SHARPENING LATHE TOOLS

Version 1.4

By Jim Rodgers
(925) 229-5773
www.jlrodgers.com

Sharpening Lathe Tools

1. **Purpose of sharpening**
    a. Improve cut surface quality
    b. Speed project completion
    c. Ease amount of "work"
2. **When to sharpen**
    a. When you are pushing harder
    b. Surface quality deteriorates
    c. Vibration increases
    d. Cutting sound changes
    e. The tool is new
3. **Overview of sharpening tools with slow speed grinders**
    a. General considerations
        i. Keep sharpening wheels clean and true
        ii. Use light touch (sharpening not regrinding)
        iii. Tool should not get hot or discolored
        iv. Use continuous motions for continuous edges
        v. Add good light and comfortable grinder height
        vi. Use dusk mask and eye protection
        vii. Learn hand sharpening
            1. Faster for simple tools
            2. Jigs may not fit certain tools
            3. Other's grinder setup may differ from your own
    b. Sharpening considerations
        i. On gouges sharpen left/right than blend full tool width (including the tip)
        ii. Look for sparks *over the top: the edge is near*
        iii. If you can see the edge, there is no edge (no glint)
        iv. Color purple on steel tools = 600 º
            1. HSS tempers at 1000 -1100 º
            2. Mild steel tempers at 300-1050 º
        v. Blunter angle for hard woods
        vi. More acute angle for softer woods
4. **Care of slow speed grinders**
    a. Guards always in place
    b. Stable mounting and platforms
    c. Dust & masks
    d. Selection of wheels
        i. White stones
            1. aluminum Oxide, Al_3O_2
            2. Friable surface – stays sharp
            3. Must be cleaned & retrued when surface pits or darkens with metal shavings
        ii. Blue stones
            1. Cobalt added
            2. Harder than white stones
        iii. Pink stones

1. Chromium oxide added for additional hardness
2. Hardest, requires more pressure to use
3. Loads most easily and required more frequent cleaning

e. Starting up a new wheel
   i. Testing the stone for soundness (ringing)
      1. Remove the wheel from the grinder
      2. Hold the wheel at the center opening only
      3. Rap with a wooden tool handle
      4. A ringing sound indicate a wheel that is mechanically sound
      5. A dull, thud should = discard the wheel
   ii. Running up a new stone
      1. Use off/on starting process for a few seconds
      2. Increase running time to 5 minutes without use
f. Balancing the wheels
   i. During run up, check for vibration
   ii. To minimize, rotate one wheel and recheck
   iii. Commercial wheel balancing systems available
g. Truing the wheel
   i. Star wheel dressers
      1. Leaves wheels too rough
   ii. Diamond "T" tools
      1. Inexpensive, easy to control
      2. Aggressive, dusty
   iii. Diamond single points
      1. Requires more time, skills, control
      2. Some (One Way) allow for accurately truing stone surface
   iv. Sintered truing stones
      1. Cheapest
      2. Breaks easily if dropped
h. On-going wheel dressing
   i. When surface darkens or appears glazed
   ii. Tool heats up during sharpening
   iii. Tool does not sharpen as quickly as normal
   iv. Wheel become grooved or out of round

5. Use of fixtures

a. Why use fixtures
   i. Repeatability
   ii. Speed (?)
   iii. Convention
b. Ellsworth 3/8 gouge fixture
   i. Setup
      1. 4" below wheel center
      2. 7" from wheel face
      3. 2" tool extension
      4. 45 º angle, fixed
c. One Way Verigrind
   i. Setup
      1. 6.25" below wheel center
      2. 5.5" from wheel face (approximately)
      3. 1.75 – 2.0" tool extension
      4. Angle adjustable

6. Sharpening shearing tools

a. Spindle roughing gouges
    i. Goal
        1. Square edge
        2. 45 º bevel angle
    ii. Process
        1. Align edge to sharpening wheel face
        2. Square handle to wheel face
        3. Rotate tool square to wheel *in one direction only*

b. Parting tools
    i. Goal
        1. 30 º - 50 º angle
    ii. Process
        1. Align one face to sharpening wheel
        2. Square handle to wheel face
        3. Slide tool left to right keeping handle square to wheel
        4. Reverse faces and repeat actions
        5. Sharpen the same number of strokes on each face to keep the cutting edge in the center of the tool

c. Bedan
    i. Goal
        1. Angle 15 – 30 º angle
        2. Top face flat and polished
    ii. Process
        1. Align bottom face to sharpening wheel
        2. Square handle to wheel face
        3. Slide tool left to right keeping handle square to wheel
        4. Hone top face

d. Skews
    i. Goal
        1. 70 º of skew (typical)
        2. 12.5 º bevel (soft woods); 20 º bevel hard woods
        3. (Bevel length = 1.5x blade thickness)
        4. Edge in center of tool
        5. Short point edge rounded, long point edges chamfered
        6. Honed edge
        7. Roll over corner on long point to reduce possibility of catches
    ii. Process
        1. Straight edge (traditional) skews
            a. Align bevel edge with wheel face
            b. Use platform or fixture to match edge to wheel
            c. Touch bevel heel to wheel, roll tool upward until bevel touches
            d. Align cutting edge horizontally with sharpening wheel face
            e. Slide tool horizontally across wheel face
            f. Turn tool over and repeat on second face
        2. Use the One Way skew sharpening attachment
            a. Place on v-arm
            b. Place handle in left most grove
            c. Align the bevel with the wheel

d. Sharpen
    i. Sharpen parallel edge by gently sliding the tools across the face of the wheel
    ii. Reverse the handle into the opposite v notch , turning the tools over to the opposite side
    iii. Complete sharpening on the wheel
3. Radius edge skews (Rafan, Stubbs)
    a. Profile tool first
    b. Align cutting edge as above
    c. Rotate tool always keeping the area in contact with wheel perpendicular to wheel face
    d. Note: *Do not radius area immediately adjacent to long point to allow for more efficient peel cuts*
4. Oval skews
    a. Make a fixture to hold the tool firmly on the sharpening platform
    b. Sharpen as above

e. Shallow fluted gouges (spindle gouges)
    i. Goal
        1. Bevel angle 30- 40 º
        2. Lower angle for beginners
        3. Finger nail profile generally preferred
    ii. Sharpening
        1. Sharpening fixture
            a. Set fixture to desired bevel agle
            b. Adjust arm length to match side bevel
            c. Sharpen left – right sides
            d. Sharpen continuously from left over the top and through the right side to blend

f. Deep fluted gouges (bowl gouges)
    i. Fingernail profile
        1. Angle is a function of application
            a. Shallow bowl = 40-45 º
            b. Deeper bowl = 55 º
            c. Deepest bowl = 60-65 º
        2. Remove bevel heel
    ii. Matching an existing tool angle
        1. Adjust jig angle to match tip bevel angle
        2. Adjust the fixture arm length to match side bevel angle
        3. Readjust jig angle and arm length until both match
        4. Sharpen
    iii. Sharpening new tool
        1. Set grinder platform horizontal
        2. Tool flat on grinder platform, flute facing out
        3. Grind desire bevel angle onto tip area opposite the flute side
        4. Tool flat, flute facing grinder wheel
        5. Grind desired profile
        6. Set Fixture to 45 º
            a. Verigrind jig 5 notches down
            b. Ellsworth fixture fixed at 45 º
        7. Adjust arm length to match bevel angle on tip

8. Grind away flats
    a. Rock tool while grinding to get convex bevel face

iv. Traditional grind (no fingernail)
1. 60 - 80 º for shear cut and finish cut for deep bowls
2. Sharpen like a roughing gouge
3. consider slightly fanning the handle at the end of each sharpening rotation to relieve sharp corner from bevel

7. Scraping tools

a. Scrapers
i. Goal
1. 70-80 º angle
2. Burnish +5 º

ii. Burrs
1. Burr or not?
    a. Leave on or add for soft wood
    b. Remove for hard woods
2. Raising a burr
    a. Hone face of scraper flat
    b. Grind/sharpen to create scraping edge
    c. Raise burr
        i. Use commercial burnisher
        ii. Use back of bench chisel
        iii. Draw burnisher across edge at 5 º angle

b. Negative rake scrapers
i. Done similarly to regular scrapers but with a back bevel added

c. Deep hollowing tools
i. Treat as scrapers
ii. Grind carefully, lightly
1. Slightly round over edges for grinder wheel
2. Set grinder platform to match bevel angle
3. Place cutter flat on platform and side horizontally left and right past the edge of the wheel

iii. Mounted cutters
1. Hand sharpen due to tip size or clearance
2. Use “fine” grade DMT card
    a. Hone top face flat
    b. Hone edge to match bevel

d. Specialized scraper, beading tools, captive ring tools etc.
i. Hone only the top surface of the scraper
ii. Do not attempt to grind or hone the contoured edge

8. Addendum

a. Tool metal and sharpening
b. Carbon steel
i. Faster to sharpen
ii. Doesn’t hold edge as long
iii. In sharpening, sparks break up
iv. Must be kept cool during sharpening
1. Dunk in water frequently
2. If tool turns blue it must be reground to removed the blued area

c. HSS Tool steel

i. M2 hardened to Rockwell 60 - 62
    1. Most common HSS tool if not marked
ii. M4, hardener to Rockwell 62-64
    1. Edge last 30–50% longer and sharpen reasonably the same as M2
iii. ASP 2030, Rockwell 65-67
    1. Powered metal process
    2. Vanadium added
iv. A-11
    1. 10% vanadium 3-5x longer lasting than M2
v. V-15
    1. 15% vanadium, 40% better that A-11
vi. Other, PRO-PM, powered metal process
    1. Powered metal process
    2. Imbedded carbide particles

9. Other devices for sharpening

a. High speed grinders with carborundum wheels, not recommended
b. Slow speed grinders with Al_3O_2 wheels
    i. 1750 grinders
    ii. Really slow grinders (Tormak 60 RPM)
c. Belt sanders
d. Bench stones
e. Monocrystalline diamond plates (DMT)
    i. Contact heel and edge on hollow ground tools
f. Hones
    i. Leather hones, MDF, Hard felt wheels
        1. Honing compounds
            a. ZAM
            b. Rouge sticks
        2. Honing wheel turns away from cutting edge
    ii. Stones
        1. Medium India, no oil
        2. Flat DMT plates

10. References:

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