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# Some Basics for Sharpening

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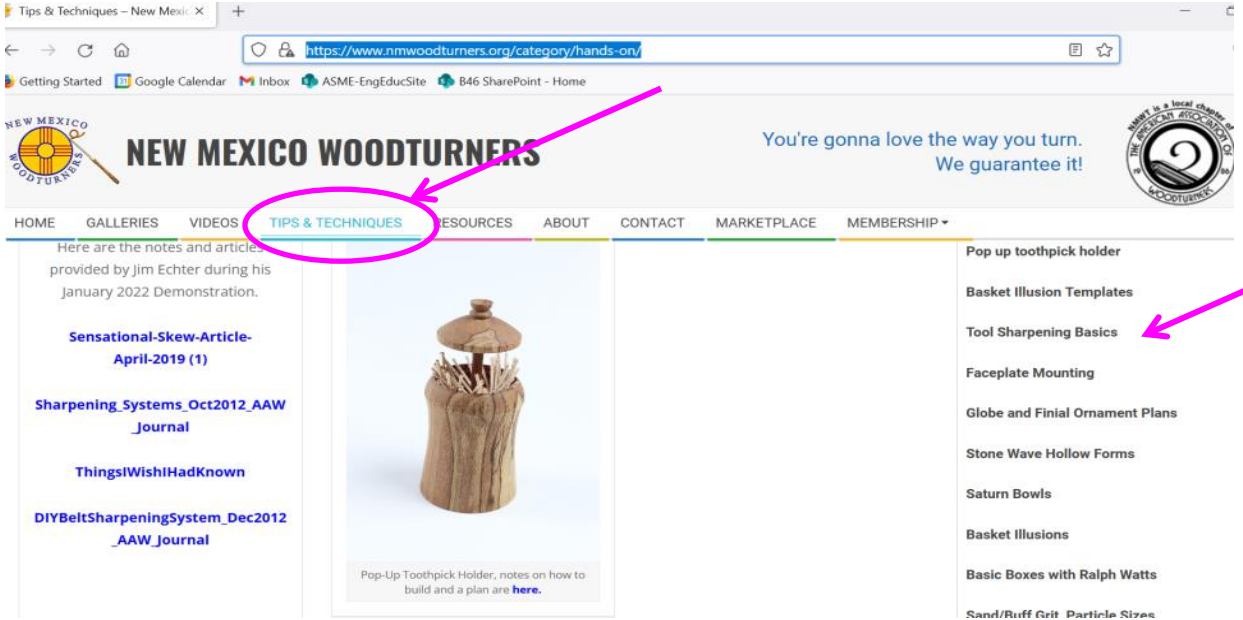
# Club website resources

- https://www.nmwoodturners.org/category/hands-on/




More below here

# Purpose of Sharpening Demo

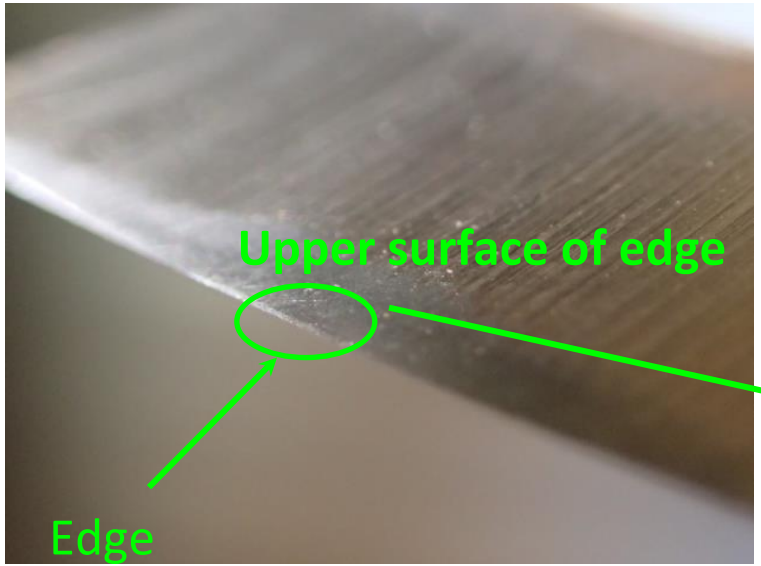
- Explain and explore what “Sharpening” is in the overall process of woodturning.
- Definition of basic terms
- Live demos:
  - Slow-speed grinder with Wolverine jig
  - Wet wheel system (Tormek)
  - Belt-sanding type (Sorby pro-edge or similar)
- Discussion of grinding wheel types
- Discussion of steels

As time permits…

Carbide insert tools (EZ wood & similar) are not in today’s demo.
The inserts are intended to be disposed/recycled.

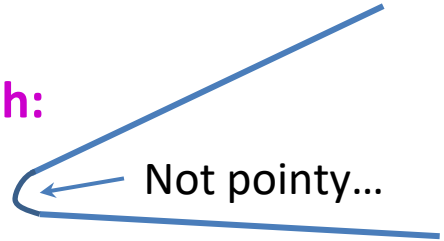
# Basic Terms

- The tool edge is the intersection of two surfaces on your tool. The edge is what cuts the wood when you turn.




Sharpening prepares the edge of the tool, so it can cut through the fibers of the wood more effectively as you shape the wood that you are turning on a lathe

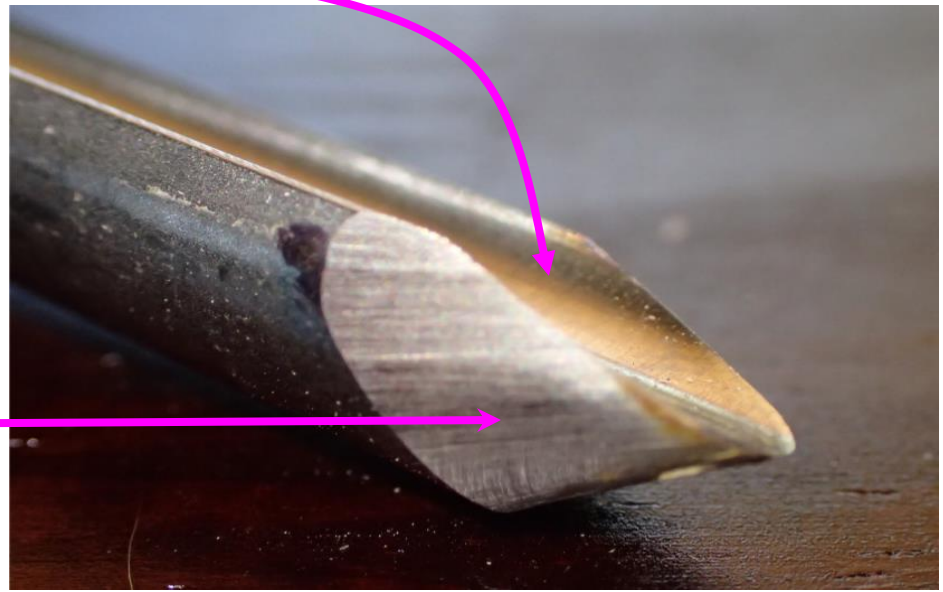
**Zoom in a whole bunch:**



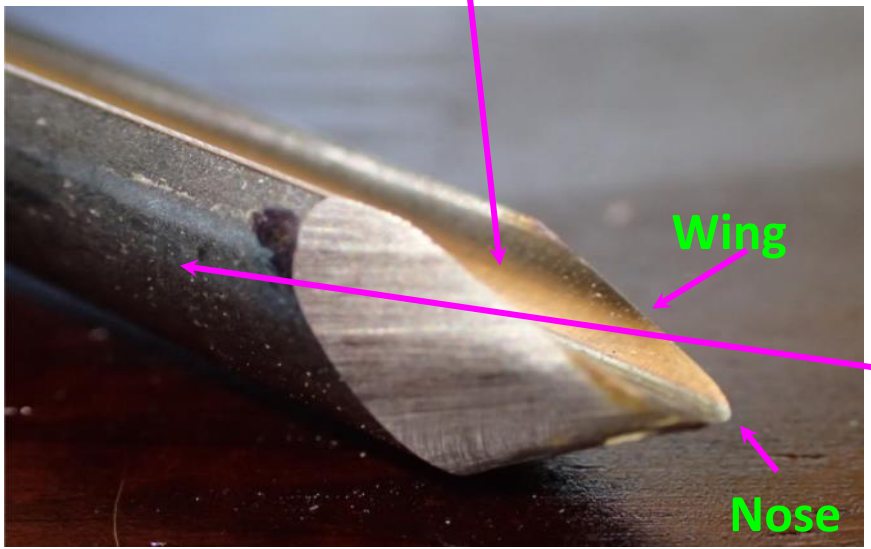

**Shorter: Sharpening makes the edge "pointy-er."**

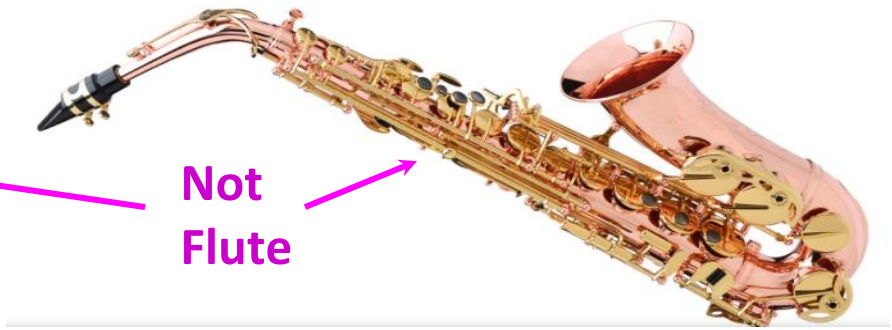
(but with a big enough microscope, it's still not pointy)

# What is “the bevel”?

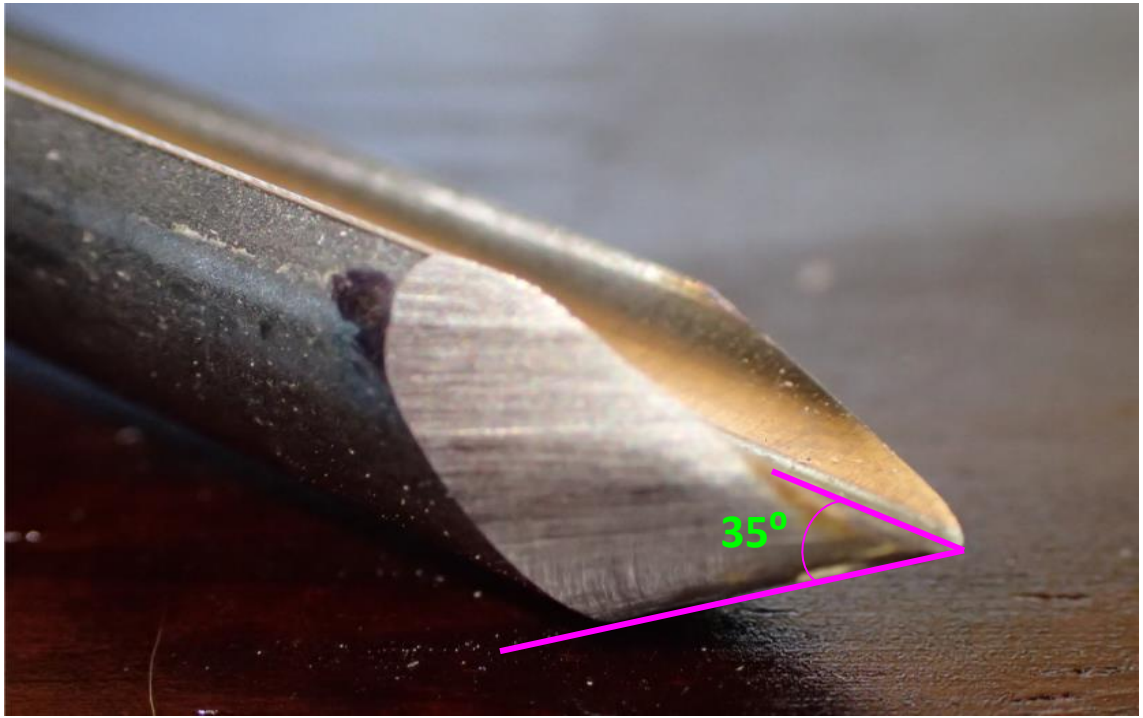



# What's the flute?



# When we say “35º” tool angle, what do we mean?




The sharpening angle is the included angle between the flute and the bevel.

On a skew, the angle is the included angle between the edges.

On your kitchen knife, the angle is the included angle between the edges.

# Sharpening methods

- By hand, using files, sharpening stones, sandpaper, etc.
- Using a machine:
  - Bench grinder, such as a slow speed grinder, with jigs to help hold the tool
  - Water cooled grinder system, such as the Tormek grinder, with jigs to help hold the tool
  - Abrasive belt (sanding belt) system, such as the Sorby pro-edge or similar
- Honing:
  - For turners, using a hand-held tool such as a diamond card to refine the edge; most typically for skews and parting tools
  - Raising a burr on a scraper with a hardened steel rod is a type of hand-sharpening—not demonstrated today
- Buffing/polishing the tool: Not demonstrated today

# Comments before the live demo

- Each type of tool requires a different sharpening technique some slightly different from another: Shape of the grind, type of tool steel, etc.
- Some tools sharpen better on different setups and jigs; and some do better by hand.
- Type of wood being turned (including resins, inlays, etc)
- What setup YOU use depends on:
  - Style of turning and size of tool – 2” spindle roughing gouge vs ¼” detail gouge.
  - Experience turning - You can’t spell “lathe” vs. 20 years of production turning.
  - Experience in sharpening - Your experience and the number of times you have sharpened a tool will change the way you go about sharpening it. You will evolve your own technique for sharpening as well as turning as you move along your woodturning journey.
- Nothing is cast in stone. There are more opinions on this subject than woodturners

# Live Demos

- Roughing Gouge
  - Platform on Wolverine. Other systems?
- Spindle/Bowl Gouge
  - V-arm and Varigrind on Wolverine. Other systems?
- Skew/Scraper
  - Platform on Wolverine. Other systems? Hone skew after grinding.
- Parting Tool
  - Platform on Wolverine. I like to hone my parting tools. Other systems?

Details on setting up the Wolverine varigrind are in the 7-page club handout (dated 2015)

# Grinder Based Systems

- Type of abrasive wheel
- Speed of wheel: Standard (~3600 rpm) vs slow-speed (~1700 rpm)
- Type of jigs to help hold the tool as you sharpen—why use a jig?

# Tormek Systems

- Very slow speed system
- Water cooled/lubricated, with ceramic wheels originally, although CBN wheels are now available.
- Advantages
  - No overheating of the tool or platform.
  - Numerous jigs available to sharpen *anything.*
- Disadvantages
  - Cost
  - Complexity of the system

# Belt Driven Systems

- Robert Sorby Pro Edge -
  - Advantages -
  - Easy Repeatable settings for all the most popular grinds and tools.
  - Abrasive grits are varied - 60 to over 1200 grit.
  - Belt changes are easy and fast.
  - Disadvantages
    - Cost of the system to begin with.  Cost of replacement belts.
    - Belts wear out and must be replaced from time to time. (The diamond based belt lasts for years but is very expensive and hard to purchase these days).
    - Not all abrasive grits are always available (supply chain issues).
    - Weird size belt, not industry standard - 2in x 30.5in belt.
    - Cannot do a 40/40 grind straight out of the box.  Takes some fiddling.
- Axminster - Basically a copy of the Sorby ProEdge

# Grinding wheels

- Don’t use diamond wheels for steel tools!
- 180 grit wheel: The particle size of the abrasive (barely) falls through a mesh with 180 lines/inch.
- For turners, aluminum oxide (alumina ceramic) wheels are the least expensive. Cubic boron nitride (CBN) are initially more expensive, but may last longer, reduce sharpening time, and typically remove less metal with each sharpening.
- Alumina wheels need to be dressed periodically (re-ground) by the turner.
- CBN wheels cannot be dressed by the turner.

# Ceramic wheel safety

- If you use ceramic wheels in a “relatively high speed” grinder, ***you must use the wheel guards***
- Always stand to the side when turning on a grinder (and turning off)—that’s when the wheel sees the most vibration
- If your grinder (or grinding wheel) sees a shock, inspect. A nick, chip, or crack on or in the wheel can cause the wheel to fail suddenly. A wheel breaking apart at 1700 rpm is not good for you!
- Use your brain, and also wear protective equipment

- If you’re using a Tormek or similar machine (< 100 rpm), you don’t need to be as worried about the wheel falling apart when spinning

# Steel properties

- Strength: How much force (actually, pressure) that you can apply before the material deforms permanently (fails).
- Hardness: Resistance to permanent indentation. Correlated with strength.
- Toughness: Resistance to impact.
- Ductility: How much deformation before the material breaks. Higher hardness is typically correlated with lower ductility and toughness.
- Wear resistance: Resistance to abrasion and wear (correlated with hardness, but still an area of much R&D)

- These properties depend not only on composition (how much carbon, how much other elements), but also heat treatment

# Steels

- “carbon steel”—All steels are iron with some carbon in them. If they only have iron and carbon, they’re carbon steel. Carbon steel is inexpensive, but wears quickly (doesn’t hold an edge a long time), and loses its properties such as hardness when heated
- “High speed steel”—a type of alloy steel (iron, carbon, and additional elements such as manganese, molybdenum, etc.) that wears longer, and maintains hardness at higher temperatures
- Grinding to sharpen heats the steel—so high speed steels are preferable for woodturners

# (Alloy) steel names

- 4130, M2, 10V, etc:  These names/numbers describe the *composition* of the steel alloy. The names indicate an accepted composition per national or international standards. (AISI-M2 is also known as UNS T11302)
- Names do ***not*** specify heat treatment, which will affect your final properties. Hardness is frequently used in marketing tools
  - Too high a hardness generally leads to low impact resistance
  - Toolmakers generally contract out for heat treating their tools
- A good tool needs to have both a good alloy, and the expected heat treatment—See Bill Zerby's handout in the club tips & techniques page if you want to know more about metallurgy & different alloys

# Final Thoughts

- Sharpening is a necessary part of the woodturning process when using traditional tools.
- There are many ways to get the job done.
- What works for YOU is most important.
- Safety FIRST and ALWAYS.

Got questions? Go see a club mentor! (in fact, go see a club mentor even if you don't have questions—you'll have questions by the time you get there!)