

Notes for Sharpening Woodturning Tools Workshop

(Prepared by Gary Martins, May 1, 2017)

1. Oneway System (Wolverine System) Invented by Tim Clay

A) Basic system consists of 2 bases, platform, vee arm, vari-grind, skew attachment, balancing system and wheel dressing system. Used almost universally.

B) Balancing system is helpful to correct balance in composite wheels.
-hole is not in the centre
-density of material varies throughout the wheels
-wheel is not round
-thickness can vary

C) Oneway dressing system is very accurate and removes material in minute amounts so wheel is not wasted. A regular carbide/diamond-dressing tool works very well and is much faster.

D) The vee arm in conjunction with the vari-grind tool is used to sharpen gouges.

(E) The vari-grind is set at 23 degrees but you can change that if you wish. I leave mine at 23 degrees.

The bevel angle is set according to the tool. i.e. 60 degrees for a bowl gouge and 50 degrees for a spindle gouge. These angles can vary according to the turner but these are good starting points.

The gouge is set in the vari-grind to a depth of 2". This isn't a critical measurement but it is usually in the range of 1 7/8 to 2 1/8". Use a block drilled to the depth with a forstner bit to be consistent and quick in this measurement.

F) **The raptor tool** (available from Craft Supplies, U.S.A.) is a simple way to set the bevel angle. Each tool costs about \$10. Be sure to keep the vee arm free from junk material so you maintain the same measurement each time.

-using the above setup it is relatively easy to achieve a side, Ellsworth, Irish, or Jamieson grind.

-sharpen one side at a time going from the back to the tip. Then dress the tip. Use very little pressure on the tool to the wheel as you are only "dressing" the tool.

-with high speed steel there is not a major concern with overheating (blueing) the steel. There is some feeling that you should not cool (quench) the steel in water because it might cause a problem with the edges of the tool. If there is some "blueing" of the steel that is not a concern although you should avoid it.

-once the tool is ground to the shape you want, you should only "DRESS" the tool. HSS is expensive.

-focus on the shape of the grind

If you wish to use a gouge with a side grind you should reference the many videos on You tube and also reference materials by Lyle Jamieson and Ellsworth (see notes you get when you purchase his tool). There are 5 basic cuts you can make with this grind and they are the basis for using the tool. One can completely turn a bowl from a log using only the side grind.

The advantages of using the Raptor tool and the vari-grind tool are "repeat grind ability", speed of sharpening and saving expensive steel!

G) The platform tool is used for sharpening scrapers, spindle roughing gouges and the like.

-to maintain the angle, one can blacken the bevel of the tool, set the platform as close as possible to the correct angle, turn the wheel by hand and note how the platform needs to be adjusted. Once you get a grind from top to bottom of the bevel you can proceed to "dress" your tool.

-the sharp wire edge does the cutting and is meant to remove small amounts of material.

-the scraper is an excellent tool to finish a surface and as such will require frequent sharpening to keep that wire edge.

-it isn't meant to remove large quantities of wood or rough out a bowl.

H) Skew Sharpening Attachment

There is a skew sharpening attachment for the Wolverine system that helps to set the angles.

-place the handle of the skew so the cutting edge is square to the wheel.

-as you move the tool up the wheel it grinds more off the back of the bevel and creates a flat bevel.

-the 3 ½ inch offset helps to reduce the hollow grind.

-grind both sides of the skew to the same amount

2. Grinders and Wheels

Most of us use a regular grinder but don't use the carborundum wheels that come with them. Grinders typically come in two speeds, 3450 rpm and 1700 rpm or both speeds. They range in price from just over \$100 and in excess of \$1,000 for a Baldor grinder.

You need 8" wheels to reduce the amount of "hollow ground" on the back of your tools. The slower speed grinders are more forgiving and can save your steel but are not critical with HSS tools.

What kind of wheels should you buy?

Certainly don't even think about using those grey carborundum wheels on your tools. Each type is usually indicated by the colour of the wheel but they are not all the same. Generally you get what you pay for them. Beware of the really cheap wheels. My first set was from Lee Valley both are white. They are soft but a very cool wheel. The blue ones are harder and don't need to be dressed as often. In the Lee Valley catalogue the blue Norton wheels don't have the finer grit but the white ones go up to 120 grit. The coarser grit wheels are generally used for shaping your tools whereas the finer grits are best for "dressing" the wheels.

I'm not sure that colour is the defining character of the wheels. The hardness of the wheels is defined by a letter of the alphabet with a K wheel being much harder than an A wheel.

Aluminum oxide wheels wear out as you dress them, can be a nightmare to balance, need to be dressed regularly and don't provide a great "grind". The better ones are priced in the \$55-\$70 range. As they wear down you must readjust your sharpening jigs.

With my composition wheels I "dress" with 80 or 120 grit but would like to have 180 grit. More on that later!!!

Note that just because your turning tool has HSS stamped on it doesn't guarantee it is of very good quality. I recently saw a set of "HSS" tools that must have been carbon steel. Be aware of the message "YOU GET WHAT YOU PAY FOR". I only purchase name brand HSS tools. There are several qualities of HSS out there and you need to do your homework. The Craft Supplies USA catalogue has plenty of information about the various tools.

Should you try to make your own? I would rather turn than make tools. Besides that, it is difficult to incorporate all the research and experience used in the name brand quality tools.

As an aside, it is not good practice to purchase a "set of tools". You won't save much money and there will likely be one or more of the tools that you will never use. Buy them as you need them. Beware the tool that has a "JONES" grind on it and costs more. You will likely change that grind very early on anyway as you learn to sharpen. Types of HSS steel really do tell the story. On the Doug Thompson video about sharpening he describes the various kinds of steel, how they are made harder

with vanadium and the use of powder coating to make it all work. Check out his video.

I like to research the tools so I can make an informed decision before I put down my money. Part of that research is chatting with experienced turners whom I respect as well as roaming the internet and YouTube videos. Beware the YouTube videos as they are not all good. You will soon learn who does and who doesn't know their craft.

Robo Hippy (Reed Gray) Sharpening Jig

The Robo Hippy sharpening jig is the answer for "repeat-ability" when sharpening your scrapers, spindle roughing gouges, negative rake scrapers and skewers.

Available from Robo Hippy on the internet for approximately \$100 US\$. Extremely well made, can be used with the Wolverine system or mounted directly on your table.

With the Wolverine system style, you only need one CBN 180 grit wheel so the jig is a huge savings in the long run.

To use it at a certain angle, remove the pin (yes it has an idiot string attached so you don't lose the pin), insert it at the desire angle (increments of 5 degrees) and sharpen you tools.

Note that the angle may not be exactly the angle it says, but the angle is consistent and will only vary by a few degrees + or -. The amount of variation is dependent upon the original installation of the jig on your grinder setup.

In a group setting this Hippy Robo jig and the Raptor jig enable everybody to learn how to sharpen their tools while maintaining the same grind each time. Simply use a black felt pen to write the correct setting on each tool and let the turners sharpen.

No more blackening the tool, very fast, reasonably priced, well made, should last forever.

There is a huge savings in time and steel.

What angles should I use?

There is no one way or one best way. The following are some good starting **guidelines** that get you started.

Bowl gouges 60

Spindle Gouges 40

Spindle Roughing Gouge 45

Scrapers 70

Skews 30

Diamond Parting Tool 35

How often should I sharpen?

Scenario Example

Let's say you are working on a 10" diameter bowl at 1,000 rpm.

The circumference of that 10" bowl is determined by $2 \times 3.14 \times \text{radius} = 2 \times 3.14 \times 5" = 31.4"$

Turning at 1000 rpm it travels $31.4 / 12 \times 1000 = 2617$ feet.

That my friends is $2617/5280 = .4957$ or almost $\frac{1}{2}$ mile in one minute!!!!

So in one minute you cut $\frac{1}{2}$ mile of wood and you think your tool hasn't dulled!

We all know and tell our partners and friends that a dull knife is a dangerous knife!

Not only is it dangerous, but it also doesn't cut worth a darn.

On the Thompson Tool sharpening video he advises sharpening **BEFORE YOU NEED TO**.

I sharpen my tools as needed. I don't use the finger or thumb test. I can tell when a tool is getting dull by the quality of the cut much better than using my thumb.

When I am doing a finishing cut, I increase the frequency of dressing the tool.

With the sharpening system described below and with the information to follow, dressing your turning tools is easy, quick, simple and safe.

What affects how long the grind lasts? Various factors affect this.

- dirty wood
- hardness of wood
- endgrain vs. side grain
- kind of wood
- amount of moisture in the wood
- the type of grind (i.e. wire edge on a scraper vs. spindle roughing gouge)
- quality of steel
- angle of the grind (i.e. razor blade vs. an axe)

You be the judge.

What is the story on CBN wheels????

CBN stands for Cubic Boron Nitride that is second only to diamond in hardness.

The CBN is electroplated to a steel wheel. There are some manufacturers that use a mix of the abrasive and a bonding agent applied to an aluminum hub but it is my understanding that these wheels are not as common and don't seem to last as long. I would avoid them. Check with the manufacturer to be certain they are electroplated on steel wheels.

There is no risk of the steel wheels exploding, chipping or cracking. I have noted that some turners just remove the protective shields on their grinders for these reasons.

Because steel is being removed from your tools, it is imperative that you wear at least proper eye protection and better still, a face shield.

Very long lasting. Reed Gray, a production turner, has used his wheels for several years and they are still going strong. He expects they will outlast him.

A VERY LIGHT TOUCH is all that is required to dress the tool. Do not apply pressure.

Because the wheels are metal and CBN is an excellent conductor of heat, the wheels and tool remain cool as long as you use a light touch.

Do have a break in period and seem to be more aggressive at first.

Made to be used on hardened steel although there are some people who feel they can be used to sharpen various materials. Generally it is recommended that we only use them on hardened steel. Most manufacturers and turners recommend you not use carbon steel as it tends to clog the wheels.

Not recommended for sharpening carbide cutters.

Come in 1" and 1 ½ " widths.

The CBN wheels run so true and well balanced that they continue to rotate long after you turn off your grinder. It can take up to 14 minutes for the wheels to stop rotating.

The wheels weigh approximately 8 lbs. so it takes over 10 seconds for them to achieve full speed.

Most turners recommend the **180 grit** CBN wheels for dressing.

Reed Gray mentioned to me that he is using Trend lapping fluid on his CBN wheels (very small amount) and it helps to keep them clean. I have a CBN hone and I use the Trend liquid with my hone. I find it very helpful so I will try it on my CBN wheel.

By using the Raptor jigs and the Robo Hippy jig, you can interchange the jigs on the same wheel using the Wolverine system. In that way you don't need to purchase a second wheel. I plan to use one CBN wheel for sharpening and my older composite wheels for shaping.

I added a clamp to the arm of my Robo jig so I don't have to line up the jig with the wheel each time I insert the jig.

What and Where to Purchase CBN Wheels

Cuttermaster (Ottawa)

- have used them and they are superb
- have listed customers on the website and it is impressive to say the least
- cost for 180 grit, 5/8 bore 8" wheel is \$195 US
- CBN is electroplated on steel
- their exchange rate is 25% so the cost in CDN \$ is \$243.75 + HST
- I don't know what the shipping cost would be
- made in China to their specifications
- recommended by Robo Hippy (Reed Gray)

Woodchuckers (Toronto)

- ordered one on May 1, 2017, arrived May 2nd. Works great.
- cost for 1 ¼" x 8" wheel with 5/8 bore is \$180. CDN plus HST plus shipping for total of \$215.00
- comes from Woodturnerswonders in USA.
- not certain where they are made but I suspect China as well.
- electroplated on steel

- suggest the use of special washers to eliminate wobble caused by bolts not machined to spindle size and quality of threads. \$6.50 each IF you need them.
- the issue is with the nuts and the spindle threads and not with the wheels. If nuts don't line up with the wheel perfectly you can get a wobble that would affect grinding on the edges of the wheel. I didn't need them on my setup.
- for the turner without any system or who wants an entirely new system they sell a ½ H.P. Rikon slow speed grinder for \$114 and for another \$180 they mount and test the CBN wheel prior to shipping.
- my contact with the company was one of the owners by the name of Peter. If you call, I would ask for him by name as he was most knowledgeable.

Craft Supplies USA

- don't handle the product in the last catalogue because of some issues.
- new product in catalogue has been dropped and I don't know what they are selling now.

References and Suppliers

1. Raptor Set Up Tools, Craft Supplies, USA, catalogue on Internet
2. Wolverine Sharpening System, Oneway and other suppliers
3. Rubber Feet for Grinder, Parts Express, #9106, 2.5" x 1". (just use hockey pucks).
4. Ellsworth on Woodturning, Book, best price on Amazon
5. Ellsworth and Lyle Jamieson videos on YouTube.
6. Numerous YouTube and Internet sites.
7. Internet Robo Hippy (Reed Gray) for Robo Hippy jig, how to install the jig and superb essay on CBN wheels. Also a video review of the jig by Mike Walddt.
8. Email from Reed Gray to me (attached)
9. Oneway.com website has video on installing and using the Wolverine system.
10. Doug Thompson Tools, video on sharpening tools.

These are only my thoughts on the matter. I have researched the internet in an attempt to provide the best information. Ultimately you have to make your own decisions about how, why, when and with what you sharpen.

If you ask 10 woodturners a question you will usually get 11 answers. Use your head and try to come up with what you believe to be logical.

Happy Turning (and sharpening)

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