

# Making a Peppermill ( a boring activity)

By Mike Lanahan

# Ground Rules

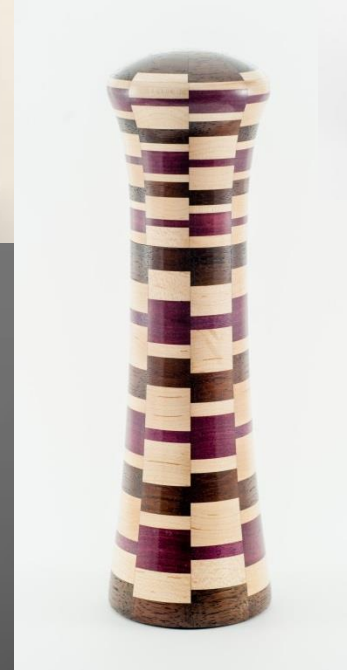
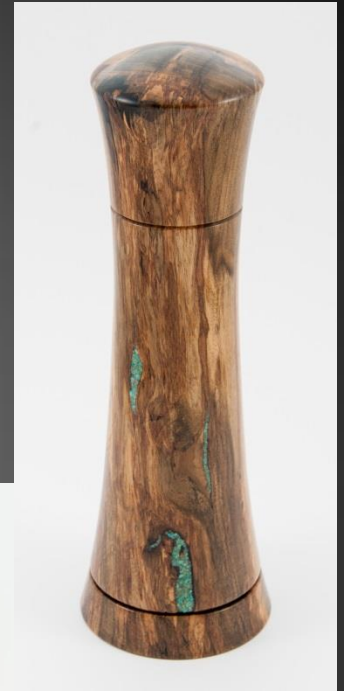
- No need for note taking
  - A Portable Document Format (pdf) copy of this presentation is available.
- Ask questions.
  - It's your time.
  - There is lot to cover.
  - I'll go fast. Let me know if it is too fast.
- Sit back, and relax

# What I Like to Turn

- Mostly I like to make Functional Art that can be appreciated and used every day.
  - Peppermills, Shaving Brushes, Crochet Hooks, Rolling Pins, Functional bowls
- I only want to make items I would use.



# Choose a Shape

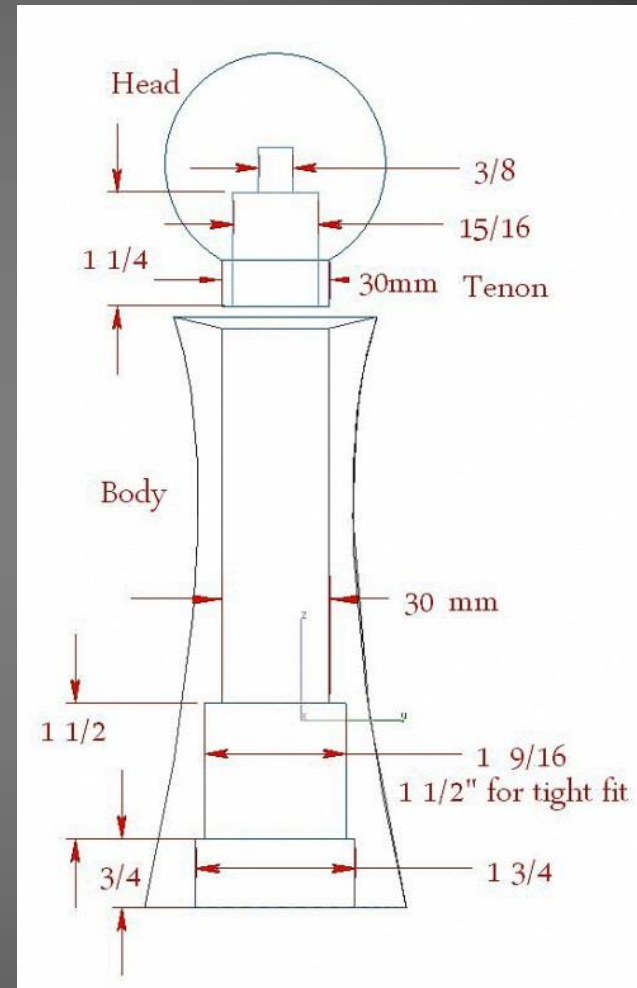


# My Peppermill Design Goals

- Adjustable burr grind mechanism.
- Good for Salt, too (noncorrosive).
- Simple but pleasing shapes.
- More modern than conventional look.
- Smooth transition line from top to base.
- Feels good in the hand.
- Smooth, easy operation.
- No metal knob on top to detract from form.

# Anatomy of my Peppermill

- CrushGrind ceramic mechanism.
  - Craft Supply, and others
  - 10" \$16.35
  - 18" \$16.85
  - 2-9 -10%
  - 10+ -15%



# Simplified Flow Overview

- Bore out Body from bottom, finish bottom
- Part off Body from Head
- Bore & finish top of Body
- Turn tenon or insert plug in Head
- Fit Head to Body & turn to shape and sand
- Prep Head to re-mount
- Mount Head and finish top
- Fit mechanism & assemble

# Mise en Place

***Mise en place*** (French pronunciation: [mi zã 'plas]) is a French phrase which means "putting in place", as in set up. It is used in professional kitchens to refer to organizing and arranging the ingredients (e.g., cuts of meat, relishes, sauces, par-cooked items, spices, freshly chopped vegetables, and other components) that a cook will require for the menu items that are expected to be prepared during a shift.





# Drill Bit Security

- How to keep drill chuck from rotating while drilling or being pulled out of the tailstock when removing bit?
  - Secure Morse taper fit.
  - Don't let the swarf accumulate and jam the bit.
  - Rotate the chuck in direction of wood rotation before coming in contact with the wood.

# Morse Taper Attention

- Clean the Morse taper of the tailstock quill and the “Jacobs” chuck or drill extension each time inserted.
- “Slam” it straight into place by hand, with 3-4” motion.
- You should NOT be able to pull it out by hand without great difficulty.
- A sharp tap from a knockout bar or the ram from the tailstock quill should easily remove it.

# “Jacobs” Drill Chuck

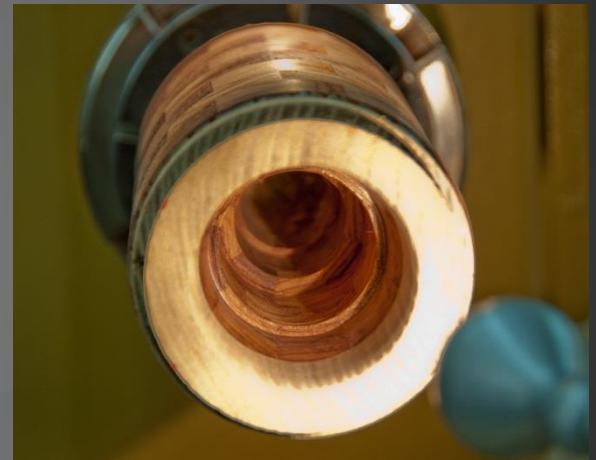
- I highly recommend a Keyless chuck.
- I have never misplaced the key.
- It has a smaller diameter than my keyed chuck and fits inside the base farther.
- It doesn't have any teeth with an affinity for pink flesh in the unlikely event it should get jammed in the mill and start spinning in my hand.

# Eat the Elephant

- You eat an elephant one bite at a time.
- The first hole is way shallower than the drill bit diameter. No problem, probably.
- The second hole is about as deep as it is wide, consider drilling in 2 steps.
- The through hole is MUCH deeper than wide. Drill it in sequential steps,  $\frac{3}{4}$ " - 1" at a time, back out, clear chips, and repeat.
- Wet wood swarf expands more and clogs faster than dry. Adjust as necessary.

# Body – Boring & Base

- Round blank & tenon both ends
- Mount in scroll chuck and bore holes in body:
  - 1  $\frac{3}{4}$ " dia.,  $\frac{3}{4}$ " deep
  - 1  $\frac{9}{16}$ " dia. [1  $\frac{1}{2}$ " dia. for tight fit], 1  $\frac{1}{2}$ " deep (critical)
    - Cut recess for grinder retaining lugs (optional). I never really do this.
  - 1  $\frac{1}{16}$ " dia. to intersection with the mill head. Drill in  $\frac{3}{4}$ "-1" steps.
  - Re-bore with 30mm ( ~ 1  $\frac{3}{16}$ " ) gives truer bore and nicer internal finish. Holds more peppercorns, too.
  - Flare, finish sand and, if desired, decorate bottom "bell" now.



# Top of Body

- Part-off body from head.
- Mount body foot tenon in scroll chuck
  - Bore 30 mm hole from top end
  - Taper top surface of body concave, chamfer hole opening, sand & seal
- Optional – if your intended design allows, you can put a tenon at the top, to finish the bottom if you forgot or have waste to turn away.



# Head – Surface & Bore

- Remount Head in scroll chuck.
  - True bottom surface of head slightly concave & sand
  - Bore 30 mm hole  $\frac{1}{2}$ " deep in solid material,  $\sim 1 \frac{1}{4}$ " deep if hollow.
  - NOTE: If grain match is not an issue, a tenon to mate with the body may be turned directly from the top material.





# Tenon

- Turn a plug to fill 30mm hole in head with  $\frac{3}{4}$ " protruding
  - Leave plug diameter oversized outside the hole
  - Glue plug in place.
  - Turn oversize plug into tenon that snugly fits hole in top of body.
- Mate body to head, and support w cone live center in bottom of mill.
  - A small sacrificial donut inserted between the Head and the Body may help if the two mating surfaces are not intended to flow in a continuous line.





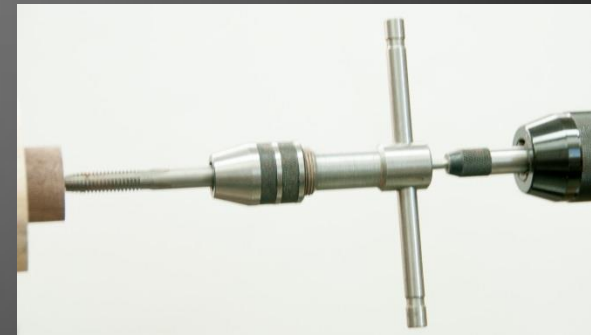
# Turn to Shape

- Turn mill to desired shape
  - Check gap between head & body. The two mating surfaces are both concave, as diameter decreases it gets looser.
  - Tighten tailstock support as diameter reduced. Look for line at intersection.
- Sand peppermill
  - Seal and apply finish, optional at this point



# Prep Head for re-mount

- Remove Body from Head.
- Bore  $15/16$ " dia. [ $7/8$ " dia. if soft wood?], at least  $1\frac{1}{4}$ " deep in tenon for stopper (critical).
- Bore  $5/16$ " hole  $\frac{1}{2}$ " to 1" deeper in tenon/head (not past intended top of head).
- Tap  $3/8$ " x 16 tpi in  $5/16$ " hole, use tap guide in tailstock.
- Trim tenon length to  $\frac{1}{2}$ " or desired length, chamfer & adjust fit (sand).
- Part-off Head from remaining material in scroll chuck.



# Shape the Top of Head

- Mount Head on 3/8" screw chuck
  - Homemade chuck
  - 3/8" bolt in collet chuck
  - Make jam chuck
  - Compression jam chuck
- Shape top, as desired, and sand.
  - Seal & finish optional
- Remove Head from chuck
- Sand & seal the inside of the mill
  - Zinzer Bulls Eye Sanding Sealer (wax-less shellac)



# Finish

- Apply finish (if not done already). Durable or Renewable.
  - CA (on lathe)
  - Watco Butcher Block Oil & Finish and Buff
  - Mineral Oil/Bee's Wax
  - Walnut Oil





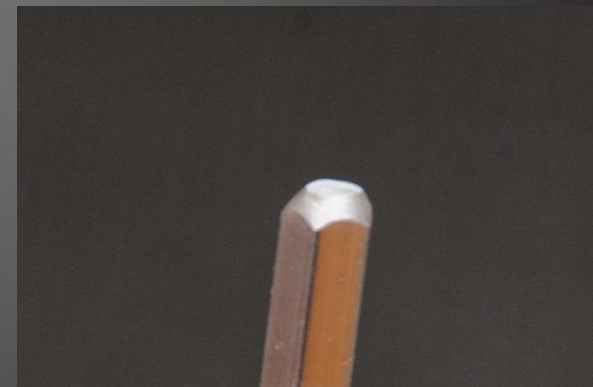
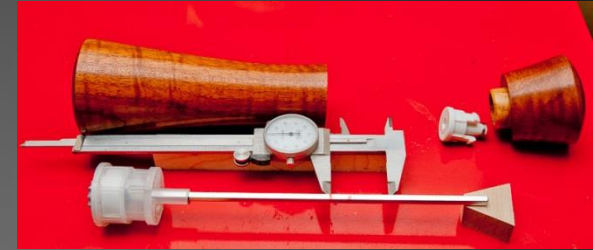
# Fit Head to Body

- Check fit of Head & Body. Adjust till turns easily.
  - Sand inside Body, or add finish to reduce poor fit.
  - Hold with pin jaws if necessary.
- Grind/cut retaining lugs from grinding mechanism (not stopper), unless a recess was cut.
  - Clean off residual plastic with knife.



# Fit Mechanism

- Mark grinder shaft for proper length.
  - Mark 1 for shaft to top of Body
  - Mark 2 lower for tenon length
  - Mark 3 1 ¼" or higher from mark 2, depending on hole depth in Head.
- Cut shaft to length, and chamfer end of shaft.



# Prep Glue-up

- Insert mechanism in  $1 \frac{9}{16}$ " Body, and mount Head onto body to check clearance.
- A tapered alignment plug to fit in the top of the Body, with a hole the shaft can fit through keeps shaft aligned.



# Glue-up Grinder

- Glue in the Grinder Mechanism
  - Assemble materials (Head, Body, grinder mechanism & Stopper, alignment plug, 5-30 min epoxy, plastic mixing cup, wooden sticks, q-tips, paper towels.
  - Mix about 1/2 – 1 teaspoon of both epoxy & hardener for about 1 minute.
  - Coat the bottom 3/4" of the 1 9/16" / 1 1/2" hole. Press mechanism into place (use a jig to press in tight fit 1 1/2" option) , insert alignment plug over shaft in top hole, wipe off any excess, and place upside down to set.





# Glue Stopper

- Glue Stopper into Head
  - Apply epoxy inside hole in tenon, and press stopper in place.
  - Wipe off any excess, and place on a paper to set.
  - Allow 1-2 hours before stressing the epoxy.
- Load mill with peppercorns, or salt crystals, insert top, and assemble. The Stopper is a tight fit on the shaft but gets easier after several times.
- You are finished!



# Resources

- CrushGrind Pepper Mill, by Chris West, Woodturning Design, February 2012, Issue #35
- Salt Shakers & Pepper Mills. How to Make Them, by J.R. Beall. [www.jrbeall.com](http://www.jrbeall.com)
- Pepper Mill, It's a New grind, by Nick Cook. American Woodturner, Spring 2004.
- <http://woodpeppermills.com>
- Turning a Peppermill. Sequence is as important as technique. By Tom Hintz. [www.newwoodworker.com/turning/trnppml.html](http://www.newwoodworker.com/turning/trnppml.html)

# Special Tools

- 1 ¾" HSS Saw Tooth drill bit, Lee Valley 06J71.28, \$15.30
  - 1 9/16" HSS Saw Tooth drill bit, Lee Valley 06J71.25, \$14.50.
  - 1 1/16" RotaStop MaxiCut bit, 150mm extension & #2 MT kit - Woodcraft 847141, \$89.99
  - 30mm HSS Saw Tooth drill bit, Lee Valley 06J72.30 \$13.
  - 15/16" Forstner bit
  - 5/16" drill bit
  - 3/8" x 16 tpi tap
  - Tap Guide, MSC, ~ \$20.
  - Sorby recess tool – optional
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- Cost of tools for special & mechanism 1st peppermill ~ \$170