# Sharpening Your Woodturning Tools

## Introduction to Sharpness and Durability

Any definition of sharp must be defined in terms of what is to be done with the tool. If we start with common kitchen knives and tools we will shed some light on what we should call 'correctly sharpened'.

| Type of Knife or Tool | Recommended Bevel Angle | Comments |
|---|---|---|
| • Fillet knife<br>• Paring knife<br>• Straight Razor | 8 to 18 degrees | A very fine edge but with very little durability – sharpness is of primary importance here |
| • Chef's Knife<br>• Boning Knife<br>• Carving Knife | 18 to 25 degrees | An all-around grind for a tool used for slicing and chopping on soft materials only; very sharp and much more durable than knives and tools above but still a bit fragile |
| • Pocket Knife<br>• Hunting Knife | 25 to 30 degrees | Sharp edge and more durable than above, knives used both for slicing and chopping |
| • Cleaver<br>• Machete | 30 to 35 degrees | Chopping and hacking but seldom cutting or paring like a knife - durability is of primary importance here |

NOTE: When determining the bevel angle for any knife or tool where you sharpen two bevels you have to consider both faces. The 'included angle' of a knife sharpened at 15 degrees on each surface would be a 30 degree bevel. When we only sharpen one side as in a spindle or bowl gouge the bevel angle is determined by the single side you grind and the tool's back.

All materials you might make a knife or tool out of will vary in how 'thin' you can make the tool's edge before its durability becomes the limiting factor. Another trade-off in durability is in how easy it is for you to create a fine edge. Some turners only sharpen with an 80 grit wheel and believe the rougher edge helps speed their work along. Other folks use a 120 to 180 grit wheel and may even hone or strop their tools to achieve a very fine edge for finish cuts.

All tool steels are a cake-like mix of ingredients and the end result is that some particles in the mix are courser and tougher to grind than others. For example it takes a wheel with hardness close to diamond to cut the vanadium of some tool steels or to grind carbide. At the other extreme a wood carver prefers a simple high carbon steel for the quality of the edge that can put on it with minimal effort using simple wheels and strops.

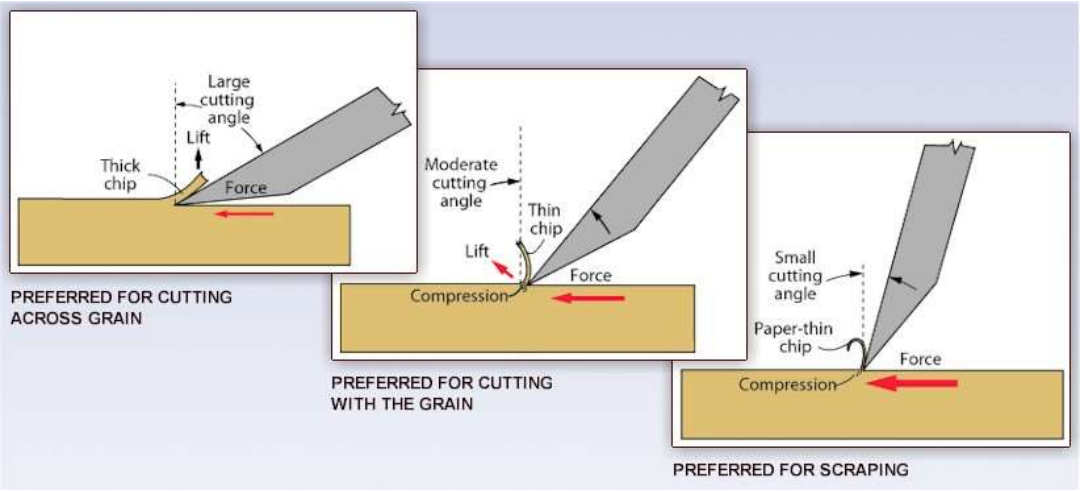
## How Wood Cuts

An edge tool basically cuts wood as a wedge. As the edge of the tool is forced into the wood fibers some amount of lifting and compression goes on before the fibers are separated. For a dull tool there is a lot of lifting and compression as well as tearing but you can get 'tear out' no matter how sharp your tool depending on the wood or the angle that the tool's edge is presented during the cut.

The finer the bevel the more the tool wants to 'feed into' the wood, something a wood turner calls the 'aggressiveness' of the tools edge. Aggressiveness of the bevel along with the angle that the edge is presented and if the edge is supported by the bevel or not all play into how easy it is to get a 'catch' with the tool.

In the diagrams below the size of the 'red arrow' indicate the amount of force required to feed the tool into the cut. This 'force' when tuning on a lathe is not you pushing the tool into the wood it is in terms of the tool pushing down on the tool rest. This is why you need to keep the handle of the tool at 5 times or more of the overhang to handle these forces safely.

Ever wonder why it is so easy to get your scrapers to vibrate in a heavy cut? See diagram at the far right and imagine that the chip is not kept 'paper thin' and all forces multiply; lift, compression and push of the tool down on the tool rest.




Picture from the great write-up on the Workshop Companion web site: How Tools Cut Wood

Note: there is compression and lift of the grain in all cuts. The diagram at the far left (I believe) is just saying it is minimal. Stuart Batty recommends a 40 degree bevel on his bowl gouges which gives him a cut much like the diagram at the far left. That angle doesn't get us into a deeper bowl so most of us use a 55 degree or steeper bevel angle giving us a cut much like the middle diagram (let's imagine that the edge is supported by rubbing the bevel of a steeper grind in this picture though).

Given this understanding we can see how the bevel angle as well as the presentation of the cutting edge of the tool to the surface of the wood will affect how cleanly it cuts. More support for the idea that 'sharpening' is about more than the very outermost cutting edge of the tool.

## Common Approaches to Sharpening Woodturning Tools

There are bevel shapes that go along with each intended use in the table discussing knives at the beginning of this article. If you could get a miracle steel that would let you be very, very sharp and yet have the edge remain amazingly durable you would still want to have the right bevel angle and bevel shape for the job. This is the main point we'll concentrate on as we discuss sharpening our woodturning tools - the bevel angle and the profile of the tool's edge for a given use of the tool.

We'll reference Steven Russell's summary of bevel angles and other aspects of sharpening our woodturning tools from his WoodturningVideosPlus.com website in this discussion: Common Bevel Angles for Woodturning Tools

| Tool | Bevel Angle Range | Suggested Starting Point | Comments |
|---|---|---|---|
| Spindle Gouge | 30 to 45 | 35 | Detail work will favor the 30 degree grind while rough work will favor the 40 to 45 degree grind |
| Bowl Gouge | 40 to 60 | 55 to 60 | The grind is usually tailored to how 'deep' one needs to reach into the bowl and the type of wood you are working with… Steve's write-up is worth studying on this topic.<br><br>Talk to Bill or read David Elsworth's book on the 85 degree 'bottom gouge' for use on the interior of a bowl. |
| Scrapers | 45 to 80 | 70 | The 70 to 80 degree angle is often used by someone using the burr right off the grinder. If you are going to burnish the edge of your scraper you will probably want to grind to 60 degrees.<br><br>If you are going to use your scraper without a burr you will favor a 45 degree bevel. Again, see Steve's write-up on this.<br><br>NOTE: a reverse bevel or double-bevel grind requires thinking in terms of the 'included angle'. |
| Skews | 30 to 65 | 40 | The blunter bevel angles are often chosen for a skew that will be used in a scraping action. The 30 to 35 degree angles make for a very aggressive skew chisel which will 'catch' easily for a less experienced turner. |
| Parting Tools | 45 | 45 | Not a lot of variation here but some folks avoid a hollow grind on both their parting tools and their skew chisels to reduce their tendency to 'self-feed' into the wood. |

An excellent summary of the approach to gouge sharpening covered in this education hour is in the Kirk DeHeer "Sharpening Demystified" article in the Winter 2006 edition of the American Woodturner magazine. The Honolulu Woodturners (http://honoluluwoodturners.org/tips.html) club has made this article available on their website if you are not an AAW member. Basically extend the tool 2 inches from

the face of the Wolverine jig, set the leg of the jig to the top of the second notch from the top and extend the v-arm to the desired bevel angle… very simple and effective.

A lot of what we discussed in this education hour was focused on getting your grind right for your various tools and then **making the process repeatable.** It really doesn't matter what type of grinder you use or if you free-hand grind or use a jig as long as you can quickly and accurately reproduce these grinds the next time you need to sharpen your tools.

Class photos:

We had a great turn-out

We discussed the basic approach used to sharpen many different types of tools

As usual the fingernail grinds of bowl gouges were a popular topic

We will talk about nose profiles and other aspects of the tool's shape affected by sharpening in later education hours as we cover the specific tools.

Next month's education hour: skew chisels, roughing gouges and spindle gouges used on wood mounted on the lathe in spindle orientation.