing and polishing the two planes of a cutting edge to the finest intersection desired. The finer that intersection the more highly polished the surfaces must be. The smallest imperfection (a grinding mark or rust pit) can become a chipped edge. The more highly polished we wish the surface to be the more refined must be the polishing abrasive. Jewelers do exactly what tool sharpeners do ... they use increasingly finer abrasives to achieve ever higher degrees of polish.

**Lapping** – The process of rubbing the back of the blade on an abrasive to make it flat and then polishing it to the highest grit in use (only required when the blade is new or when restoring an old tool). In other words, whatever we propose to do to the beveled side of the tool, the front, we must also do to the back.

**Grinding** – Shaping the cutting bevel to the desired shape and angle and repairing any damage. This is called the primary bevel. I usually go directly from the grinder at this stage.

**Honing and polishing** – We work on only a small part (1/16" to 1/8") at the front of the cutting bevel, called the secondary or micro-bevel. The micro-bevel can be renewed for a long time before regrinding the primary is necessary. A large micro-bevel serves no purpose. Multiple micro-bevels also serve no purpose. Only the micro-bevel touches the wood and only the micro-bevel requires honing and polishing. Its sole purpose is to strengthen the edge and make sharpening easier by making it faster.

I should say at this stage that the various detailed steps in the method vary greatly from one person to another. I'm teaching "my" method. Different instructors emphasis different details that work for them. Interestingly, those who teach sharpening or otherwise do it well are continuously debating and sharing their ideas with one another. In that sense there is no "right" way so long as one understands and follows the principles. Despite our preferences, and all the debate, we all seem to get to the same place!

### **The three steps in more detail.**

**Lapping**, or flattening, the tool's back is critical. A tool that is not flat or which has imperfections such as coarse grinding marks cannot be made sharp. Lapping can take no time at all for a new blade such as a Veritas plane iron to what seems like an eternity for an old tool. Start as coarse as necessary (I've used 50 grit belt sander paper) and finish the process on the 1000 and 4000 stones. For a new blade this work should take no more than 10 minutes. An older blade could take much longer to make right. One popular method is sandpaper. Another is the lapping grits although I find them messy and I worry about contamination. Both use plate glass as the flat reference surface. I've since switched to a granite surface plate for its additional versatility. Diamond plates are also useful but expensive.

After lapping, the front 1/2" or so should be further polished as high as the highest grit you will use on the micro-bevel. This is critical because this surface (the face) dictates how sharp an edge that can be created. However, in practice I usually lap a larger area because it takes little extra effort and enables me to work the tool on my stones more efficiently. Bear in mind that you may not get the face or back of a new blade as polished as you might like the first time. Be patient and work at it some more at subsequent sharpening sessions.

For a lapped blade polishing should take only 5 minutes or so. Thereafter it will be enhanced every time you polish away the burrs while honing.

Remember, therefore, never again touch the back of the blade with anything coarser than the grit you used for polishing.

**Grinding the primary bevel** ... there are three basic methods:

- A 200-ish water stone or equivalent diamond plate, with or without a honing guide
- On a regular grinder with cool wheels (producing a hollow grind which is preferred by some for freehand honing.) or on a 1" belt sander
- On a power system such as the Veritas MkII

While a detailed discussion about bevel angles would consume many pages, there is no need to be terribly fussy so long as you follow these basic guidelines:

- A 25° grinding angle or primary bevel is the norm for most tools (planes, chisels and shaves)
- 30° provides more strength for mortise chisels and block planes used for end grain
- 20° is suitable for light paring chisels and some block planes in well behaved wood
- 35° to 50° angles may be used for specialized applications in bevel up planes

Refer to LV Technical Bulletin #25 regarding plane blade geometry used by Veritas.

**Honing the secondary bevel** ... this is how you make the tool sharp. Despite its importance, this step should take five minutes or less, a bit more if you are struggling with the honing guide, a few minutes more if the blade slips out of square in the guide! A few strokes of the 1000 grit will establish the secondary bevel. Many people skip to 4000x for this step. A dozen or so strokes on the 4000 will create a good polish. At each of these stages you should strive to turn up a consistent wire edge on the back which is then honed away by stroking the back of the blade a few times on the stone you used for polishing the back. That is to say, if you polished the back of the blade at 8000 you will use that stone to remove the burr formed by both the 1000 and 4000 stones.

## ***FREEHAND HONING***

The freehand honing method that I use is easier to do than it is to describe! Here are the steps:

- For as right handed person, lead with the left foot. I place my left foot under the front edge of a bench at the normal height.
- Grip the tool by the sides with the right hand. This hand will do the driving. The other will do the steering.
- For plane irons press the index and middle fingers of the left hand on the front of the blade in a way that allows you to apply equal pressure in a controlled and balanced way. The location of the fingers can change from side to side to make corrections or to camber the edge.
- For chisels, press the index finger of the left hand on the back of the blade just behind the edge and the index finger of the right hand behind that of the left.
- Find the primary angle – rock the tool on edge until you find it. This is harder to do with thin blades.
- Lift slightly to increase the angle. Congratulations! You've just established your micro bevel.
- Lock your arms. Rocking your whole body from the ankles up and with the upper body fairly rigid, stroke the blade back and forth while maintaining the secondary angle.
- Use a figure-eight stroke to even out the wear on the stone.
- Whenever possible, use the edge of the stone for small or narrow blades.
- Hone wide blades before narrow ones.

**The Burr is Important** ... Spend enough time at each stage to turn a good consistent burr. Failure to turn a burr means you have not honed the front edge sufficiently to meet the back edge; that is to say, the two planes of the cutting edge have not met. When the burr is turned and it is consistent along the entire edge and it is large enough ( $\pm 1/16''$ ) to be useful, the tool will not be made sharper by continuing further with that stone. It's time to move on.

The burr at 1000 is easy to detect; a bit more difficult at 4000. The burr at 8000 should be presumed because it cannot be felt reliably with the fingers.

Some believe one can skip 4000 and proceed from 1000 or 1200 (the so called medium grit stone) to 8000. I am unconvinced. I believe skipping 4000 makes for too much work for the 8000, thereby achieving no time saving.

The idea is that the finer stone removes the scratches from the coarser stone, replacing them with still finer scratches. However, I do not believe one must do 1000, 1200, 4000, 6000, then 8000, without skipping a grit as one would when sanding wood, these being the typical grits for water stones. I use 1000, 4000 and 8000.

I finish up by using chromium oxide (green) honing compound (.5 $\mu$ ) on a strop. The strop I use most often is maple but leather is common and I sometimes use that as well. A common technique is to take one or two careful, gentle pulls on the bevel followed by one on the flat of the back.

I have recently changed this part of the method. I have experimented with the green compound on mylar backing adhered to MDF as one would a stone. I've also used a leather strop. For the present I prefer to finish up with the maple strop but by drawing the edge of the blade through the end of the block, effectively polishing both sides at once. This reduces the risk of rounding or dubbing and is actually quicker to do.

I am also experimenting with diamond paste to see what it offers. Diamonds, whether a plate or paste, seem to offer some efficiencies for harder steels like A2.

The cap iron on bevel down planes also needs attention, usually a one time affair. It should be sharp and the mating edge should have a slight back bevel to ensure a tight fit with the plane iron across the entire width. There should be no gaps. The top should be polished and waxed to allow for efficient clearance of shavings. While this operation is an aspect of the overall tuning of a hand plane, I've included it here because the methodology fits with discussions of sharpening.

## ***ADDITIONAL TIPS AND COMMENTS***

- Protect the stone as much as possible; sharpen wide tools before narrow; use as much of the stone as consistently as possible. As the saying goes, worry about the edges and the center will worry about itself. A figure eight pattern is typical.
- Flatten your stones regularly ... this must be done more often than people appreciate. I do it at each sharpening session, more often if I will be sharpening many tools or a lot of chisels. The rule of thumb is to flatten the stones after every five to ten minutes of use. This takes less time and results in more consistent results than if the stones are allowed to deteriorate and become out of true. Lap often and you will be a better and much faster sharpener faster.
- There are a few options for lapping stones. They all work, some better than others.
  - Diamond stones – expensive but reliable; worth the cost if the diamond stone is also to be used for grinding.
  - Norton lapping stone – over rated and unreliable.
  - Silicon carbide grit on plate glass – messy and old school but it works and is still popular with many.
  - Sandpaper on glass ... easy and commonly done (Toshio Odate) but more time consuming in my opinion.
  - My favorite – 100-120 grit drywall screen on ¼” plate glass supported by a piece of melamine – cheap, fastest and least messy; use router mat to minimize slippage.
  - A granite machinist’s surface plate or a granite tile instead of glass.
- Lap the coarsest stone on the lapping medium; then each stone progressively on the next; hence, the 4000 on the 1000, the 8000 on the 4000. Use pencil marks to indicate progress. This is a variation on the traditional method. Some use two 1000 grit stones against each other to start; one canceling out irregularities in the other. This is excessive. Lapping, as recommended, takes only 2-3 minutes.

- Clean your honing guide between stones so as to not transfer slurry from one stone to another thus contaminating the finer stone. Spritzing with the spray bottle over the stone pond works.
- Firm pressure is typically used for the coarse stone, moderate pressure for the medium stone and quite light pressure on the fine stone.
- Nagura can be used to clean and condition fine stones, building very fine slurry. It can also be used to dress down spots that seem high or where the blade seems to be sticking.
- Test sharpness on your thumb nail ... the lower the angle at which the blade will catch, the sharper the edge. You can also use the plastic barrel of a ballpoint pen. Also, check the blade across its width for consistency. Paper towel also works.
- After you have finished, immediately wipe the blade with wax or oil to inhibit rust formation.
- Blades should be laid on the bench bevel down (edge not touching) to protect the edge.
- Each time you sharpen a plane blade, clean the plane and lubricate as required.
- I see no particular value in laying a plane on its side when not in use unless there is no other option. It's far better to have a scrap of carpet, an old mouse pad or a scrap of wood handy so you can set the plane down right side up. In that way the blade is safe and so are you.

## ***MORE INFORMATION***

Beech, Brent. "Brent's Sharpening Pages".

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[www.woodcentral.com](http://www.woodcentral.com) – a popular and excellent discussion forum for woodworkers.

## ***BIOGRAPHY***

Brian Greene is a writer, woodworking teacher and self-taught designer-maker of contemporary furniture. His furniture, built-ins and decorative objectives are distinctive and use both traditional and contemporary materials and methods. He loves teaching and sharing his passion for woodworking and sharp tools with others. Brian works at Lee Valley Tools and is a member of the Ottawa Woodworkers' Association. The opinions expressed in this paper are his alone. He can be reached at [brian\\_greene16@hotmail.com](mailto:brian_greene16@hotmail.com)