

Class Notes: Sharpening Woodturning Tools

Goals today

- Have fun and learn something --- Make a friend who is as crazy as you are---Be safe
- Have each of you that brought a tool -- leave with a profiled and sharpened model tool to take home as a model
- To have each of you understand the use of grinders and the One Way Wolverine sharpening system
- To present one reliable way of sharpening that will work immediately for you. There are many good alternative approaches. We believe a single, middle of the road, repeatable, sharpening approach will work well for you.— and not to fall off the rails with discussions of other systems

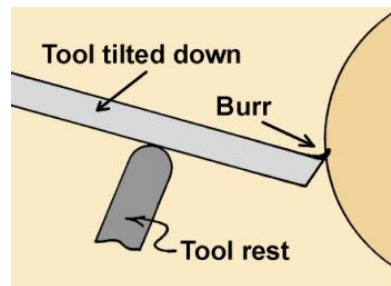
Fundamental understandings

- **Profiling**—the initial grinding of the cutting edge of the tool to achieve the desired 3D shape and bevel angle of the cutting end of a tool.
- **Sharpening** – that is lightly touching up the immediate cutting edge of the tool, with minimal removal of steel, while maintaining the shape, and bevel angle without changing the profile of the tool
- **Types of tool steel for turning tools**
 - **High carbon steel** ... any tool over 10 years old or of otherwise unknown origin or vintage is probably high carbon steel—the traditional woodworkers cutting tool steel for the last century but is NOT HSS
 - **High Speed Steel** – HSS in used in modern turning tools is high in molybdenum. The carbides in it are small and evenly distributed. It has high wear resistance, examples being M2, M4 or M6 classified steel – all currently sold mainstream brand turning tools use this steel unless it is powdered metal. M2 class tools are substantially more wear resistant than older high carbon steel, and are easier to sharpen. (Robert Sorby, Henry Taylor, and Hamlet are examples of companies using these steels)
 - **HSS-10% Cobalt** – used as imbedded cutting tips by some tool manufacturers, typically for hollowing tools, especially the David Ellsworth Hollowers.
Resharpenable.
 - **Powdered Metal** – Manufacturers using powdered metal (PM) tools claim better dimensional stability during heat treatment, and longer tool life. (Crown PM Pro, Doug Thompson Tools, -- *resharpenable*)
 - **Kryo or Cryogenic treated steel**—Either with HSS or PM tools, super cooling the cutting edge area of the tool increases its wear resistance and the tool reportedly will last longer than non-cryogenically treated tools. (Henry Taylor, and Crown PRO PM)
 - **Carbide or Nano-carbide** – used in a number of tools such as Easy tools, Hunter Hollowing Tools, Jackovsky Hollow Pro tools etc. Disposable – cannot be resharpened. **BJ personal opinion:** these are great for hollowing, but a poor choice for mainstream wood turning.

- **Two fundamental types of tools**

Class Notes: Sharpening Woodturning Tools

- **Spindle turning tools** – more slender, designed for use with the tool rest very close to the wood. Examples: Spindle Roughing Gouge, Spindle gouge, some scrapers, skew, parting tool—in general **spindle tools are not designed for use in bowl turning, and *may not be safe***. Exception, the spindle gouge (never the roughing gouge) is sometimes used by some turners to shape the EXTERIOR of a bowl, presuming the tool rest can be brought close to the bowl.
 - **Bowl turning tools** – stronger, beefier, stiffer --- designed for use extending well off of the tool rest. Examples: bowl gouges, heavy duty scrapers
- **The Ways Tools Cut**
 - **Scraping cut**



- **Slicing cut**

Today's Workshop

- We will first PROFILE tools
- Then Sharpen the edges

Tools we will profile and sharpen today

- **Parting tool** -- burr edge
- **Scraper** – burr edge
- **Spindle Roughing Gouge** – knife edge
- **Bowl Gouge** – knife edge
- **Spindle Gouge** – knife edge

Introduction

This workshop focuses on sharpening using a jig system as a guide, specifically the OneWay Wolverine Sharpening System

- It is the most common used -- 100 of these are out there for every one of Tormek, Sorby Belt, etc.
- Goal is to master :”woodturning” – not “steel tool sharpening”
- The OneWay gig plus grinders ... It works -- is consistent
- If you do a workshop anywhere, this is almost certainly what you will find provided with the grinders

Class Notes: Sharpening Woodturning Tools

- Hand Sharpening – **Why do** the pros sharpen by hand
 - They learned back before these jigs were available
 - They travel by air, and travel as light as possible
 - They never know what will be available for sharpening at demos and hand grinding always works
 - Most of the pros have their tools provided to them by manufacturers

Tools, when shaped effectively and sharp will allow you to quickly carve wood held in a rapidly rotating powered vise - a lathe. Shape and sharpening is more important than the tool brand or type of steel.

- **“Shape”** is the to 3D profile and the bevel angle ground onto the cutting end of a tool.
 - Jigs are a devices to help repeatedly reproduce a consistent shape at the grinder.
 - Jigs don't assure the desired shape. Hand control, adjustment, and attention to the evolving shape during the grinding process is crucial.

Sharpening Station you will be using

- 8” slow speed Grinder - 6” grinder works too. Any grinder that is reasonably true running, no tool bouncing. Low or high speed. So you likely don’t need to buy a new grinder to get the job done.
- Grinding Wheels: 60 - 120 grit 1” x 8” Aluminum Oxide wheels are the typical wheels that will come on your grinder when you buy
 - Next wheels – Norton 3X ceramic wheels or
 - CBN (Cubic Boron Nitride) wheels ... perfectly balanced, \
 - essentially “forever wheels”, usable only on M2, M4 or Powdered

Metal tools.



- Wolverine System: Arm, Platform, Fingernail Jig
- Wheel Dressing crucial. Square and clean wheel. Good quality diamond wheel dresser.
- 1-3/4” depth gauge for spindle and bowl gouges
- Angle gauge (General Tools 17 Square Head Protractor)
- Permanent black marker

Parting Tool - Hands on with **Wolverine Arm**

- It is a SCRAPER. You are creating a BURR.
- Grind initial profile: equal length sides, straight across front edge, and 45-70 degree included angle -- not critical
 - Mark desired profile with Sharpie.
 - Use long arm of Wolverine and pocket to set handle.
 - Sparks over the top of the cutting edge signal bevel plane has been ground to intersect cutting edge
- Parting tool is a scraper – only one side is the cutting side, and it should have a burr that you can feel.
- Option: Ellsworth Shark Profile
- Re-sharpen

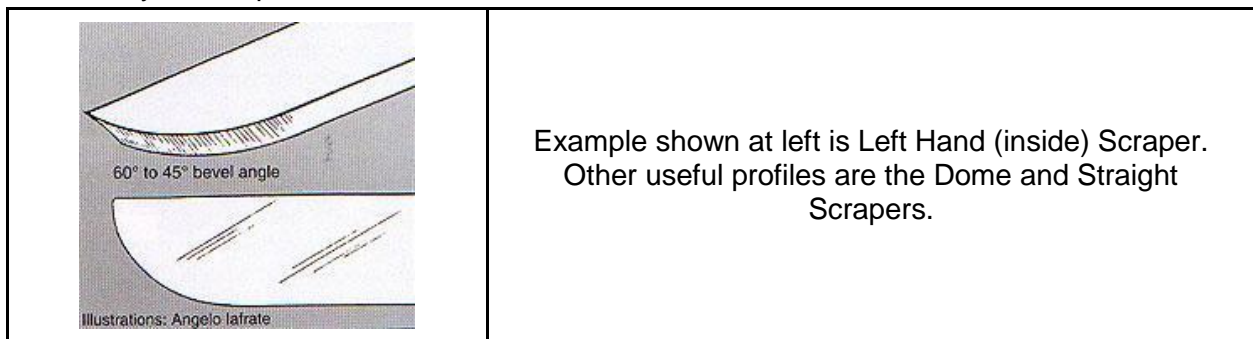
Class Notes: Sharpening Woodturning Tools

- Match the bevel to the wheel. Use marking pen on bevel and smooth “sound” from hand turned wheel reset Wolverine arm. This trains us to grind the bevel, not the edge.
- Light grinding to refresh edge
- Maintain original profile
- All black marks on bevel should have disappeared

THE SCRAPER

Around a 60-70° nose angle ground on Wolverine platform

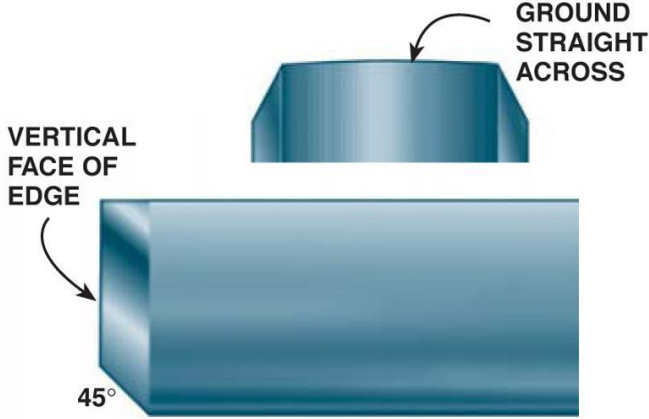

- “Burr” --Lots of approaches to raising burr. The burr left by grinder is simplest and adequate for turning. This is heresy for you flat work woodworkers, but is one of the ways we depart from convention.



Spindle Roughing Gouge - Hands on with **Wolverine platform (The arm can be risky)**

- Grind initial profile: Straight across and about a 45° bevel using Wolverine platform
 - Set platform
 - Keep tool flat on platform and slide forward to make a small mark on bevel.
 - Measure bevel angle and fine tune using Wolverine arm
 - Grinding of profile
 - Roll tool from corner to corner. Keep flat on rest.
 - Beware of over grinding center and avoid concave profile.
 - Slight convex at corners is ok
- Re-sharpen Spindle Roughing Gouge
 - Use black pen to mark bevel surface to help confirm Wolverine is set to match wheel.
 - Use “sound” and full mark across bevel to set Wolverine arm to confirm your have repeated setup angle
 - Light grinding to refresh edge
 - All black marks on bevel should have disappeared

Class Notes: Sharpening Woodturning Tools

 <p>GROUND STRAIGHT ACROSS</p> <p>VERTICAL FACE OF EDGE</p> <p>45°</p>	<p>Spindle Roughing Gouge desired profile</p>
 <p>MULTI-FACETED EDGE</p> <p>SPEAR-POINTED DETAIL GOUGE</p> <p>OVERHEATED AND SAW-TOOTHED EDGE</p>	<p>Watch out for these common sharpening mistakes</p>

Class Notes: Sharpening Woodturning Tools

Bowl Gouge - Hands on with Fingernail Jig

Sizes: The European “standard measure” for a bowl gouge is the distance across the top of the flutes. The U.S. standard is to measure the diameter of the rod from which the bowl gouge is ground. So a rod of 1/2” diameter that has a distance of 3/8” between the flutes is a 3/8” bowl gouge in Europe (Sorby, Henry Taylor) but in U.S. measure it is a 1/2” gouge.

- Why Ellsworth/Irish/Fingernail grind?
 - Enables four useful cuts: push and pull cut, shear scrape and shear cut.
 - Steep nose angle allows “turning of corner” at transition to bottom of bowl
- Same basic steps as above for spindle gouge
- Profile to a round nose and 60° nose angle. “U” shape or Parabolic flute good place to start.
- Wing length about an inch for a 3/8” (European measure, 1/2” for U.S.)
- Continuous convex wing edges - avoid “birds beak” or concave portions
- Later can use added bowl gouges with different nose angles to cover a range of bowl shapes (see picture at right below)
- Relieving bottom edge of nose a good idea to avoid marks on wood and ease control



Our “middle of the road” starting point.
“U” shaped flute.

60 degree nose angle will turn corner at bottom of bowl. Gently rounded wings. Will do the vast majority of your work well.

Nose can be in a range from 45° - 65° degrees which provide solutions to special situations (see right)

If curvature of wings is straighter shear scraping is improved, but pull and push cuts disadvantaged a bit.



Some alternatives when you have more bowl gouges or different needs.

Top gouge at 50° and shorter wing also a good choice. Harder to turn corner at bottom of bowl though.

Middle gouge will allow undercutting of top of bowl. But usually can't turn the corner at the bottom. Bottom gouge with straight across grind helpful in turning the corner at the bottom of a bowl.

Class Notes: Sharpening Woodturning Tools

Spindle Gouge - Hands on with Fingernail Jig

- Why fingernail profile? Aids cutting of details: “V’s,” coves, beads, chamfers, endgrain cleanup. Can make skew much less important.
- Selected profile: 40° nose bevel, fingernail shape, not pointy,
- Grind with light touch!
- Fingernail jig leg angle is set permanently per Thomson Tools handout
- Set Wolverine Arm extension for desired nose angle. Trial grinds and measure.
- Sharpen Spindle Gouge
 - Nose first to 40° bevel
 - Freehand grind top profile if needed
 - Sides next with convex edges on sides - One side at a time
 - Blending last (light on nose) resulting in continuous rounded top profile.
 - Observe the resulting profile frequently and carefully. Adjust by working “high spots” and leaving “low spots” alone. Avoid “birds beak” wings.
- Resharpen (use black marking pen and sound of hand turned wheel to set arm to match existing bevel)
- Note: A useful second spindle gouge is a “detail” gouge for fine crisp forms, lines, and longer reach over rest. Steeper bevel, more pointy, and shallow flute



Basic Spindle Gouge Profiles

