

Sharpening for Woodturners

Developed by Alan Leland

Introduction

This workshop was developed to provide background information on why turning tools are ground the way they are and to provide some hands on sharpening experience. Although I use the wolverine system in the workshop, I also touch on methods of sharpening without the use of commercial jigs. For beginners and more experienced turners I recommend using one of the many jigs on the market today, as they save time and steel. A good idea for someone who would like to sharpen a side ground gouge (Irish Grind David Ellsworth Grind, etc.) free hand is to practice on a bolt from the hardware store so as not to waste precious tool steel. One of the most important concepts that I emphasize in this class is the fact that there is not one perfect bevel angle or shape and that there are a variety of bevel angles and shapes that are useful for a variety of turning situations.

Tools & Materials

Grinders: two people per grinder
Wolverine Sharpening System or equivalent (recommended)
Sample tools to be sharpened
Students tools to be sharpened
Handouts with relevant information on bevel angles etc.
Safety equipment (safety glasses, face shield, safety goggles)

Procedures

1. Begin the class by introducing yourself and have the students introduce themselves and ask them to share with the class their experience and any specific sharpening problems or areas of interest. Then introduce them to the grinder and go over the various types and speeds of the most common types of grinders. I discuss wheel size, type and grits. No need to get over technical here as most turners do not need to know all of the more technical aspects. They for the most part need enough information to get them started. The majority of the people that take this class are hobbyists' not professional turners. The idea is not to bog them down with technical details but to give them an understanding of the basics, if they would like more information refer them to books by authors such as Allan Batty's *Woodturning Notes* (my favorite Book On woodturning) available from Craft Supplies *Woodturning Catalogue* or Mike Darlow's book *Fundamentals of Woodturning*, as they go into great detail on the subject.

It is best to have a handout prepared that deals with some of the more technical aspects such as suggested bevel angles, grinder speeds, basic safety tips and any other details that you think might be important

2. Then proceed to discuss the following tips with emphasis on grinder safety.
a. Optimum height for grinding system is the same as optimum lathe height which is the same height as your elbow.

b. Grinder safety shields and all other safety equipment supplied with the grinder, should be installed and functioning properly.

c. Emphasize the use of safety goggles or some sort of eye protection.

d. How to test a wheel to hear if it is still sound by taking off the grinder and tapping it to hear if it rings, if you hear a dull thud the wheel is defective and should be replaced immediately.

e. Stand aside when turning grinder on and let it get up to speed before grinding tools.

**Never restart the grinder, if the wheels are still spinning from the last time that it was on, as this may cause the nuts on the wheels to work loose from the torque of start up combined with the already spinning wheels.*

f. How to use a star dresser or preferably diamond tipped dresser or some other type of wheel dresser to flatten and freshen up the face of the wheel. My favorite diamond dresser is the T shaped one available from Craft Supplies Woodturners catalog.

g. If using a jig, explain how to mount the tool in the jig and how to properly use the jig. Be sure to remind students to check to be sure all jigs are tightened properly and to check once in a while to insure that they have not loosened up from the vibration of the machine.

Note: If using the Oneway varigrind jig or similar jig be sure to mention that one hand holds the jig in the pocket and the other hand is on top of the jig not on the tool handle. Holding the tool handle provides too much leverage and usually results in the tool and jig hitting the side of the wheel and chipping the wheel or worse. Also warn the students, to keep their hands in a position so that they will not get caught between the jig/ tool and the grinder should an accident occur.

h. Tool should be ground at or above the most sticky out part of the wheel (at or above center) on the face side only.

i. Just enough pressure is applied to hold the tool on the wheel.

j. Try to make use of the whole face of the wheel to avoid dishing it out. There is no need to whip the tool back and forth across the wheel just hold it steady in one spot then ease it over to another spot eventually making use of the whole wheel.

k. The proper use of water to keep the tool steel cool while sharpening.

l. Describe and show how to look at the sharpened edge to get a feel for when it is sharpened. (with an even bevel all the way around and the lack of reflection at the edge).

It is always a good idea to have a blank of wood mounted in a lathe to test the tools before and after sharpening to give the students a better understanding of how important it is to use a properly sharpened tool. It may also enable you to show how the variety of shapes and bevel angles for the various tools actually work when turning a piece of wood.

3. The next step is to discuss each type of tool (scrapers, spindle roughing gouge, bowl & spindle gouge, skew and parting tools) and show the various methods that can be used to sharpen them properly. Be sure to discuss the various bevel angles and explain why they vary. Some time

can be spent discussing the various shapes for the different tools. (Demonstrate how to sharpen the tools, both freehand if you can and with the use of a jig)

4. Below I have listed the bevel angles that I find most useful in the type of turning that I do most often. My preferred and most often used bevel angles are listed in Blue

Popular Grinding Bevel Angles

(Bevel angles are listed in degrees)

My preferred bevel angles are listed in blue

Bowl Gouge (55) 40 to 65 plus

Parting Tool (25) 25

Spindle Roughing Gouge (40) 40 to 45

Scrapers (75) 70 to 80

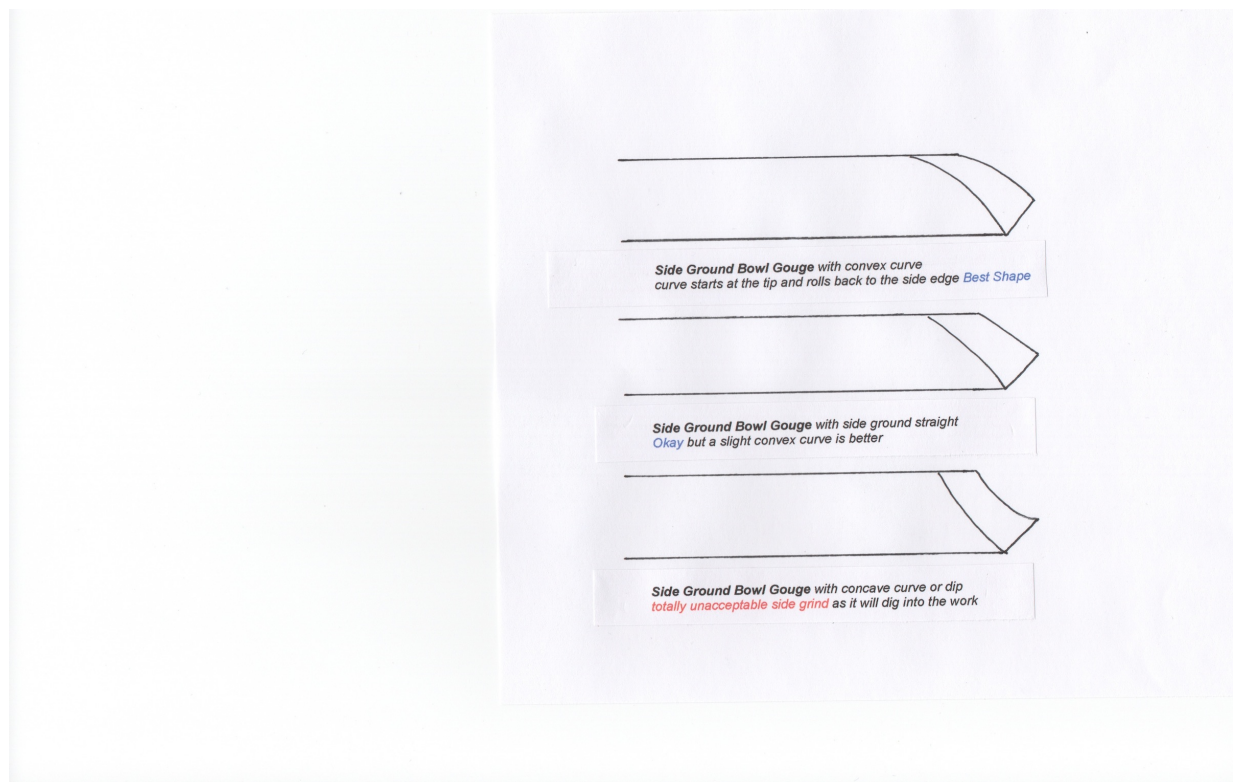
Skew Chisel (30) 25 to 55

Spindle Gouge (35) 25 to 45

5. Along with the preferred bevel angles it is a good idea to demonstrate how to form the side grind sometimes referred to as the Irish grind, Celtic grind, David Ellsworth grind, etc. and how to form the finger nail shape at the tip of the tool. This would be the time to mention the benefits of the side grind and explain why it is so popular. I consider my side ground bowl gouge to be my bowl & platter roughing gouge as I like to use a more traditionally ground gouge for all my finishing and final shaping cuts.

a. Bowl gouge with side grind (sometimes referred to as the Irish Grind, David Ellsworth Grind, Celtic Grind, etc.) with finger nail shaped tip. I set the Wolverine Varigrind jig at the top notch or the one nearest the tool handle so that the washer on the arm of the jig almost covers the slot. I then move the sliding pocket arm in or out to set the bevel angle (I generally use a 55 degree bevel on my roughing bowl gouge). I then work on shaping one side of the gouge, shaping a slightly convex curve and then repeat the same procedure on the other side thus creating the side grind or David Ellsworth grind. When shaping the side grind with the Wolverine jig the side of the tool must be rocked and rolled as it is ground on the wheel to create the slightly convex curve that is desired on the side of the gouge. If you just lay the side of the gouge flat on the wheel with out rolling it back and forth the side grind will end up being concave. The last step is to blend the two sides to form a nice finger nail shape on the front of the tool. When using the wolverine Varigrind jig, I have the finger of one hand holding the pivot point in the pocket so that it does not slide forward and the other is on top of the jig carefully placed so that it will not come in contact with the grinding wheel. Holding on to the tool's handle is not a good idea as it provides too much leverage and this extra leverage may cause the tool to fall off the face of the grinding wheel and slam into the side of the wheel and thus damaging it, the jig and the wheel in the process.

b. If there is time and interest I like to demonstrate how to freehand sharpen a bowl gouge with the proper side grind and bevel angle. I would like to share some tips I learned from Allan Batty and a few others that I learned from Stuart Batty and Mike Mahoney on freehand grinding.



If using a brand new gouge or one that is so badly out of shape that it needs to be completely reshaped, a quick way to give yourself a target for the proper finished shape of the side grind is too, Turn the flute upside down and using the flat plate that comes with most grinders as a support for your hands while gently keeping both sides of the flute evenly on the wheel, grind the convex shape of the side grind onto the top of the flute. Now that you have the top of the flute shaped to your liking you only have to grind your preferred bevel angle around the tip and the sides to match the shape of the top of the flute. Stuart and Allan like to grind the top of the flute back at roughly 40 degrees with a slight convex curve shape. They do not like a long side grind on the side of their bowl gouges. For the front bevel of my bowl gouges I tend to go with a 50 or 55 degree bevel as I find that it fits the majority of the shapes of bowls that I turn. A tip that I learned from Allan Batty is to mark the top corners (a Sharpie marker or even masking tape is good to use to mark this template) of the grinder platform at 40 degrees as a guide for rotating the tool handle around when grinding the side bevel. You then set the platform to your desired bevel angle (Allan prefers 45 degrees and Stuart likes a 40 degree bevel), which will vary according to the type or depth of bowls and platters you intend to turn. As I generally do fairly shallow bowls and platters I like a 55 degree bevel on my side ground bowl gouge. As I did with the Varigrind jig I grind one side and then the other side, taking the steel away that needs to be ground away which can easily be seen by the shape that I roughed in previously or to match the shape of the existing side grind. Using the 40 degree mark on the platform as a guide I swing the tool handle around up to this mark while at the same time gently shaping the convex side grind and gently rolling the flute from the open position 12 o'clock to a more slightly closed flute position thus shaping the side grind and maintaining the same bevel angle on the side bevel as is

on the front bevel. Once both sides have been properly ground, I blend the front bevel to the sides creating a nice fingernail shape. With a bit of practice and some helpful supervision one can very easily learn to freehand grind a good edge and shape on their tools. Rather than waste good steel, it is advisable to practice on a 1/2" bolt purchased from a hardware store. You would be surprised at how easy it is to freehand grind your tools.

6. Traditionally Ground Bowl gouge, this is my finishing tool for most of my faceplate work. There are two ways to sharpen this tool. The one I use most often is to place the end of the tool handle in the pocket of the Wolverine pull out arm and adjust the arm until I can grind a 40 degree bevel on the end of the gouge similar to a spindle roughing gouge. I then just roll the tool back and forth grinding a nice round shape on the front. I occasionally leave the right wing ground straight up like a spindle roughing gouge and the left wing ground back slightly. Another way is to set the platform of the grinder at 40 degrees and lay the tool flat on the platform and the handle perpendicular to the face of the grinding wheel and just roll the tool on its axis to form the nicely rounded shape.

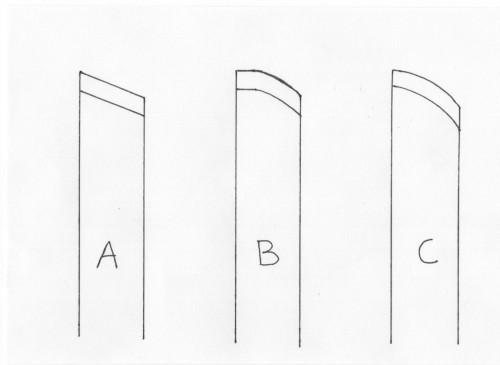
7. Time to cover the spindle gouges. First let's do the Spindle roughing gouge. My favorite is the 1 1/4" Spindle Roughing gouge. I use the pull out arm of the Wolverine jig to sharpen this tool. I rest the bottom of the handle in the arms pocket and pull out the arm to the proper distance so that I can grind my preferred bevel angle of 40 degrees onto the end of the roughing gouge. This tool is designed to be ground flat across the top and with the side wings straight up and down or perpendicular to the top edge of the flute.

8. On to the basic spindle gouge, my favorite and the most useful one for me is the 3/8" spindle gouge. Depending upon what I am turning the bevel angle of my spindle gouges is ground anywhere from 25 degrees up to around 40 or 45 degrees except when using it for end grain turning I grind an entirely different shape and go with a more flattened bevel angle of close to 60 degrees. (I will not cover this grind in class as it may confuse some folks) I use the Wolverine Varigrind jig to sharpen my spindle gouges set to the bottom of the third notch down from the tool handle end of the jig.(the end of the notch closest to the tool handle). I then rest the pivot point in the pocket of the pull out arm and pull the arm out to set my desired bevel angle which is generally around 35 degrees for the majority of the work that I do. I use the index finger of my left hand to hold the pivot point in the pocket as it tends to vibrate forward. The fingers of my right hand gently hold the top of the jig where the locking screw handle is located (but not the screw handle as that may be loosened by the movement of my hands when sharpening), making sure that my hand will not make contact with the grinding wheel while sharpening and keeping all fingers/hands body parts etc. out from under the jig and where they will not be trapped between the jig and the grinding wheel if something goes wrong. *I feel that it is dangerous when using the Varigrind jig to hold the tool handle while sharpening as it provides too much leverage and it is easier to roll the tool off the grinding wheel and thus slamming the tool and the jig into the side of the grinding wheel, possibly breaking the wheel but at the very least knocking a big chip out of the wheel, all of which could cause serious injury.* I like to grind the wings of my spindle gouges back to get them out of the way when I turn beads and for other

more delicate shapes. As I do with side ground bowl gouges I shape the side of the spindle gouge with a slightly convex side grind. Personally I rarely if ever use the side of my spindle gouge for any turning.

9. Time now for the Skew. I have found that the easiest way to sharpen a skew is to use the flat platform that comes with the Wolverine system. Using my a protractor and a marker such as a black Sharpie I draw two lines on each side of the platform at 70 degrees to match the preferred skewed angle and then I adjust the angle of the platform to match the proper bevel angle of my skew. For most domestic hardwoods and softwoods the preferred bevel angle is a bevel that is generally 1 1/2 to 2 times the thickness of the steel the skew is made from. I most often grind my skew bevels 1 3/4 the thickness of the tool. Say for a 3/4" wide by 1/4" thick skew the length of my bevel would be some where between 3/8" and 1/2" long measured perpendicular to the cutting edge. In most cases this will provide a bevel angle of 30 Degrees plus or minus. For very dense or exotic woods a blunter bevel angle of closer to 40 degrees is best so that the tool will stay sharper longer when cutting such hard and dense woods. I found Allan Batty's explanation of the proper bevel angle for a skew to be the most informative, so check out Allan Batty's "*Woodturning Notes*" available from Crafts Supplies Woodturning Catalog. Once everything is set I then lay the skew flat on one side and grind that side until sparks come up over the edge or until I feel I have a nice even bevel, keeping the tool parallel to the line that I drew on the platform. I then proceed to follow the same procedure for the other side of the skew. Once the edges are sharpened I ease the top or long point corner back edge of the bevel on both sides so that it will not leave a score mark when turning (see drawing). The last step is to hone the edges for a razor sharp edge. The skew is the only tool that I hone on a regular basis. I only take the skew back to the grinder when I have chipped the edge or honing is no longer effectively giving me a sharp edge.

I have tried using the Grind and shape that Alan Lacer recommends for his style skew and found it to be very effective. To use Alan Lacer's style skew grind, he recommends that the bevel length be 1 1/2 times the thickness of the tool and the long point and short point fall within the 70 degree skew angle. He grinds a flat 90 degrees to the edge, at the long point about 1/4 to 1/3 of the length of the top edge and then he grinds in a slight curve to meet up with the short point. He then hones both the bottom and top edge and then hones the bevel on both sides of the edge by first touching the hone to the back of the bevel and slowly bringing it around so that the hone touches both the back of the bevel and the front cutting edge of the bevel. Unless the edge is damaged he continues to sharpen his skew by honing. Try not to round over the edge or the skew will be dulled



A. Normal Skew: ground at 70 degrees with the length of the bevel $1\frac{3}{4}$ to 2 times the thickness of the tool. $\frac{1}{4}$ " thick skew would have a $\frac{3}{8}$ " to $\frac{1}{2}$ " wide bevel.

B. Alan Lacer Style: the first $\frac{1}{3}$ of the skew is ground at the tip 90 degrees to the side edge and then arcs away down toward the heel. Toe to heel is still at a 70 degree angle.

C. Skew with Full Arc; not the best way to grind a skew, as it limits what can be done with the skew, for instance it is difficult to preform a peeling cut with a full arc skew.

10. The Parting Tool: Parting tools are fairly simple to sharpen. Like the skew they are generally sharpened with a 25 degree bevel. I use the pull out bucket of the Wolverine Sharpening system to sharpen my parting tools. I place the tool in the jig and adjust the jig in or out so that I can grind a 25 degree bevel on both sides of my parting tool. Then I grind until I see sparks coming over the top edge of the parting tool. Then sharpen the other side of the cutting edge in the same manner with the jig in the same position that I sharpened the other side of the cutting edge. If you have a diamond sided parting tool make sure that the sharpened edge meets at the widest point of the diamond sides.

11. Scrapers: Scrapers can be ground to any shape that you like and often times are ground to make one particular shape in a turning. Most hollowing is done with scrapers of various shapes, sizes and configurations. The majority of scrapers are ground to a bevel angle of around 70 to 80 degrees, but there is some variation in this bevel angle depending upon how the scraper is going to be used. I tend to grind my round nose scrapers and my hollowing scrapers at approximately 70 to 80 degrees. Lately I have added a negative rake to most of my scrapers to help prevent them from self feeding into end grain. They also they seem to work more smoothly and are a tad less grabby when scraping end grain and when hollowing. This negative rake can be added to any scraper by simply turning it upside down and grinding a 5 to 10 degree bevel on the top side of the scraper. I find that the negative rake vastly improves my turning experience and the effectiveness of my scrapers.

The burr left on the top edge after grinding should be honed off with a diamond sharpening stone and a new burr put on after honing the top of the scraper then reestablish a fresh clean burr using a carbide rod at a 5 degree angle to rub in a fresh bur. The carbide rod is the

same type of rod that is used to sharpen cabinet scrapers. The rule of thumb that I use in regards to the burr is that, when turning exotic or extremely dense woods, it is best to hone the burr off, but when turning domestic hardwoods and softwoods, I find scrapers work better if the burr is left on, as the tool works in much the same way as a cabinet scraper and leaves an excellent turned finish.

I use the flat plate that comes with most grinders and the Wolverine System to sharpen my scrapers. I set the flat plate as close to the wheel as I can and set it to grind the angle that I want, generally around 70 to 80 degrees. I sharpen all of my scrapers to this same angle so that I do not have to change the setting from one scraper to the next. I then rest the scraper on the table with my thumb resting on top of the tool pressing it down on to the table and using it as a pivot point to shape the cutting edge. I grind until I see sparks coming up over the cutting edge. To add the negative rake I rest my hand on the table and place the top surface of the tool on the wheel at an angle so that it will grind it at about 5 or 10 degrees. Try to make one nice smooth bevel. I then turn the tool over and regrind the 70 to 80 degree bevel. I only have to grind the negative rake angle once and do not have to redo it until the tool wears out and the negative rake is gone and needs to be replaced.

For the small scraping bits used in hollowing tools, I use a jig to hold the bits so that I can grind and shape the bits on the grinding table without grinding my fingers. The jig is fairly simple sometimes I use a small stick or block of wood with a screw with a washer to hold the machine bit in place. A fellow woodturner made a jig from a piece of steel stock that was tapped and a set screw inserted with a washer to hold the scraper bit in place between the washer and the jig.

12. Once all the tools have been covered it is time to pair the students up, two to a grinder maximum and supervise them as they each sharpen one or two tools as they take turns on the grinder. Pay special attention that they properly lock the jigs in place and that they move the tool slowly across the face of the wheel so as not to fall off the wheel.

*Be alert to the fact that when using a Varigrind jig or similar jig, that the tool is not held by the tool's handle but rather the controlling hand is on top of the jig and the other hand is insuring that the jig stays in the pocket and does not move forward. Be alert and make sure that neither hand is in a position to make contact with the grinding wheel or be trapped between the tool and the grinding wheel or jig arm.

* Be open to any questions that the students may have and try not to let your particular preferences interfere or limit the discussion.*

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