# Getting the Most out of the Work Sharp Sharpening System

**Text and Photos by Jerry Work**

One of the great benefits from having my studio and small gallery where I design and handcraft fine furniture located in the 1907 former Masonic Temple building in historic Kerby, OR, is that I get frequent visitors who stop to see my work or just to chat. The ones who are woodworkers range all the way from well known professionals to advanced hobbyists and to those just beginning their learning process. After the exchange of pleasantries and (hopefully) some oogling and ogeling around the gallery, the conversation often turns to the layout of the studio or the tools and techniques I employ.

It is during that part of the conversation that the question is normally asked about how I sharpen my hand cutting tools. Most everyone I know sends out power cutting tools, such as saw blades, shaper cutters and router bits, to a specialized sharpening service, but nearly everyone tries to sharpen their chisels, plane blades, lathe tools and carving tools themselves. And, most everyone expresses some level of frustration trying to do so.

They read about people who are able to put a “perfect” edge on these tools and see pictures of the long curl of wood shavings coming from a well tuned and sharpened plane, but few have been able to achieve such “perfect” edges by the techniques they have used in the past, hence the frustration.

Once in a while a visitor will be one of those for whom the act of sharpening, the process itself, is the end they are after.

They are the ones who talk about a near Zen-like experience from getting their tools “scary sharp,” and they seem to be willing to go to any end or spend any amount of money just to get something sharper than they ever could before.

I always pause a bit before answering questions about how I sharpen to make sure I really understand which type of person I am talking with. I’m one who uses tools to build fine furniture. Tools for me are just that, tools. They are the means to the end, not the end in and of itself. A sharp hand cutting tool is a must to do fine work and to do it efficiently enough to keep my prices affordable. I sharpen because I need sharp tools. Since I never really know the questioner’s intent, I have to probe a bit to find out if they want to sharpen to do good work or sharpen for the experience of sharpening.

Over the decades that I have been doing this I think I have tried just about every kind of gizmo and gadget ever marketed as being a sharpening machine, jig or fixture. Most were messy, requiring water or oil as a coolant. Some really tweaked my interest initially but quickly proved to be too much of a hassle to actually use very often. Some were simple and worked but were very slow and the results haphazard. Some had all kinds of holding fixtures for each different kind of hand cutting tool while others offered some sort of one size fits all contraption. Some turned an abrasive wheel vertically, some horizontally, some had you push the cutting edge over a stationary abrasive while still others had you push an abrasive over a stationary cutting edge.

Independently of how they performed the sharpening task, the biggest weakness in all the systems I used in the past was the inability to quickly reestablish the exact same bevel angle I used when I sharpened that tool the previous time. Each time I sharpened a tool the cutting edge was different by some amount, and I had to learn to compensate for that difference one use to the next. I always thought there were enough variables from one piece of wood to the next to keep me on

my toes so didn't ever appreciate the need to adjust for the cutting angle differences as well.

Most of the devices I used in the past tried to overcome this inherent design weakness by suggesting the grinding of a "micro-bevel" after grinding the primary bevel angle. The micro-bevel is just a second cutting edge five or so degrees different from the angle of the primary cutting edge that only extends a millimeter or less back from the point. The idea is that this micro-bevel can be established quickly since little material has to be removed, so even though the micro-bevel angle is likely different from sharpening to sharpening, it is at least fairly quick to produce. Kind of the "no harm, no foul" mentality.

I never have been able to buy into that idea and always wanted a simple, fast, convenient way to reestablish the exact same bevel angle each time I sharpen. That way I wouldn't need to remove very much material to reestablish the perfectly sharp edge and would not have to spend the extra time and set up to do a micro-bevel.

***Only recently did I find a way to do that time after time, edge after edge, across the whole gambit of my hand cutting tools.***

It all started with a call from the Professional Tool Manufacturing company located in Ashland, OR. This company is well known for it's excellent "Drill Doctor" brand of drill bit sharpening systems. The caller said they were developing a new hand cutting tool sharpening system and asked if they could come talk with me about it. I was intrigued because their Drill Doctor line is so well received in the marketplace, so I agreed to the meeting.

At the appointed time the product manager and the lead designer/engineer on the project came in carrying a box. I expected some sort of cobbled together model or prototype to be used to explain their idea. I was stunned when out of the box came a fully functional, well machined, pre-production prototype constructed from polymer and metal materials carefully EDMed to simulate the form and function of what were to become the cast metal components of the production machine.

***It was clear from the first glance that they had addressed and perhaps solved the problem of reestablishing the exact same bevel angle every time you sharpen.***

Here we were less than a few moments into the conversation, and they were presenting what I had always hoped to find - the same cutting bevel angle time after time, no matter what grit of media was being used and with no need for jigs or fixtures! This was no arm-waving whiteboard discussion of what might be. Here was a fully functioning machine that did exactly what I wanted, and it was sitting on the table in front of us. Sure, it was a prototype so it would not stand up to the rigors of daily use, but it worked and worked very well indeed.

Now let's jump forward a whole bunch in time and talk about the production version of what they designed, now called the "Work Sharp" machine, and how it has changed my work habits so dramatically.

In the past the process of sharpening my hand cutting tools had to take place

somewhere else in my studio where I could contain the oil or water mess, store all those jigs and fixtures, and where I could reread the instruction manual every time I simply wanted to sharpen a chisel or whatever. As a result sharpening was a process that took me away from building fine furniture, so subconsciously it became a process to be avoided. I simply worked with far less than sharp hand cutting tools far too much of the time.

The Work Sharp machine has done away with all the water or oil mess as it is air cooled. It needs no jigs or fixtures as we will see shortly, and it is intuitively obvious to use with no measuring, positioning, guessing, or repeat set up so I don't need to reread the instruction manual all the time. It is also small, compact, and robustly made so I know the results won't change over time either.

As a result, the Work Sharp machine now lives right where I store and use my chisels, planes, gouges and lathe tools. Any time I reach for one of these I simply place it in the Work Sharp for a few seconds to reestablish that "perfect" edge so I am always cutting with exactly the same bevel angle and can rely on getting the same result time after time. What a difference that has made in my work processes and my efficiency.

As we progress through this "Getting the Most..." manual we will talk first about how the Work Sharp machine functions and then progress through the different kinds of hand cutting tools and how to optimize their performance using the Work Sharp system. Along the way we will also talk about construction of a "sharpening center," a very handy piece of shop/studio furniture I designed to accommodate both the Work Sharp and the Drill Doctor. It is on wheels so you can keep it close at hand no matter where you are in your work space.

If you are like me, one who likes to build and create far more than you like the process of sharpening, I think you will quickly change your work habits just as I did. By keeping the Work Sharp close at hand and by being able to quickly reestablish that beautifully polished and "scary sharp" cutting edge, every cut will perform in a known and predictable way. You will enjoy your hand cutting tools more and use them more productively as well.

If you are into the art of sharpening and want to spend hours doing it, this tool just might ruin your day. It nicely produces a perfect edge every time with little or no effort. Sorry about that!

## *So, how does this thing work?*

The Work Sharp machine rotates a 150mm diameter (6”), 10mm thick tempered glass plate in a horizontal plane. Pressure sensitive adhesives in a progression of grits are applied to the very flat surfaces of these glass plates. The plates can be dismounted, turned over and remounted quickly with just a thumb screw. No tools required.

***So that you can see how this works, the pictures here were taken with no abrasive on the glass plates. I will add abrasives when I show the Work Sharp in action.***


Below the plane of the glass plate is a cast and machined metal tool rest which has fixed fences on both sides as well as a movable fence. Turning a knob moves the movable fence to allow you to create a space between the fixed fences that is exactly the width of the cutting tool you wish to sharpen.

The tool rest can be set to 20, 25, 30 or 35 degrees relative to the glass plate. This is done by lifting a cast metal lever and indexing a tooth on the tool rest to a notch formed in another cast metal piece so the angles will not change from use to use or over time. They will always be exactly the same.

The tool to be sharpened is registered off of the flat back of the tool held to the surface of the tool rest. The fences hold the edges of the tool in exactly the same orientation relative to the glass plate time after time as well.

With the machine turned on and the glass plate turning at a low RPM (so as not to over heat the cutting edge,) you place the flat back side of the tool on the top of the rotating glass plate to make the leading inch or so perfectly flat. Then register the flat back on the tool rest and push the tool up to contact the abrasive on the bottom of the glass plate. Leave it in contact with the abrasive on the glass plate for about a second or two and then pull it down a

quarter inch or so for about a second or two and repeat these motions to the point that you remove all the scratch marks left by the previous, coarser grit. Invert or mount a new glass plate with the next finer grit and repeat up through the grits.


When you have reached your final grit, you can optionally mount a leather faced glass stropping plate and polish the now perfect back and edge to a mirror-like finish.

On the first sharpening you will be machining a known bevel angle into each of your cutting tools. Use the angle that most closely matches how those tools were machined in the first place. You will most likely be going up through four or more grits from coarse to fine to both establish this known angle and to hone the back and bevel to produce a very sharp cutting edge.

Leave the last (finest) grit plate you used mounted on the Work Sharp. From that point forward, each time you pick up a tool that you intend to use, just place the flat back on the tool rest and repeat the up and back motion described earlier. Do that a few times and your cutting edge will always be just as sharp as the last time you used it.

If you do manage to damage the edge, back up a few grit steps and renew the edge. Fast, easy and very repeatable.

***What about the hand cutting tools that are not flat on the back?***

The Work Sharp provides four different means of sharpening things such as lathe tools, carving tools, gouges and the like that are not flat on the back as chisels and plane blades are.

A supplied tool rest (red arrow) can be placed into grooves machined into the metal top casting and set to the desired height as shown here. In this example the lathe tool cut-


ting surface is the sharp edge formed between the top of the tool and the diagonal face cut in the end of the tool. By resting the bottom edge of the tool on the tool rest you can quickly reestablish the cut-

ting edge by shaping and honing the diagonal face. If you ever did need to reestablish the flat on the top edge, that can be done by placing that edge down against the top surface of the glass plate.

If the width of the tool is not too great and the angle of the diagonal face is one of the four angles to which the built-in tool rest can be set, you could use that tool rest, hold the body of this lathe tool against the fixed fence and then just push the face up against the abrasive on the underside of the glass plate, just as we did with the chisel example.

There also is a port accessible from the rear of the Work Sharp which allows odd shaped cutting tools to be sharpened. In the photo below no abrasive is mounted on the glass plate so you can see more easily what is going on. The odd multiple bevel angle of this gouge can be brought up through the rear port to be flat against the underside of the abrasive.

To make that both easy to do and easy to see, the Work Sharp comes with a specially slotted wheel shown in this photo.

Slotted abrasives are adhered to this slotted wheel, and it is mounted in place of the glass plate as shown. When the slotted wheel turns, you can see through the moving slots and actually watch the cutting edge of the tool as it is machined by the slotted abrasive.

This is a very accurate way to establish and reestablish such odd angles as well as shapes like a fingernail gouge, for example. In this photo the slotted wheel

has been removed so that again you can see how the rear port allows you to easily position odd shaped or angled cutting tools relative to the abrasive on the bottom of the slotted wheel. The photo below shows the underside of the slotted

wheel and one of the several grits of abrasive available with matching slots.

You can purchase additional glass plates and slotted wheels if you want a broader range of grits for your sharpening.

There is one final wheel available and that is the leather strop wheel. This is a glass plate with leather bonded to one face. It can be used leather side up for polishing the flat back of a chisel or plane blade or one of the odd shaped cutters you elect to sharpen from the top using the included upper tool rest.


You can also turn it over, leather side down, and use it in conjunction with the built-in adjustable tool rest to polish the bevel angle established by the positive positioning of the lower built-in tool rest. It comes with polishing compound to load the leather strop surface.

One last comment on the very flat glass plates before we move on to examining the machine in more detail. These strong, tempered glass plates are amazingly flat on both sides and uniform at 10mm in thickness so they make possible the use of everything from very coarse grits to grits smaller than one micron (one millionth of a meter!) with equally fine results.

Work Sharp supplies standard with the unit 150mm diameter pressure sensitive grits in FEPA (European) ratings of P120, P400, P1000 and Micromesh 3600. Other coarse grits can easily be obtained from hardware or woodworking stores while other grades of finer grits can be found in most auto paint stores.

These very flat glass plates will produce a perfectly flat bevel angle unlike wheels which produce a concave bevel angle potentially weakening the the cutting edge that is doing all the work for you.

***Now let's examine the machine in more detail.***

In the close-up of the front and side of the machine you can see the tool rest, fences, back-side honing surface, sharpening port heat sink, the tool rest adjustment handle, and the fence positioning knob.

Here is the machine without the glass plate or the abrasive mounted. A simple thumb screw attaches the glass plate or the slotted abrasive wheel onto the motor spindle (red arrow). The spindle is mounted with sturdy sealed ball bearings to provide a long service life and no maintenance.


By lifting the handle (yellow arrow) you can move the tool rest and heat sink to one of four bevel angles; 20, 25, 30 or 35 degrees relative to the flat surface of the glass plate (shown here without abrasive for clarity).


Surrounding the motor shaft is a hard rubber ring that supports and cushions the tempered glass plate (green arrow). It also further seals the shaft and bearings from the very fine metal shavings produced by the abrasive action of the grit.

Note that the surface of the tool rest and heat sink (also called the “sharpening port” in company literature) is also covered with a pressure sensitive abrasive (blue arrow) that serves two purposes.


First, when you pull the tool to be sharpened back away from the abrasive on the underside of the glass plate, the tool rest abrasive fractures the micro wire edge that is formed by the sharpening process. Since you normally push the cutting tool up against the abrasive on the underside of the glass plate for a second or two and then retract it for a second or two, repeating this process five or ten times per grit, the wire edge is constantly removed as it is first formed.


With most sharpening systems the wire edge is only removed after it is fully formed which can result in a microscopic fracture of the very cutting edge you are trying to establish. By constantly removing it as it is formed, the quality of the cutting edge is improved.

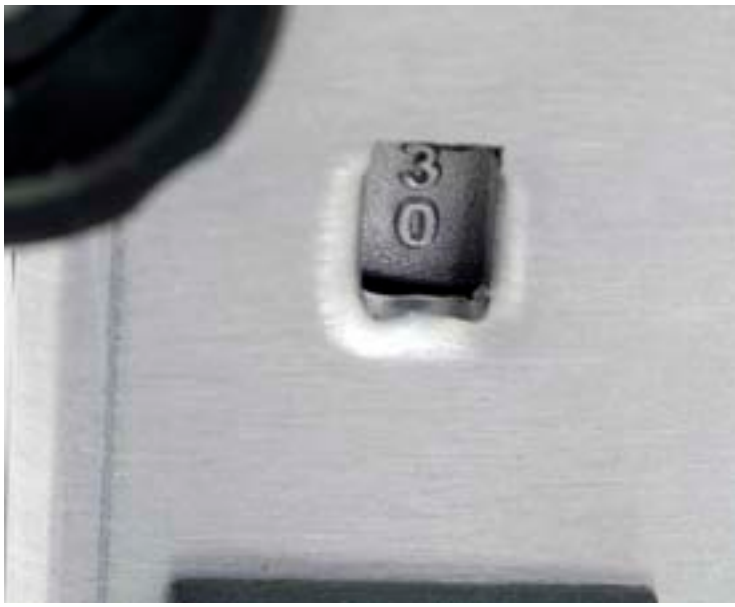
The second purpose of this grit face on the heat sink and tool rest is to help you position the tool so it has less tendency to slide down the incline of the tool rest and will keep the cutting bevel nicely in contact with the abrasive doing the sharpening.

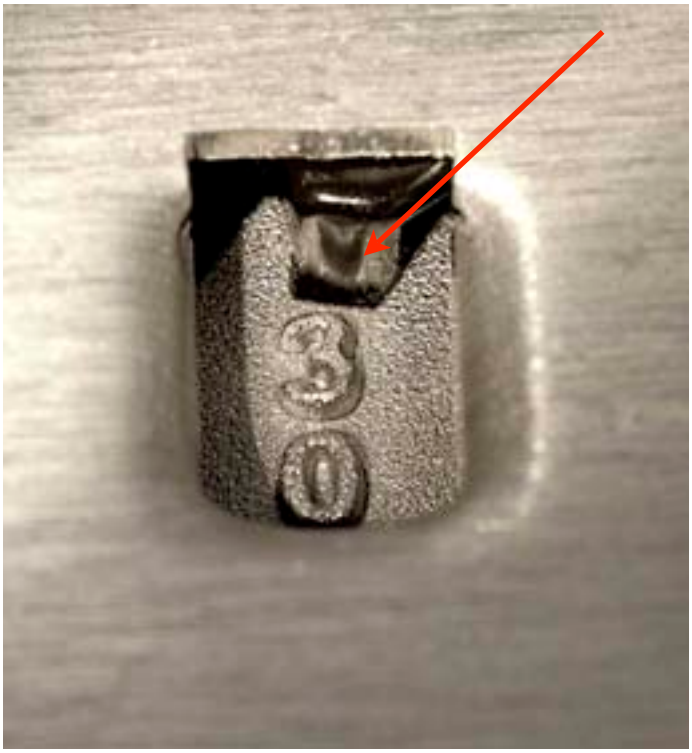
The heat sink that is built in as part of the tool rest directs cooling air to reduce heat build up on the cutting edge which otherwise might burn or damage the edge.

The strong upper and lower body castings are held securely in registration, one with another, by sturdy steel machine screws (orange arrow). This robust construction is evident throughout the Work Sharp. It looks to me as if it will last a

long, long time.  No planned obsolescence here.

The side close-ups on this page show how the lower tool rest angles are established by a tooth and notch formed into the metal housings (red arrow).  Note how the tooth locks on both sides of the notch for a positive repeat each time you select that angle.

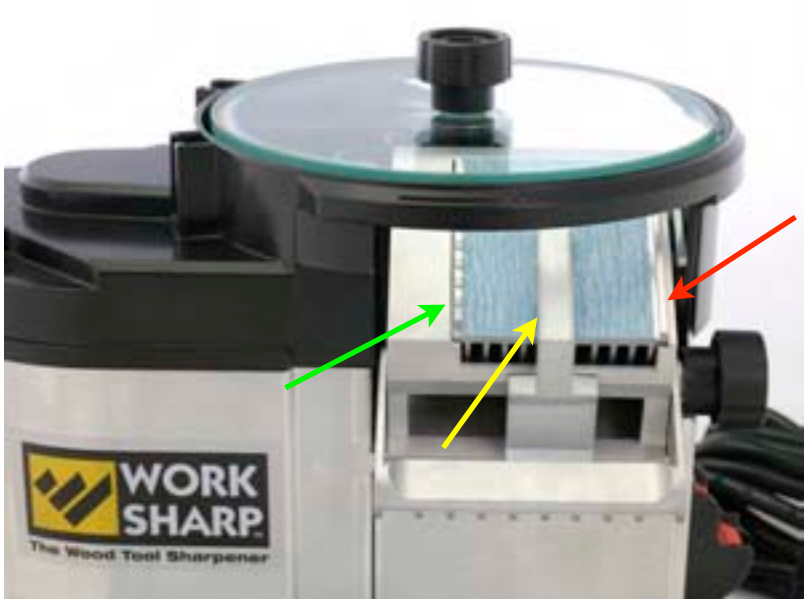




***As we discussed earlier, this one feature alone makes the Work Sharp machine stand head and shoulders above all the other machines I have used in the past.***

Once the bevel is well formed, all you need to do for normal daily resharpening is just hold the tool firmly down on the tool rest and push it up against the same finest abrasive you used to sharpen the tool in the first place.  Hold for a second or two and pull back for a second or two.  Repeat that motion a few times.  It could not be easier, faster or more accurate.  As a result you will do it every time you pick up a tool such as a chisel.  Now you will always be working with the sharpest possible hand cutting tools.

***Now let's look at the fence in more detail.***

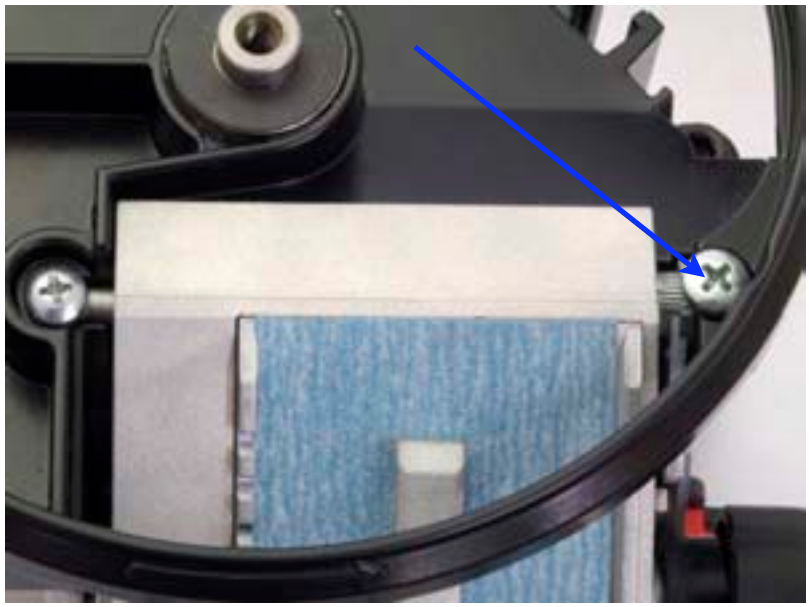



There are three parts to the fence: the outer fixed side (red arrow,) the inner fixed side (green arrow,) and the center movable portion (yellow arrow.) The right side fence is the one you will normally use to position the edge of your tool as that places the tool cutting edge in contact with the largest area of the glass plate.

This close-up is taken from behind the Work Sharp with the glass plate removed so you can see the relative position of the cutting tool when against the right fixed fence with the moving fence placed against the other side of the tool to make sure you guide the cutting tool squarely up against the abrasive on the underside of the glass plate.

You can also use the left fixed fence if you want to even out wear on the surface of the abrasive. The movable fence and the left inner fixed fence are grooved so the the movable fence can be positioned all the way over the fixed fence to make room for cutting tools as wide as 2".

One of the very important design features on the Work



Sharp is a skew adjustment allowing you move the side-to-side angle of the tool rest by very small amounts to produce a square cutting edge on your tools.

Skew is adjusted by loosening the screw on the right (blue arrow) and rotating an eccentric (notched piece below the

screw) which forms the right-most support for the tool rest pivot rod. The rotating lever is located on the right side of the Work Sharp and shown here by the red


arrow.

This photo also shows the knob used to locate the movable fence (green arrow). Turning the knob causes that portion of the fence to move from side to side. Since it always stays parallel with the fixed fences on either side of the sharpening port, it is fast and easy to properly register flat tools to produce really square as well as finely honed cutting edges.

***Now that we know a bit about the machine, let's go to work sharpening our hand cutting tools. We want that "scary sharp" edge we have heard about and will find that it is well within our grasp.***

## *Using the Work Sharp*

Here is a collection of hand cutting tools, probably a lot like those in your shop or studio. I use two sets of standard chisels, some mortise chisels, lathe tools of several types, carving tools and hand planes. These are the items that we will sharpen in this section.

The roll-around stand that the Work Sharp is sitting on is one I built to house both the Work Sharp and the Drill Doctor drill bit sharpening system.

I like to keep these close at hand so I am always working with the same fine cutting edge each time I grab a one of these cutting tools. The cabinet uses simple rail, stile and flat panel construction. One shelf behind the two doors and one drawer hold all the accessories and supplies for both the Work Sharp and the Drill Doctor.

The top is stainless steel that has been buffed in a cross pattern with a scouring pad similar to 3M synthetic abrasive pads. A quick rebuff is all it takes to keep the top clean and bright. I use the same technique on all my cast iron work surfaces as well.

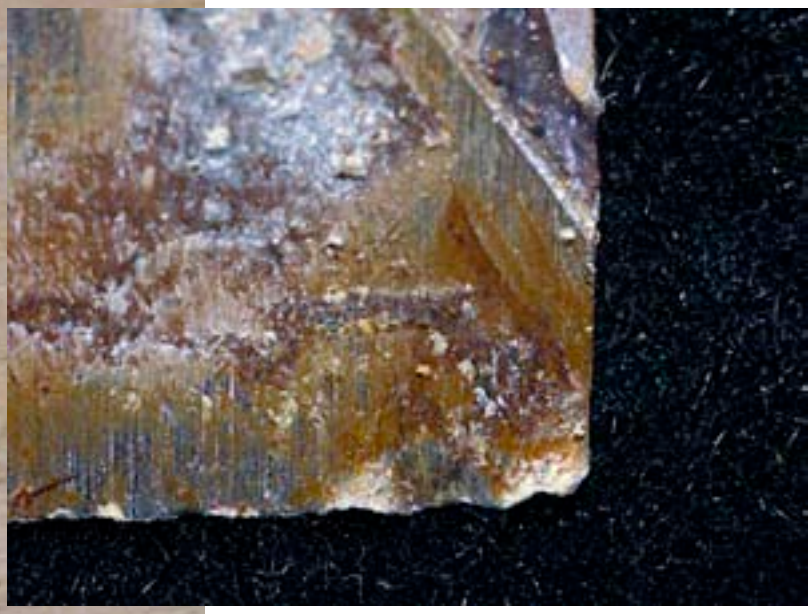
Like most furniture makers I use the chisels for a lot more than “just” cutting tasks. They frequently are used to remove glue squeeze from corners, to scrape burrs from inaccessible places, to shave a finish flaw and the like.

Anytime water comes in contact with metal, as it does when removing glue squeeze, the metal will begin to rust very quickly. The more polished the edge, the more quickly it rusts. Rust by it’s very nature causes microscopic pits to form so it is important to either remove the glue from the metal as soon as you can or, as I now can do, reestablish the cutting edge frequently.

We will see shortly how the Work Sharp will remove those blemishes and reestablish the finely polished cutting edge quickly since most of these chisels have been sharpened by Work Sharp before.

Before we do that, let's start with an old beat up construction chisel that has not been sharpened with Work Sharp before. It has been badly abused by digging out nails, whacking knots, being used as a crow bar, and all those other necessary tasks that I'm sure none of you ever do (grin)!

The highly magnified cutting bevel and cutting edge images show just how bad this chisel was before it was sharpened. The edge is nicked all across and the bevel and back are both rusted and pitted. A really ugly chisel!



Before using the Work Sharp for the first time, you need to affix the grits you want to use to the glass plates. The photo below shows the two glass plates and four grits that come standard with the Work Sharp before the grit is adhered to the glass plates. The standard grits are P120, P400, P1000 and MicroMesh 3600. This is a really good range of grits and will handle most needs.


As we saw earlier, you can also buy additional glass plates and many different grits so can custom tailor the grit selection to how you like to work. I prefer to work with three glass plates plus the leather strop plate. That gives me seven grit surfaces plus the leather strop to select from while doing the sharpening on the solid glass plates.


We will look at the slotted plates in a minute.

Seven grit surfaces give me a coarser P80 grit to more quickly rough in an ugly chisel like the one on the previous page. It also lets me add an intermediate P220 grit to use between the P120 and the P400, plus a MicroMesh 6000 to use just before the final polish on the leather strop wheel.

Those selections are shown in the upper photo. You can start with the standard two plate set up and get very good results. If you want, you can add the other glass plate and/or the leather strop plate to round out your setup.

Putting the grit on the plate is simple. Just peel off the clear backing, align the abrasive with the center hole, and roll it on out as is shown in these photos.

I like to write the grit number on the face of each abrasive near the mounting hole. That way it is easy to see what grit is mounted since once you have abrasive on both sides of the glass plate you can no longer see the markings on the back.

When you get to mounting the MicroMesh material, note that its backing is in three parts so be sure to get all three. Also, be sure to roll it from the middle out to avoid any air bubbles that would cause an uneven surface. The MicroMesh material is much softer and more pliable so bubbles will form more easily than under the traditional abrasive sheets.

Place the grits in order with a coarse grit on one side and the next finer grit on the other. Progress on up through all of the grits you intend to use.

It is also a good idea to clean the glass plate well before you adhere the abrasive to make sure there are no dust or chips between the plate and the abrasive. When you get down into the 3600 to 6000 range the grit particles are very small (2 microns for the 6000 grit) so even a small chip or dust particle will cause a bump in the abrasive surface that is much larger than the grit particles themselves.

The photo right shows how the grit on the second side will obscure the numbers so marking the grit number on the face will be a handy reference.

The photo below shows the MicroMesh 6000 rolling onto the back side of the leather strop plate.  You can either start from the center and roll it out both directions, or start at one side with the center hole aligned and roll all in the same direction.

The bottom photo shows the four glass plate set up I use:  the two plates that come with the Work Sharp plus one extra glass plate plus the leather strop plate.  With this set up the grit steps are P80, P120, P220, P400, P1000, MicroMesh 3600, MicroMesh 6000 and the leather strop with buffing compound (included with the strop plate).

Now we are ready to tackle that ugly old chisel.

The first step is to set the proper bevel angle. Put your thumb on the lower tool rest and pull up on the bar to index the tool rest to the angle desired.

Check by inserting the chisel on the tool rest up to the point that the bevel angle is even with the top of the Work Sharp plate surround and sight across. The bevel on the chisel to be sharpened should be roughly even with the top of the plate surround when the correct bevel angle is selected. The tool rest will lock into the selected angle by simply releasing the bar. The chisels I use are beveled at 25 degrees.

Next, mount the P80/P120 plate with the P80 side down, turn on the machine and flatten the back of the chisel with the P120 grit on the top of the plate.



The plate spins at 580 RPM's so overheating is not much of an issue unless you were to hold the chisel back in contact with the plate for a long time. If it starts to feel warm to your hand, lift off for a few seconds to let the chisel cool down.

Work the back of the chisel until it is flat for at least an inch below the cutting edge and all the rust and pits are gone. The easiest way is to rest the butt end of the chisel gently on the edge of the glass plate and then rock it down nice and flat with one finger above as shown in the photo left.

The top photo shows the back of our ugly chisel transformed from the rust and pits we saw earlier to a uniform scratch pattern. It took less than a minute to do this.

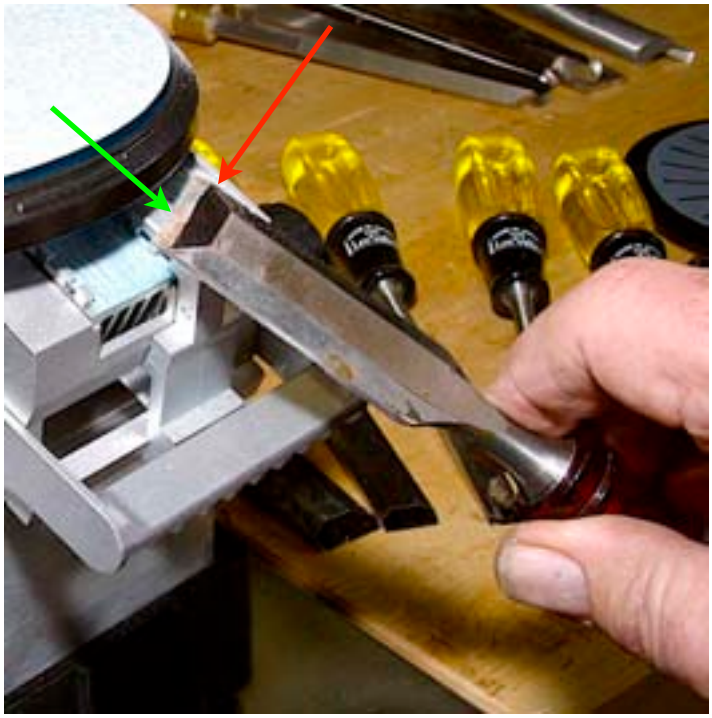
While there is no cooling fluid mess, know that the fine metal particles cut off by the abrasive will create fine metal dust as you can see if you look closely at the photo above and those on the next page.

***Always work from the right side of the wheel where it is rotating <u>away</u> from you. Never flat grind with the wheel rotating towards you as the chisel could dig in and get thrown back at you.***

With the back nice and flat (but far from polished at this point) adjust the fence to properly align the sides of the chisel but loose enough that you can easily push it up against the underside of the glass plate (the P80 surface) for a second or two and then pull it down across the abrasive on the face of the tool rest to remove any burr or wire edge formed.


Continue that motion until the bevel is nicely formed all the way across the cutting edge. In the lower photo you can see much progress, but the bevel grind (red arrow) has not yet reached the cutting edge (green arrow), so more time is required at this grit level. Keep stroking the chisel in the sharpening port pushing up against the spinning abrasive for a second or two and then retract for a second or two to wipe off the burr or wire edge formed.


Once the bevel angle is evenly formed all the way across the cutting edge, check with a square to make sure the cutting edge is 90 degrees to the sides. If not, adjust the skew until it is. The unit shown here came exactly on 90 degrees right out of the box.



At this point we have transformed our “Pygmalion” from a rusted, pitted unusable mess to a well formed, but not yet sharp working tool you will be proud to own.

From here it is easy as the Work Sharp machine does all the work for you. Invert the glass plate so the P120 side is down and remove the scratch marks formed by the P80 grit and replace them with the finer scratch marks of the P120 grit.

If you are using the standard four grit sequence on two glass plates (instead of the seven grit sequence on three plates and the leather strop plate that I use) your first plate will have P120 on one side and P400 on the other.


The process is the same though it will take a little longer to get the chisel into initial shape with the P120 grit than it takes with the P80 grit. Also, you will need to mount the first plate with the P120 side up to flatten the back, then invert it to form the initial bevel angle at P120, and invert it again to refine the bevel edge with P400.

Using the seven grit, four plate set up shown here you minimize the number of times you need to invert the plates, and you will form the initial correct back and bevel more quickly.

Back to our seven grit sequence. Mount the second plate with the P220 side down and the P400 side up. Refine the flattening of the back on the P400 side working the same way you did initially with the P120 grit.

Once the scratch pattern on the back has been refined to the P400 level, work the bevel on the underside of that plate on the P220 grit, invert the plate and take the bevel to the P400 level.

At this point the back and bevel will both be noticeably better with a bit of a shine developing and the edge very flat and looking quite sharp.

Mount the plate with the P1000 and MM3600 grits and repeat the process again. Work the back on the MM3600 side, then work the bevel on the lower P1000 side, invert the disk and finish off the bevel with the MM3600.

At this point you have a very, very sharp chisel that will cut wood better than you may have ever experienced before.

While it is indeed sharp, it is not polished. If you want to add a mirror-like polished surface to the back and bevel, it is time to mount the plate with the MM6000 on one

side and the leather strop material on the other.

By working both the bevel and the back on the MM6000, followed by buffing on the leather loaded with the polishing


compound included with the leather strop plate kit, you can achieve as high a shine as you wish.

A mirror-like finish takes some time to achieve and it really does not improve the working sharpness much, but it will impress your friends!

The reason I polish (to far less than a true mirror finish) is so that I can more easily see nicks or blemishes. As discussed earlier, I like to insert my chisels into the Work Sharp port (with a fine abrasive mounted, either the MM3600 or the MM6000) each time I pick one up so that the cutting edge is always the same. If I do manage to nick the edge (probably by doing something I shouldn't do,) it shows up on the polished surface, and I know to back up a couple of steps to reestablish the fine edge before use.

The first time you use Work Sharp to initially condition a chisel, you will likely be amazed by how much fine mat of grit is collected under the plate and behind the machine. You can see it in the bottom photo. Just brush or vacuum it away.

If you leave the bevel in contact with the abrasive for long enough with the coarse grits, you may even see this mat glow red/orange and burn. Just lighten up on the amount of time the bevel is in contact with the abrasive.

The air cooling is very effective at keeping the cutting edge from burning, but this fine steel wool-like mat will get hot and burn far earlier than the cutting edge will.

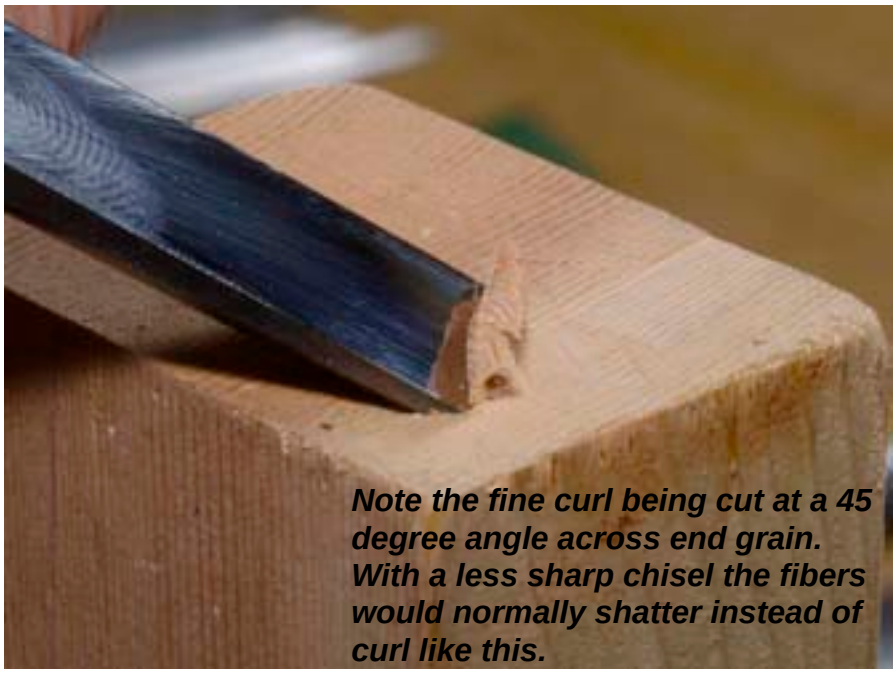
Now that we have seen the process of bringing this beat up old chisel back to life, let's look at the outcome.

These side by side photos tell their own story. The only difficulty is trying to photograph the newly formed polished bevel, back, and cutting edge. I backed up two grit levels to produce the scratch marks shown here to make it easier for you to see the fine edge.

In person you can barely see even these scratch marks and they do not affect the fine cutting performance. The close-up photo on the next page shows how fine a curl can be taken off hard to cut end grain with chisels this sharp.

If you want to take the time to do so, you can eliminate all the scratch marks and leave the truly mirror-like finish discussed earlier.

Before we move on, there are a couple of things to note. First, remember that in this sequence we used a four plate, seven grit sequence instead of the two plate, four grit sequence that comes standard with the Work Sharp. The standard set up works very well and is all most will want or need starting out.



***Note the fine curl being cut at a 45 degree angle across end grain. With a less sharp chisel the fibers would normally shatter instead of curl like this.***

Adding additional plates is a convenience, not a necessity, but I think a lot of you will wind up with the leather strop plate and at least one more glass plate, as I did.

Keeping your grits in an orderly progression means you can mount the first plate coarse grit down and use the next finer grit that is on its top surface to do the initial flattening of the back.

Making the back flat is far more important than most people think as they usually only look at the cutting edge from the bevel side. If the back is not exceptionally flat, the bevel will intersect the back cleanly across part but not all of the cutting edge. If the back is concave, the center will be a sharp edge but the outer edges will not be. If the back is convex, it is just the opposite.

If you keep grinding on the bevel, you will eventually reach the point where there is a sharp edge across the whole width, but it will not be a straight edge. The edge will curve upward relative to the back if the back is concave and downward if it is convex. Both conditions would make the chisel hard to use effectively as it would produce scoop marks or humps instead of a nice clean flat surface.

If you were using such a chisel to clean the bottoms of through dovetails, the joint would not fit well even if it was cut spot on. If you were using it to form tenon faces, the tenons would not fit tightly to the mortise walls, weakening the joint.

So, make sure you get the back really flat initially before you proceed with the bevel. It is only important that an area about an inch back from the cutting edge be flat. By using the very flat top surface of the abrasive on the top glass plate on the Work Sharp, it is easy to achieve.

You don’t need to use an overly coarse grit on the back since all it needs to be is flat. The cutting edge will be formed by the bevel. A sharp edge is the intersection of two faces coming together at an angle, in this case the flat back of the chisel and the 25 degree bevel angle on the face of the chisel.

Taking the wire edge off as you go enhances the quality of the cutting edge. Working the back with every other grit in the sequence along with constantly pulling it over the abrasive bed on the sharpening port tool rest accomplishes that.

Once you start using them, the abrasives will begin to load up. I find it handy to use the supplied rubber eraser material on the top surface each time a glass plate is installed or rotated. It only takes a few seconds and keeps the abrasive clean for the next use.

Now that we have “mastered” converting a brick breaker of a chisel into an incredibly sharp and effective woodworking instrument, there are no more excuses for putting up with dull hand cutting tools again.

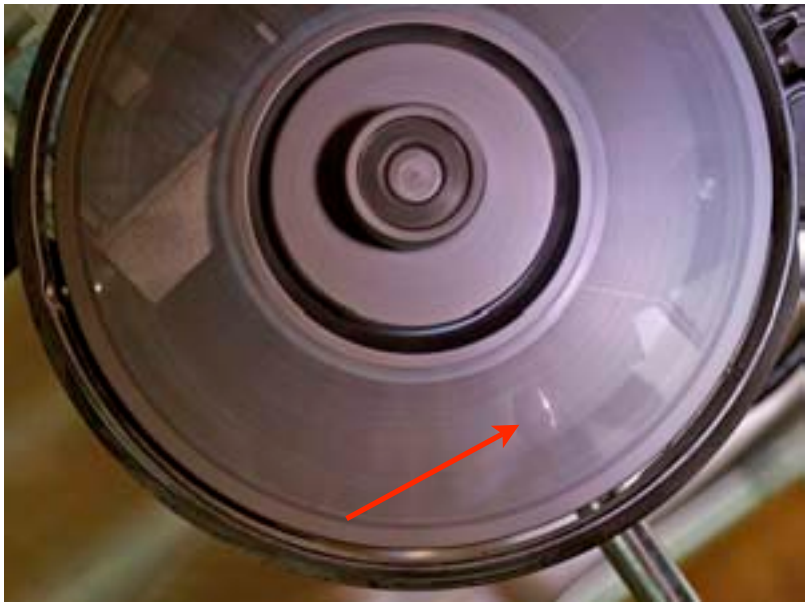
Since the back of each tool will already be flat once you condition them for the first time using Work Sharp, you normally will only need to touch up the bevel edge to keep flat backed tools like chisels and plane blades incredibly sharp all the time.


I leave the finest grit on my Work Sharp and just insert the cutting tool for a few strokes each time I pick one up so it always cuts the same way. And, remember, no need for a micro-bevel since the exact bevel angle is maintained all the time.

***The next step is to lean how easy it is to sharpen odd and complex bevels on things like carving and lathe tools.***

Lathe tools are difficult for most to sharpen since they often have curved or compound bevel surfaces. Sharpening is most often done on a rotating stone (aka “grinder”) which really can butcher the cutting edge unless you use a very fine stone and are quite skilled.

The curved surface of the grinding wheel cuts a concave shape on the bevel surface, often weakening the cutting edge and badly scratching it as well. It is also easy to overheat the fragile cutting edge with a grinding wheel which can draw the temper out of the steel, ruining what can be a very expensive cutting tool.



**Here are close-ups of the slotted wheel in action. Note how you can see the very point of contact between the curved bevel and the abrasive.**

The ideal way to sharpen these curved or compound angle shapes is on a flat abrasive like the Work Sharp glass plates. The challenge there is that you can’t see the interface between the abrasive and the portion of the bevel being cut since your line of sight is blocked by the cutting tool itself making it hard to establish and maintain a common bevel angle.

The Work Sharp solution is to supply another kind of flat plate onto which you apply abrasive sheets. This time the plate and abrasive are both slotted so, as the wheel spins, you can see right through it and can see clearly exactly where the abrasive is contacting the curved or complex cutting bevel.

Here are two photos looking down on the Work Sharp with the slotted wheel mounted and spinning. In use it is much easier to see through these slots than it is to photograph this phenomenon. This is a very clever solution to a very old and previously intractable problem.

Now, let’s go back to the beginning and take a look at how the adhesive mounts to the slotted plate and how the plate mounts to the Work Sharp unit.

This photo shows the slotted plate and slotted abrasive. They are the same 150mm in diameter as the glass plates and mount the same way. The difference is these are one-sided with the abrasive always down.

I like to use two of these slotted plates, one with P400 grit mounted and the other with P1200 grit mounted. Lathe and carving tools generally come new with the bevel edge well formed, just not very sharp. Also, they seldom suffer the abuse that chisels and plane blades experience so seldom need coarse grits to take out chips or bad nicks.

I find the P400 does a good job of taking out the bad grinding marks left if the tool had previously been “sharpened” (more like butchered really) using a typical vertical stone on a bench grinder. It is plenty coarse enough to correct most edge flaws you will encounter.

The P1200 does a great job of detailing a really fine edge, and there is not normally much need to go finer than that, given the way lathe tools cut. Hence, two of these slotted wheels will do well for most applications. You can always just use the one that comes with the Work Sharp and change the slotted abrasives as you work, but the cost for the second slotted wheel is modest compared to the time you will save.

These abrasives have a sticky back just like the solid abrasives used on the glass plates. They install the same way as well. Just peel and stick.

Be sure to mount the abrasive with the slots aligned with slots in the plate so you can see clearly the cutting edge while you work. Some will find it easier to align the

abrasive to the disk as shown above, while others will find it easier to align the disk to the abrasive as below. I tend to use this latter method.

As with the abrasives on the solid plates, I like to mark the grit on the abrasive side near the center so I can see at a glance which grit is mounted. If you could blow up this small photo to full-size you would see the P1200 is on the right and the P400 is on the left.

The slotted wheel mounts on the same shaft using the same thumb screw as the glass plates. Once in place and

spinning, it is very easy to see through to the bevel on your cutting tool.

On the original version of the sharpening center rolling cart that I built, I installed an adjustable arm light that I could position to see through the slots to the curved or odd shaped bevel edge on the cutting tool. I found it inconvenient to have that cord dragging around and in my way so I instead mounted the light just behind my large band saw and at a height that allows me to roll the sharpening station with the Work Sharp (or the Drill Doctor) on top right under the light when I need it. Works like a charm.

Here is a little closer shot. You can see how the sharpening station rolling cart places the Work Sharp at a comfortable height so I can see through the slots clearly. The shade on the light is positioned below my eyes so there is no glare to distract my attention. That helps keep my full concentration on watching the smooth, flat bevel angle emerge.

This next series of photos shows a high quality round nose lathe tool that had been sharpened on a typical bench grinder. It would do its job, just not very

well. Here you can see the original edge on the left. On the right I just touched the bevel to the slotted wheel on the Work Sharp with the P400 grit mounted so you can see how concave the bevel really is from the wheel on the bench grinder.

The top photo on the next page shows a close-up of this same bevel after partially sharpening it on the Work Sharp. I did not fully dress this edge so you could see the remaining large gouge marks left in the center of the concave bevel by the grinding wheel.

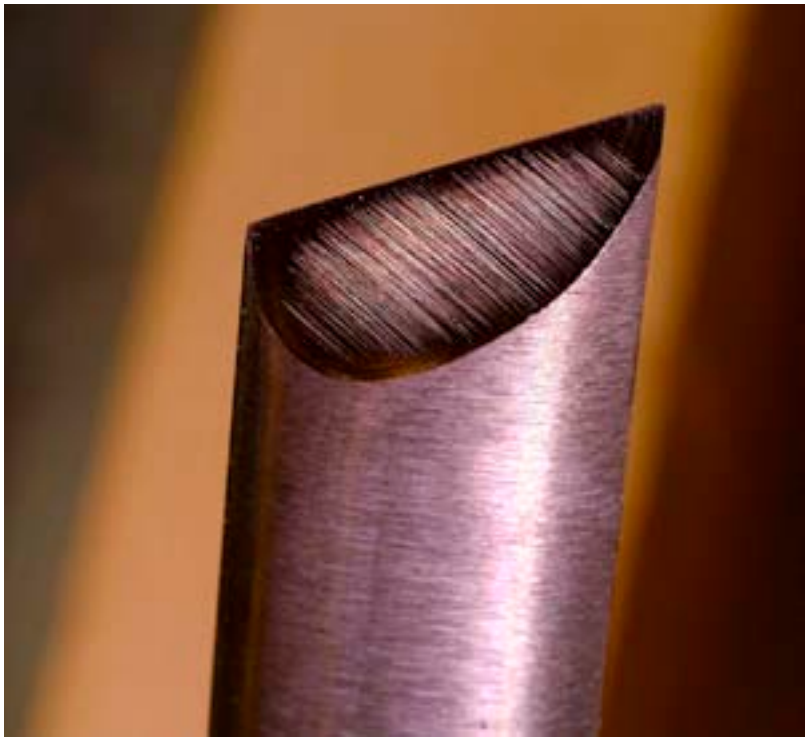
Note how the original rough top cutting edge is now very smooth and much, much sharper. Test cuts on the lathe before and after confirmed what a big difference even this small amount of correction made in the performance of this tool. The cut surface on the work piece is noticeably smoother which greatly reduces sanding time at the lathe.

After taking this photo this tool went back to the Work Sharp for a full dressing to clean up and flatten the bevel on the P400 and then polish with the P1200. The polished edge looks better but really doesn't cut all that much better than the P400 edge shown above. It is a bit improved, but the difference is nowhere near the difference between the jagged cutting edge left by the grinding wheel and the smooth sharp edge left by the Work Sharp.

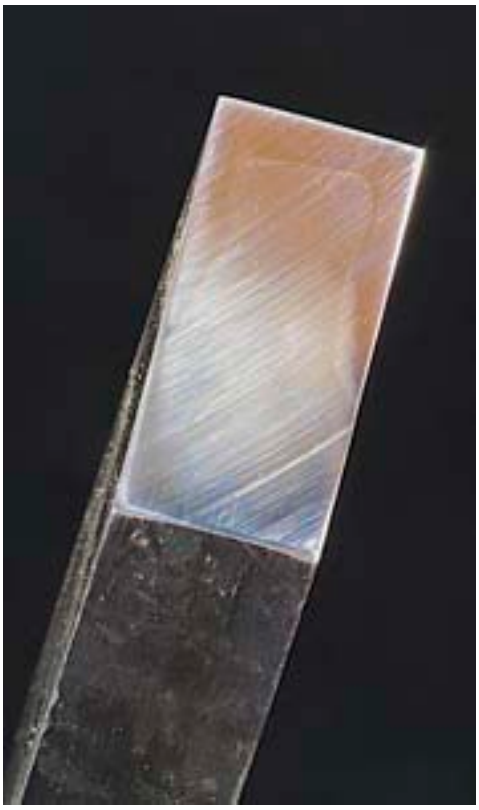
Here is another example. This time it is a double bevel cut on an angle in the end of an ovaloid tool shank. Most of the time a tool of this shape is used to cut primarily on the upper point to create very fine detail. Once in a while the whole of the cutting edge is used as well.

This first shot is how the tool looked after being subjected to a grinding wheel. Like the round nose tool, this one is made by a well known English company highly regarded for the longevity of their lathe tools. Again, this tool cut, just not very well.

The enlarged photo below shows how a light touch on the P400 shows up the concave bevel and rather dull cutting tip

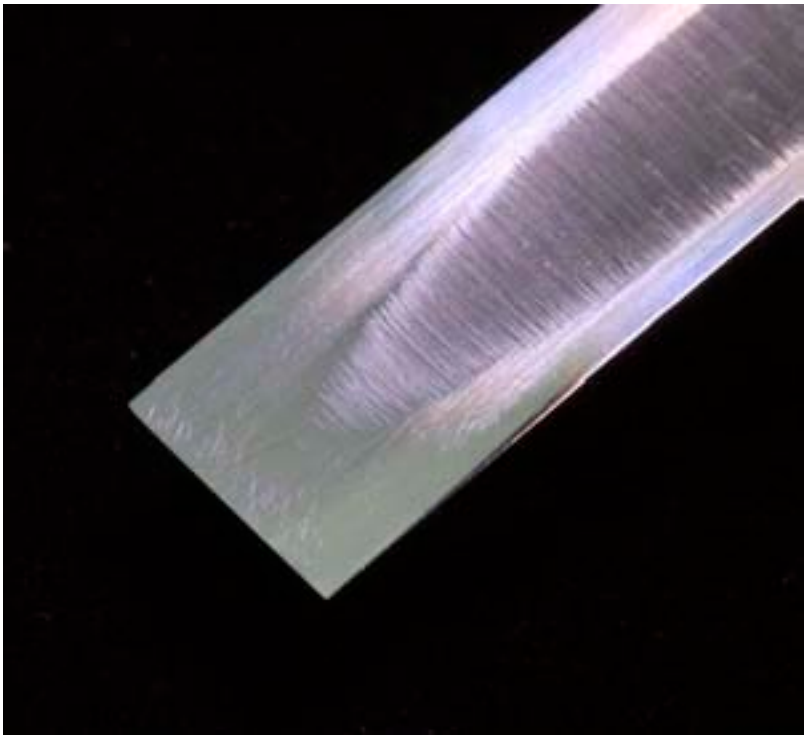


left by the grinding wheel. Before and after cutting tests on the lathe again confirmed just how much better this tool cut with just this light P400 dressing. From here I took the tool to a proper flat bevel with P400 and polished it with P1200 to the state in which I use it today.



I should note that the “before” bevels on these two tools were not hacked out by hand on a blue-light-special grinding wheel. They were cut on a quality fine grinding wheel using a well known lathe tool jig intended for cutting such surfaces. While that jig works to establish a good bevel profile, the concave cutting edge left by even a good grinding wheel is no match for a finely honed, flat bevel left by the Work Sharp.

The ability to see directly through the spinning slotted disk lets you follow the desired bevel angle with great precision no matter how it curves or how double bevel angles interact. You move the tool watching the old scratch marks disappear while the new, much finer edge is developed.



If you do have trouble seeing this action, try coating the bevel with machinist’s blue or red layout dye, or just run a felt tip marker over the edge before you begin. The edge formed by interaction with the Work Sharp slotted disk will shine clearly while the dyed or marked portion will remain dull.

***Here are two shots of an insanely sharp laminated Japanese mortising chisel. I had to reinsert scratch marks into the bevel and back to take these photos. I wish you could see this one for yourself!***

## *Summary*

In this manual we have seen how the Work Sharp system makes it easy to establish and maintain perfectly flat, repeatable bevel angles on all your hand cutting tools time after time. It doesn't matter whether the hand cutting tool is flat like a chisel or plane blade, or whether it is curved or complex such as some lathe or carving tools. And, it doesn't really matter much whether the tool started out a "brick breaker" like our chisel example or a really fine quality lathe tool that had been previously sharpened on a wheel with a fancy jig like our lathe tool examples.

Since the flat backed cutting tools are registered off of the back side, the bevel angle remains exactly the same, time after time no matter how long or how short the shank and no matter how coarse or fine the grit used.

Since the bevel angle never changes, there is no need for a micro-bevel. If you want to put one on for some reason, it is easy to do. Just sharpen all the way as you would normally, and then steepen the bevel angle setting on the sharpening port tool rest by 5 degrees and hone a micro-bevel at that setting.

By keeping your Work Sharp close at hand and using it whenever you need a hand cutting tool, you always work with only the finest cutting edges. Not only does that produce better quality work, it also is a lot more fun. Enjoy!

Jerry

***Jerry Work designs and hand crafts fine furniture in the 1907 Masonic Temple building in historic Kerby, OR, where visitors are always welcome.***

www.jerrywork.com
glwork@mac.com

## *Appendix 1 - The Sharpening Center*

Throughout this manual we have talked about and shown the Work Sharp sitting on a shop made rolling cart I call a "sharpening center." I find this cart really convenient as it keeps my Work Sharp right at hand no matter where I am in the studio. It lives here behind my 24" band saw right under an adjustable arm light.

It is simple to build. You also might find something similar in the kitchen section of a specialty furniture store. For the rail, stile and flat panel style of this one, use any paintable hardwood you have to make the rails and stiles. A hard surfaced, man-made material is ideal for the panels.

Cut grooves in the rail and stile pieces to accept the panels to make the sides, doors and back. Screw these components to plywood or surfaced MDF top and bottom pieces. Use inexpensive hinges and off the shelf pulls and casters.

Splurge a bit and have a local sheet metal firm make a stainless steel top. It is simply four folds with the corners welded that you can glue over a piece of plywood or MDF. Make this top a bit larger than the structural false top and screw it to the structural false top on the cart from inside.

Stainless steel is an ideal surface for your sharpening center since the act of sharpening either your hand cutting tools or twist drill bits creates abrasive dust. It is easy to wipe off or vacuum off the stainless steel and you don't need to worry about scratching or damaging this surface moving around your scary sharp chisels, lathe tools, plane blades or carving tools.

To keep the stainless steel looking good I like to

run a small orbital sander with a synthetic woven abrasive (similar to 3M pads) across the surface in a cross pattern. That imparts a nice look and removes any blemishes. I do the same thing with my cast iron surfaces and follow it up with a coat of paste wax to keep surface rust from forming.

Put shelf bracket holes on the inside of the side pieces of your sharpening center for an adjustable shelf. Make the drawer however you wish. I used inexpensive bottom mount runners for this one. The drawer won't be carrying much weight so no need to use ball-bearing slides and dovetailed construction unless you want to.

Size the unit to hold the Work Sharp and all the components and abrasives you need plus room to hold a Drill Doctor for sharpening all your twist type drill bits.

Once you start using the Work Sharp on this movable sharpening center, you will never again find a dull tool in your hands.

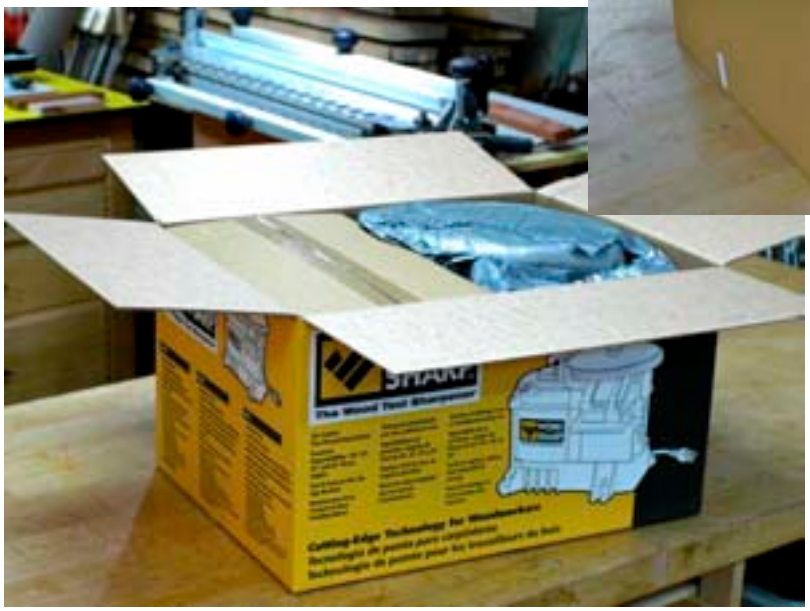
## *Appendix 2 - What Comes in the Box?*

The Work Sharp comes very nicely packaged with everything you need right in the box to do an outstanding job of sharpening all your hand cutting tools.

The Work Sharp and standard accessories are in the yellow box. The photo below shows the very secure packaging.

The Work Sharp unit is encased in foam bags to prevent shipping damage. The included accessory items are in the inside cardboard box shown.


Mine came with the accessories shown because I wanted more grit steps, an extra slotted wheel, and the leather strop wheel.



Included accessories are pictured on the next page. They include two glass plates, one slotted plate, a good assortment of grits for both the glass plates and the slotted plate, a rubber eraser

type grit cleaning block, and a good factory manual.  Everything you need to get started.....right out of the box.