

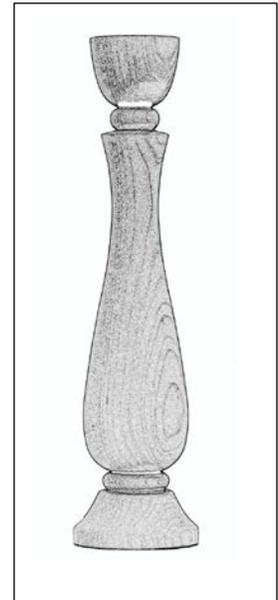
Activities

Discussion

These projects allow more skill development including making items to match a drawing, sizing projects to specific dimensions, and just trying fun stuff for the first time!

- **A candle stick** addresses transferring and reproducing dimensions from a plan and breaking the project into steps.
- **Turning a candle stick set** raises the ante by attempting to make multiples of the same object. This requires accurate layout, a “story stick,” and careful, focused turning.
- **Three leg miniature stool** combines faceplate and spindle turning as well as duplication into one single project. Here you will also have to make a drilling fixture to get the leg angle correct.
- **Carver’s mallet** is just fun and also it is useful in the shop. Simple curves fitted to your hand.
- **Spin tops** are more fun, fast and great gifts for kids. If you do the whole thing with your skew chisel you will be very skilled very quickly!
- **Letter opener** is an exploration of turning on three axis to achieve the “oval” opener blade.

Spindle Project – Candle Stick or a Candle Stick Set



Objectives

- Learn to turn more complex shapes.
- Learn to turn from drawings.
- Transfer dimensional drawing information to a project through direct measurement transfer and “story sticks.”

Materials required

- One 3”x3”x 9” hardwood blank for the first candle stick.
- One 3”x3”x9” blank for each additional candle stick.

Discussion

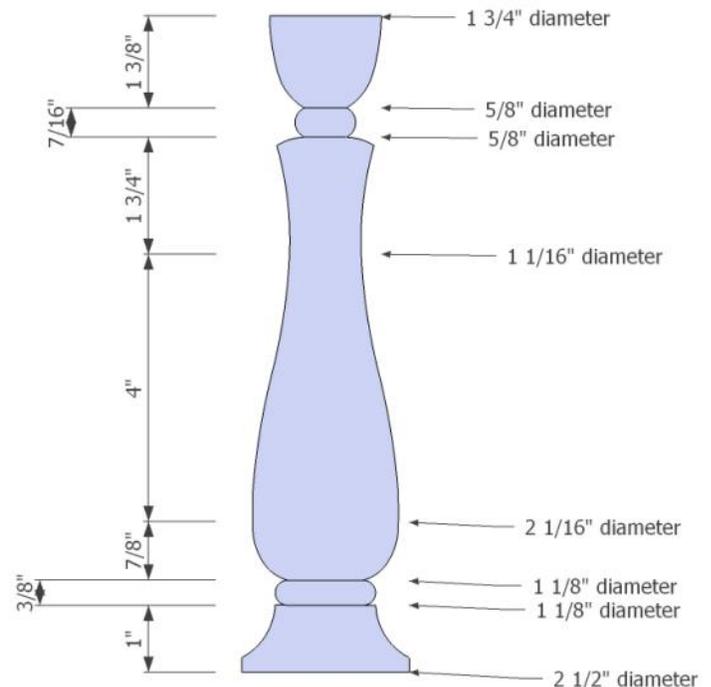
The difficulty of this project is in making three objects match. This requires more careful planning and transfer of the dimensions and diameters before starting to turn the shape. Making a set of three related candle sticks also requires some creative decisions concerning how to increase or reduce the dimension by 10%. To get the best results don’t skip making the drawings!

Activity

- Rough out a blank and transfer key transitions to its face. Transfer only the key dimensions. Be sure to start the project from the tailstock end of the wood.
- With your parting tool and a pair of calipers transfer the key diameters at the pencil lines added above.
- Start turning the shapes from the tailstock end working toward the headstock end.

If you are making the set:

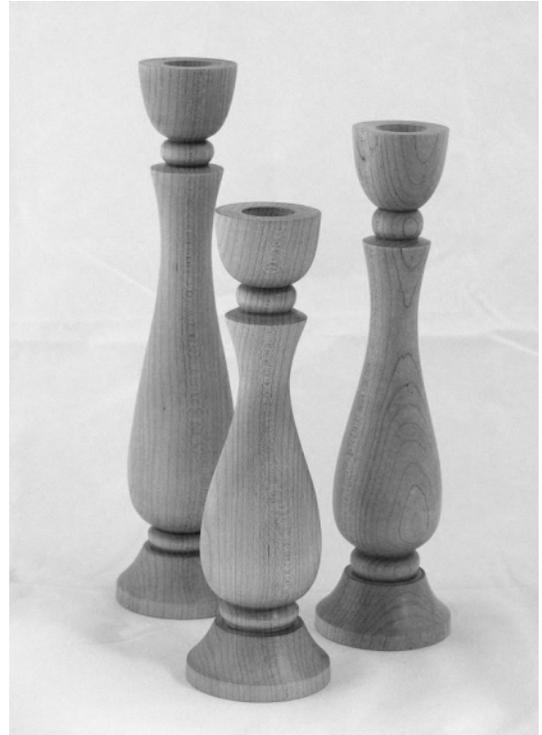
- Turn a second candle stick 10% smaller than the original by determining the new dimensions and creating an accurate scale drawing before starting.



- As with the first candle stick, transfer the dimensions and carefully turn it in the same manner. It will be important to assure that the shape pleasingly matches the first version.
- The third candle stick should be 10% larger than the original using the same processes.

Part one: Making the first candle stick

- Rough turn a blank between centers.
- Add a tenon and transfer the blank to a four-jaw chuck.
- Transfer dimensional information from the drawing.
- Turn the candle stick to match the drawing.
- Drill a candle taper recess in the top.
- Sand and part off.



Part two: Designing and turning your own candle stick set

- Create a new drawing using a sheet of ¼" grid graph paper.
- Make this drawing similar to the original model except 10 % smaller. Consider what proportions need to change and which need to remain the same.
- Add appropriate dimensions to allow you to transfer the drawing to the lathe.
- Turn your designed candle stick in the same manner as above.
- Repeat the activity by making another new drawing 10% larger than the original and repeating all the above steps.

Turn a Small Stool from a Given Drawing



Objectives

- Make the seat as a face plate project.
- Make three matching legs as spindle projects.
- Develop a “story stick” from the full scale drawing to assist in matching the legs.
- Produce the three stool legs exactly alike.

Materials required

- Stool seat blank 10”x10”x2” hardwood stock.
- Stool legs: three pieces of matching or contrasting hardwood 2”x2”x13”.
- A 3/8” dowel cut to 3/4” length used as a hole plug.
- Card stock or stiff paper to create full scale templates for turning the legs.

Discussion

This project requires both faceplate and spindle work. Matching the legs is the most challenging task. A fixture to drill the leg holes at 15 degree splay will facilitate accurate drilling on a drill press, If you hand drill use two adjustable squares to line up the drill bit.

Activity

Part One: Turning a stool seat

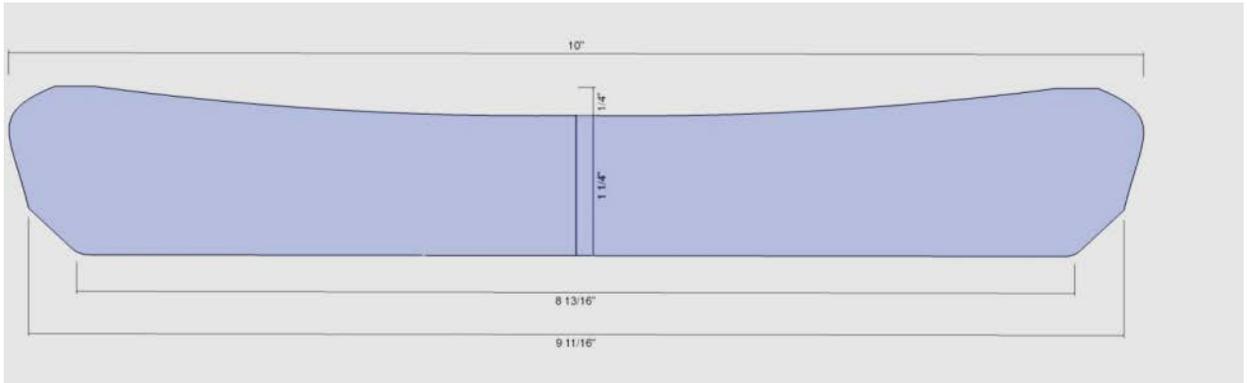
Prepare the seat blank

- Mark the dead center of the seat blank and draw a circle to allow the blank to fit on your lathe (9 1/2” diameter for 10” lathes and 11” diameter for 12” lathes).
- At the band saw, trim the square blank to the pencil line.
- Using a drill press, drill a 3/8” hole 1” deep at the dead center location or other diameter as your chuck manufacturer requires.

Turn the seat profile

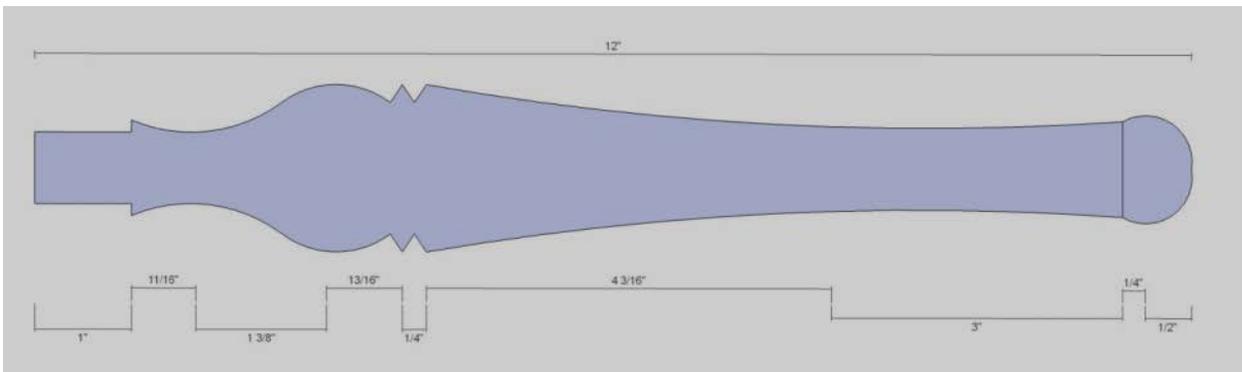
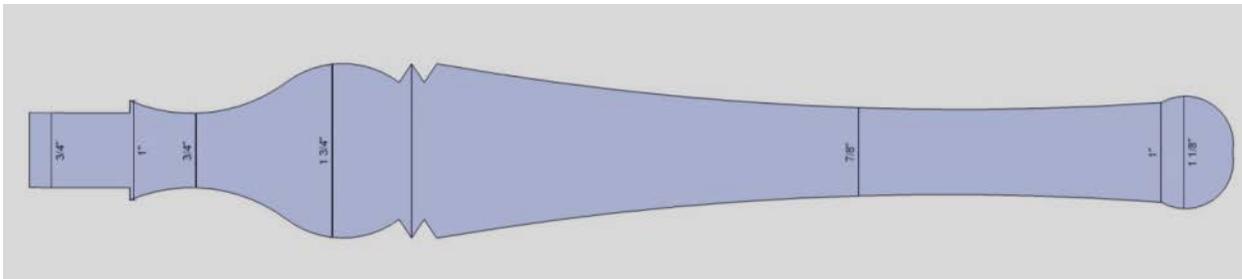
- Using the screw chuck and your four-jaw chuck, screw on the seat blank assuring that it sits completely flat against the chuck jaws.
- True the edge of the blank with the bowl gouge approaching the edge from both faces.
- Square up the face of the seat blank first then “cup” the center of the seat blank to 1/4” depth. Use a straight edge to check the curvature.
- Round over the top edge of the seat for comfort.
- Chamfer the bottom edge of the seat blank undercutting at about 45 degrees to improve the appearance of the seat’s thickness.

- Sand the top and edges to final smoothness and remove the seat from the lathe.



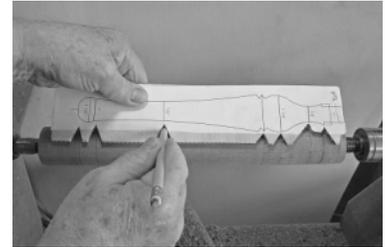
Part two: Preparing to turn three legs

- Create a full scale leg drawing similar to the one shown and paste it onto a piece of heavy duty construction paper or thin plywood.
- Transfer the major transition points of the design to the template edge.
- (Optional step) On a band saw or scroll saw carefully cut out the opposite side of the drawing to conform exactly to the desired shape to be turned.



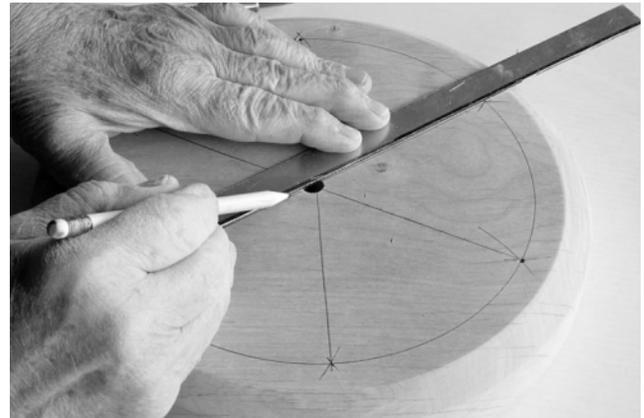
Part three: Turning three matching legs

- Rough turn each leg blank between centers then transfer the dimensional information from the drawing template. Place the tenon end at the tailstock end of the lathe and the ball foot end at the headstock end.
- Turn the shape to match the drawing checking frequently to assure the correct shape.
- Turn the leg tenons to exactly $\frac{3}{4}$ " diameter using a parting tool and your calipers to get a snug fit for the seat hole.
- Sand to final grit.
- Part off the leg at the ball foot end (headstock end) using your skew chisel or shallow fluted gouge.
- On the band saw shorten the tenon if required to 1" to fit the drilled seat hole with $\frac{1}{8}$ " glue clearance.
- Repeat this activity for the additional two legs.



Part four: Completing the stool

- On the back side of the seat mark a circle from the center to $\frac{1}{2}$ " from the chamfered bottom edge using a compass and a $\frac{3}{8}$ " peg glued into the center hole.
 - Use the same compass setting to mark the penciled circle into six sections (do this action in both clock-wise and counter clock-wise directions).
 - Locate the center of every other set of markings and center punch an alignment mark. This is where you will drill the holes for the legs.
 - Construct a straight line from the punched marks through the center point to the opposite side of the drawn circle. This will be used as a sight line to get the drilling straight.
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- Create a drilling fixture to set a 15 degree leg splay angle or set the table of your drill press at a 15 degree tilt.
 - Align each marked leg hole location in the drill press and drill a $1 \frac{1}{8}$ " Forstner bit hole until all edges of the bit cut the wood, but no deeper. This is the shoulder on which the leg will rest.
 - *It is important that the drilled holes face outward from the seat's center.*



- Change the drill bit and drill three $\frac{3}{4}$ " Forstner bit holes $1\frac{1}{8}$ " deep to fit the legs.
- Hand sand or use a belt or ROS sander to smooth the back of the seat, removing all pencil marks and sanding the glued dowel flush.
- Glue in the legs using yellow woodworker's glue. If the leg fit is tight you may need to "persuade" the fit with a dead blow mallet.
- Finish the seat and legs.

A carving mallet



Objectives

- Complete another simple spindle project, one for you to design and size to fit your hand.

Supplies

- Hardwood stock 3"x"3x10" ash, hickory, maple, etc.

Discussion

Everyone needs a mallet. To get the mallet comfortable in your hand, stop the lathe frequently and grip the handle areas to feel the fit.

Process

- Rough out the stock and remount it into a four-jaw scroll chuck with a solid, square tenon and add the tailstock for additional support.
- Turn the mallet handle at the tailstock end of the project checking it frequently to assure it fits your hand in both length and diameter.
- Shape the "working end" at the headstock end of the wood. Allow sufficient distance between the project end and the four-jaw scroll chuck for parting off later.
- Remove the tailstock and carefully clean up the end of the handle.
- Reduce the diameter at the headstock end and part off.

Spin Tops



Objectives

- Create a quick, fun project.
- Practice using the skew chisel to develop personal skill.

Materials required

- Hardwood 2-3" square x 4" long.

Tools & Equipment required

- Live center and spur drive.
- Four-jaw scroll chuck.
- Spindle roughing gouge.
- Parting tool.
- Skew chisel.
- Color markers for decoration.
- Wax for finish.

Discussion

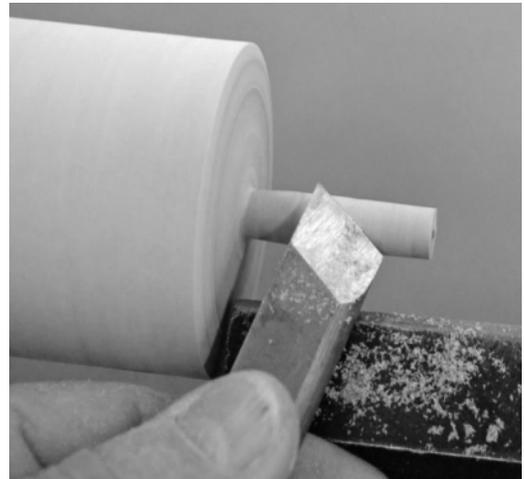
As the top is turned it can be decorated with color, burn wires, or...? Be sure to part off the point area carefully to get a clean cut that will allow the top to spin smoothly. Keeping the spin point low in the design will allow for more stable and longer spins. Experiment!

Activity

- Set the lathe speed to approximately 1800 RPM and mount the wood between centers and turn it round with the spindle roughing gouge.
- Add a tenon to match your chuck and remount the blank in the four-jaw scroll chuck. Re-true the blank if necessary.



- Using the skew chisel make several “peel cuts” to reduce the diameter of the end to slightly larger than required to finger spin the top. Keep the long point of the skew chisel toward the headstock end during this cut. Take several small cuts reducing the shaft diameter in steps.



- Using the long point end of the skew chisel make planing cuts to smooth out the finger spinning end.

- Still using the skew chisel make a “V” cut to clean up the upper surface of the top’s face. Allow a small clearance angle between the tool and the vertical surface being cut.

- Sand and complete the upper surfaces adding any decoration or colors to make the top more interesting.

- Starting about ½” to the left of the desired bottom of the top, make a “V” cut with your skew chisel. Enlarge the “V” cut from both the left and right sides deepening and widening the cut. When the diameter is very small, hold the handle of the top in one hand and continue the “V” cut until the base is parted off.

Remember to keep a small clearance angle between the tool and the wood being cut. Focus on making clean, continuous cuts from both sides.



Creating the finials

Objectives

- Create small taper turning with delicate detail
- Practice using the skew chisel and detail spindle gouge

Materials required

- Straight-grained hardwood 1 ½ x 1 ½ x 6 inches

Tools required

- Roughing gouge
- Detail spindle gouge
- Skew chisel
- Four-jaw scroll chuck
- Live center

Discussion

These finials can be produced for a variety of applications such as Christmas ornaments, box lids, etc.

The longer the finial the more the turners is required to support the turnings as they proceed from the tailstock end towards the headstock.

Activity

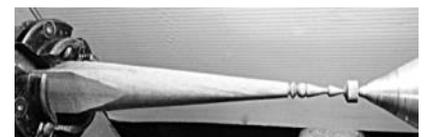
- Mount the finial blank into the base portion of the four-jaw scroll chuck and support the opposite end with the tailstock and live center.
- Increase the lathe speed to a minimum of 1,500 RPM.
- With your skew chisel or shallow fluted gouge shape the finial blank into a long slender taper leaving ⅛ inch at the tailstock end to cut off later.
- Plan and execute a design for the finial working carefully from the tailstock end toward the headstock.



Mount the blank at the base of the jaws

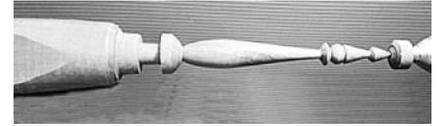


Round than taper the blank



Shape finial from tailstock end

- Create a tenon at the base of the finial to match the hole drilled into which it is to be fitted. The tenon should be approximately $\frac{1}{4}$ inch in length. It is important to recheck the exact diameter of the hole with calipers before cutting the matching tenon.



Add tenon and complete the tip

- Undercut the tenon area to allow the finial to set snugly against the curved shape of the ornament body.
- Part off the finial in the center of the tenon leaving half of the tenon remaining.

- Using the remaining portion of the tenon may be used for a top finial if making a Christmas ornament. Under cut it to snugly fit the top portion of the ornament body.



Use 1/2 the tenon for the top finial

- Shape the opposite side into a small round shape, sand and part off.



The completed set of finials

Three-Axis Letter Opener

Objectives

- To practice working on multiple axis on one project

Materials require

- 1 ½ x 1 ½ x 11 straight grained hardwood

Tools required

- Drive center & live Center
- Turning tools for roughing and fine turning
- Sand paper and finish

Activity

Prepare the blank

- Carefully mark the center of the blank on each end
- Draw a line through the center point perpendicular to the grain and transfer that line to the opposite end of the blank
- Mark two off set points on this perpendicular line 3/8" on either side of the true center on both ends. Center punch these marks on both ends
- Mount and seat the blank on all center points before beginning the turning.

Turning the letter opener to shape

- Mount the blank on the true center and turn it to a 1" diameter cylinder while leaving a 1" square at each end.
- Turn the handle portion (nearest the drive center) to its final shape
- Turn the blade portion to from its taper leaving at least ¼" at the tip of the bland.

Shaping the blade

- Remount the blank at one of its offset centers (both end must be on the same center)
- Begin turning the face of the blade DO NOT TOUCH THE DANLE PORTION
- Transfer to the opposite set of offset centers and begin turning from this face

- *Temporarily replace the blank on the true center; position the blank with the partially turned blade faces positioned vertically.*
- *Draw a pencil line from the tip of the blade to the handle area at the center; also do the same on the other side. (This will aid in matching the two offset turning at the letter opener's exact center.)*
- Continue to turn the blade by moving from one offset set of centers to the other carefully approaching the marked pencil line.

Finishing touches

- Once you have formed the blade, return the blank to the true centers and sand the sand the handle
- Turn the lathe off and hand sand the blade area
- Finish the turning process by reducing the diameter at the handle end to 1/8" and re-sand if necessary.
- Cut the excess waste from the project at the band saw and hand sand the cut areas forming the tip of the blade as you go.
- Add an oil finish

