

Sharpening Woodturning Tools

Part 1 – Sharpening Systems



Presented by

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Waterloo-Wellington Woodturners Guild
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American Association of Woodturners

INTRODUCTION

Your Presenter:

Paul Newton has been woodturning for approximately ten years. He is a member of the American Association of Woodturners, is currently President of the Waterloo-Wellington Woodturner's Guild, and is a past President of the Thames Valley Woodturner's Guild in London, Ontario. He has demonstrated turning techniques at Guild meetings and workshops. His turnings include bowls, vessels, pens, wine stoppers, and art pieces.

History

Woodturning is a craft that has been passed down through generations, with the earliest known examples being over 3000 years old. Before the metal age, and the industrial revolution, vessels for eating and drinking were mostly made of wood or ceramics. The earliest of these were carved wooden bowls and cups. Later artisans learned to "turn" wood on early pole lathes, creating more uniform shapes. With advent of the industrial revolution, turned wood items declined in use in favour of those in metal and ceramic.

Woodturning enjoyed a resurgence beginning in the mid-twentieth century, and is presently enjoying immense popularity worldwide as both a professional art form and a popular hobby. The American Association of Woodturners was formed in 1986, by a small group of American (and Canadian) woodturning artists. Today the AAW boasts over 15,000 members, and a network of over 350 local chapters worldwide.



Pole Lathe from Early Viking Settlement - Newfoundland

Intent of this Seminar

In this introductory seminar we will learn to effectively sharpen our woodturning tools. Subjects will include:

- Safety Guidelines
- Tool Steels and their differences
- Turning Tools, their Shapes and their Usage
- Tool Sharpening Systems
- Tool Sharpening Techniques

SAFETY GUIDELINES

Wear Proper Attire!

- Always wear eye protection. A full face shield is the best method of protection. At the very least wear safety glasses when sharpening tools.
- Loose clothing and hair are dangerous because it can get caught in spinning machines. Tie back long hair, and wear clothing with short sleeves or roll up long sleeves. Remove jewelry and watches and rings as they can get caught up in moving parts.
- Be aware of the dangers of excessive breathing in of metal dust. Metal dust is dangerous when inhaled in quantity. Prolonged exposure to metal dust can cause respiratory ailments. Wear a dust mask or provide adequate dust collection.

SHARPENING LATHE TOOLS

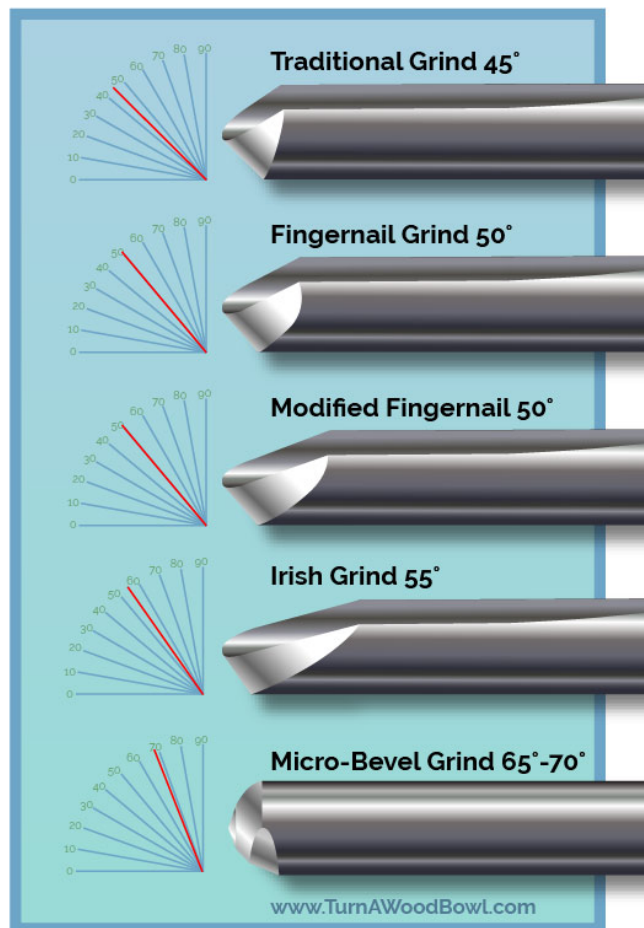
Lathe Tools Shapes & Usage:

- Spindle Roughing Gouge – "dish" shaped tool; used **ONLY** for between centres work where the grain of the wood is parallel to the lathe bed. Used for roughing square stock to round and rough shaping after. It is **NOT** to be used for face grain work such as roughing bowls.
- Spindle Gouges – Used for shaping spindle (between centres) work. Best used for bead and cove work. May be used for final shaping of foot or bottom of bowls on the outside of the bowl only. Do not use spindle gouges inside a bowl. Also used for hollowing endgrain work such as small vessels and lidded boxes.
- Skew – Difficult to master as a beginner. Prone to catches if not used correctly. Used **ONLY** for between centres work where the grain of the wood is parallel to the lathe bed. Can be used on the outside of bowls to form grooves for decoration or to shape tenons when used as a scraper.
- Parting Tool – Used to cut off or "part off" work from the lathe. Also used to form tenons on the ends of spindle work, or on the bottom of bowls.
- Scrapers – Flat tool used to "scrape" the surface of the wood to achieve a smoother finish. Also used to do final shaping and tenon work. May be used on either spindle work or bowls. "Negative Rake" scrapers are a better option as they give better control.
- Bowl Gouges – "V" or "U" (also parabolic) fluted tools used primarily for roughing and shaping bowls. May be used on spindle work also (outside). May be used for hollowing depending on how it is ground.
- Hollowing tools – Tools that are generally "hooked" in some way, used for hollowing out vessels and other end grain work. Many use carbide tips. Some are ring shaped.

- Carbide Tipped Tools – All use a "scraping" method of cutting the wood. More recent innovation in turning tools. Most recently offer a "negative rake" version also.

Gouges

- Bowl Gouges
 - "U" fluted tools used primarily for shaping wet or "green" wood. U-Flutes are more aggressive in their cut.
 - "V" flutes give a finer cut.
 - Parabolic Flutes – are the best of both worlds. Excellent on wet or dry wood.
- Grinds
 - Traditional Grind – 45° (wings slightly pulled back)
 - Fingernail Grind – 50° (wings width of flute)
 - Modified Fingernail – 50° (wings width of shaft diameter)
 - Irish Grind – 55° (wings two times tool diameter)
 - Micro Bevel Grind – 60-70° (uses a secondary grind for clearance)



Bowl Gouge Grinds



Measuring the Bevel Angle



Robo-Rest

- Sharpening Scrapers
 - Sharpen scrapers on a platen using your grinder. Set the angle for the bevel to approximately 70-80 degrees. Various jigs are available to measure these angles, such as the MobyJig or the Stuart Batty Angle Jig. Another great method for determining angles is by using the "Robo-Rest", an after-market platen that fits on the Wolverine Jig and has a graduated side plate with holes set at 5 degree increments.

- Hold the scraper flat and drag across the wheel, sharpening the bevel only to achieve a burr on the top edge.

- Carbide Tip Tools
 - Replaceable carbide tips. Can be rotated to present a fresh edge.
 - Brittle, and chip or damage easily. Must be replaced when chipped or cracked.
 - Can be sharpened using Honing oil and a CBN or Diamond Card Hone.
 - Remove the tip from the tool; turn it face down and rub in a circle for approximately one minute. Wipe off the oil, and re-install the tip on the tool.
 - Recent innovation is to offer "negative rake" carbide tips which have a top relief bevel. These tips will allow a more "catch free" application, however they cannot be sharpened without the use of specialized attachments. These tips are more expensive.



Easy Wood Tools

Tool Steels:

- Lathe tools come in a variety of modern tool steels.
- Older tools, (made prior to the 1970s) are probably Carbon Steel. This is a softer steel used commonly for tools prior to the advent of High Speed Steel. These tools are most recognizable by the shower of yellow sparks when applied to a grinding wheel. These tools do not hold an edge well, and require constant sharpening. Sharpening will remove more steel than is desirable, thereby shortening the tool life. These tools can only be sharpened on stone grinding wheels as they will "gum up" diamond or CBN wheels.
- Newer tools are made from variations of High Speed Steel, and even more exotic steels. As you move through the tools steels from softer to harder, the alloy adds more Vanadium.
- M2 High Speed Steel – Industry standard for woodturning tools. Holds an edge long than old carbon steel, and does not wear down as quickly. It is the most affordable.
- KRYO M2 H.S.S. – M2 steel that has been Cryogenically frozen to increase the hardness of the steel. Edges last up to 2 times as long as standard high speed steel.
- M4 H.S.S. – Edges last up to 2 times as long as M2 HSS. Fine edges harder to achieve.
- PM or CPM Steel – these steels are Powdered Metal (PM) and Crucible Particle Metallurgy (CPM), produced by using compressed gas during the pouring stage to produce fine metal pellets which are then consolidated under high pressure.
 - Edges last 5-6 times as long as M2 HSS. Fine edges harder to achieve.
 - Higher Alloy Grades Available
 - Improved Wear Resistance
 - Consistent Tool Performance
 - Good Grindability (on resharpening)
- M42 H.S.S. – Steel has a high Cobalt content
 - Edges last 3-4 times as long as M2 HSS.
 - Fine edges easier to achieve than PM or CPM steel.
 - Good Grindability (on resharpening)

Tool Sharpening Systems

- Low Speed Dry Grinder With Sharpening Jig
 - Low Speed - +/- 1700RPM is recommended. Higher speed (3000RPM) grinders may be used, but also may overheat the tools and remove some of the tempering.
 - Cost: Grinder - \$330; Wolverine Jig - \$90; Vari Grind - \$53; (optional CBN Wheels - \$190/wheel).
 - Grinding Wheels
 - Carborundum – Coarse grits; generally used for shaping tools before sharpening. Too aggressive for final sharpening of tools. Creates excessive heat. (Lower cost)
 - Aluminum Oxide – most common for use in sharpening tools. Creates moderate heat. Good for general sharpening. Wheels must be periodically dressed flat which slowly reduces their diameter. Will require replacement eventually. (Moderate Cost +/- \$70)
 - CBN (Cubic Boron Nitride) – newest innovation. 2/3 as hard as Diamond but with far less cost. Keeps tool cool during grinding. Produces a finer grind and a superior edge. Wheels do not require dressing. (Higher Cost +/- \$170-190) Use only with High Speed Steel.
 - Diamond – much higher cost. Keeps tool cool during grinding. Produces a fine grind and a superior edge. Wheels do not require dressing. (High Cost +/- \$450) Use only with High Speed Steel.
 - Aluminum Oxide wheels require constant dressing and will need replacing on a regular basis if used frequently. CBN or Diamond wheels require no dressing, do not go out of shape, and will last for many years.
 - Sharpening Jigs
 - Oneway Wolverine Jig is the industry standard. Once set up, it will produce a repeatable grind and edge. There are other similar jigs on the market.





Vari-Grind Attachment



Raptor Setting Gauges

- **Slow Speed Wet Grinder With Sharpening Jig**
 - Tormek Grinder
 - Cost: T4 - \$570; T8 - \$1000 (plus approx. \$250 for basic jigs).
 - Slow Speed - +/- 125RPM. Uses water as a cooling medium. Grinder runs in opposite direction to dry grinders.
 - Grinding Wheels
 - Silicon Carbide.
 - Japanese Waterstone (T8 only).
 - Diamond (T8 only).
 - Sharpening Jigs
 - Uses a proprietary Jig similar to the Wolverine Jig. Once set up, it will produce a repeatable grind and edge.
 - Requires only one or two passes to sharpen.
 - Has leather honing wheels for polishing the edges and removing the burr.
 - Silicon Carbide wheels are soft and cup easily. Require constant dressing and re-shaping. Wheels are expensive to replace (\$298 for SC - \$420 for Diamond).



Tormek Slow Speed Grinders

- Belt Sander

- Slow Speed - +/- 100RPM. Runs in opposite direction to dry grinders.
- Cost: \$650.
 - Sanding Belts - Silicon Carbide.
- Sharpening Jigs
 - Uses a proprietary Jig similar to the Tormek or the Wolverine Jig. Once set up, it will produce a repeatable grind and edge.
- Good for sharpening skewes, parting tools, scrapers.
- Heats up the tools slightly.
- Belts are fairly inexpensive but require more frequent replacement.



Sorby Belt Sander

SUGGESTED RESOURCES

Suppliers

- Wolverine Sharpening Jig
 - Oneway Manufacturing – Stratford – www.oneway.ca
 - Lee Valley Tool – www.leevalley.com
 - BusyBeeTools – www.busybeetools.com
- Tormek (Sweden) – www.tormek.com
 - Lee Valley Tool – www.leevalley.com
- Sorby Pro-Edge Belt Sander
 - Robert Sorby (UK) – www.robert-sorby.co.uk
 - Craft Supplies USA – www.woodturnerscatalogue.com
- Rikon Grinders and CBN Wheels
 - Woodturners Wonders – www.woodturnerswonders.com
 - Lee Valley Tool – www.leevalley.com
 - Woodchuckers – www.woodchuckers.com
- Easy Wood Tools – www.easywoodtools.com
 - Lee Valley Tool – www.leevalley.com
 - Craft Supplies USA – www.woodturnerscatalogue.com
 - Woodchuckers – www.woodchuckers.com
- Angle Setters for Gouges (Red)
 - Craft Supplies USA – www.woodturnerscatalogue.com
- Moby Jig (Skew angles)
 - www.glennlucaswoodturning.com

Videos

- Sharpening Turning Tools – Craft Supplies USA
 - Craft Supplies USA – www.woodturnerscatalogue.com
- Tool Sharpening for Wood Bowl Turning
 - www.turnawoodbowl.com
- Tool Sharpening DVD/Download
 - www.glennlucaswoodturning.com

Associations

- AAW – American Association of Woodturners www.woodturner.org

Local Clubs and Guilds

- Waterloo-Wellington Woodturners Guild (Waterloo) www.wwwwoodturners.com
- Thames Valley Woodturners Guild (London) www.thamesvalleywoodturners.com
- Golden Horseshoe Woodturners Guild (Burlington) www.ghwg.ca
- Grey-Bruce Woodturners Guild (Kincardine) www.gbwg.ca
- Simcoe Woodturners Guild (Midhurst) www.simcoewoodturnersguild.com
- Toronto Woodturners Guild (Toronto) www.torontowoodturnersguild.com
- Woodturners Guild of Ontario (Toronto) www.wgo.ca
- Kingston Woodturners (Kingston) www.kingstonwoodturners.com
- Valley Woodturners (Ottawa) www.valleywoodturners.userworld.com