Board to a Vase

Dennis Belcher
Photos by Jeff King

Lead Picture – 2424 or / and 2029

All woodturners have limitations. Those constraints can be equipment or our body. The attraction of this project is that it does not require a chain saw, heavy lifting, an extensive shop, deep hollowing tools, or a truck. Only a lathe and a basic set of turning tools are required. The vase in this article uses a table saw and chop saw in preparing the stock, but in a pinch, the stock can be prepared with a portable circular saw. A handful of clamps and some wood glue complete the list of necessary tools.

Have the glass insert before you start the project. The insert I use measures 1 51/64 “ (4.56 cm) by 7 ½” (19 cm) tall. Adjust the dimensions to the insert you use. Your board should be at least 4 5/8” wide, 31” long and one inch thick. Boards less than one inch can be used, but it decreases the curve of the completed form.

Picture #1 – 1874
Caption – The project is made from one board.

A wide range of wood is appropriate. When carving or texturing the vase, cherry and maple are my favorites. Glue lines vanish when the vase is carved. Figured wood also works well as seen in Pictures 2. When showcasing the natural beauty of wood, additional care must be taken to achieve tight glue lines.

Picture #2 – 1865
Caption – The vase can showcase the natural beauty of the wood.

Preparing the stock

To minimize glue lines, edges should be straight and true. Any irregularity in the edges results in a gap in the glued form. My table saw has a fine cut blade that produces a crisp, straight edge with no saw marks. A hand plane, or power jointer, can also be used to achieve true edges.

Picture #3 – 1878
Caption – The edges of the stock must be straight and true to minimize the glue line.

Small boards are dangerous to cut. The safest way to cut the 2 ¼ square end caps is to cut them for a longer board. The cutting sequence in Table 1 to removes this hazard.

Table 1 – Board Preparation

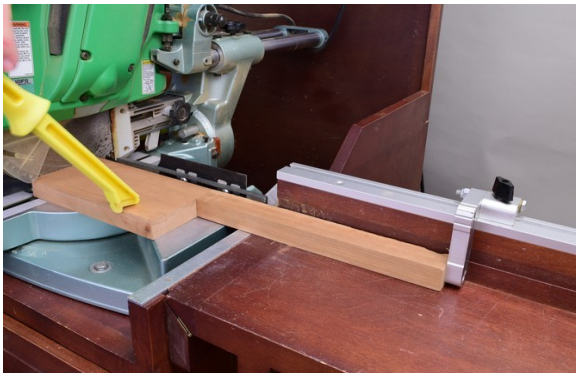
Cut #	Action	Dimensions
1	True one edge of 31” long board	
2	Re-cut both ends of the board at right angles to trued long edge	
3	Cross cut first wide side	8 ½ x board width
4	Cross cut second wide side	8 ½ x board width
5	Cut wide sides to final width	4 ¼ x 8 ½
6	Cut first narrow side from trued edge	2 ¼ x remaining board length
7	True edge for second narrow side	
8	Cut second narrow side from trued edge	2 ¼ x remaining board length

9	Cut 2 1/4” from first narrow side	2 ¼ x 2 1/4 end cap
10	Cut 2 ¼ from second narrow side	2 ¼ x 2 ¼ end cap
11	Cut first narrow side to length	2 ¼ x 8 ½
12	Cut second narrow side to length	2 ¼ x 8 1/2

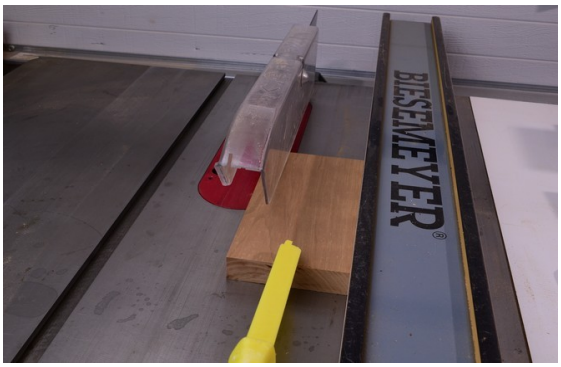
Caption (*If needed)* – Table shows the sequence in preparing and cutting the sides.

A table saw is used to cut the boards to the correct width and a miter saw to cut the pieces to the proper length. Stop blocks on the miter saw insure that the four side boards are cut to exactly the same length.

Picture - #4 1882
Caption – The use of stop blocks increases the accuracy of the cuts.

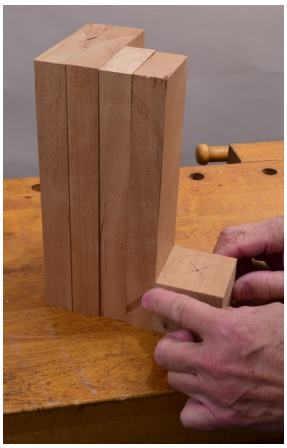


Picture - #5 1887
Caption – A table saw fence is invaluable in cutting the sides to matching widths.



Once four sides and two end caps are cut to size, check that the length and width is consistent across all pieces. The accuracy of your cuts will determine the extend of glue line problems in the completed form. Take your time and make sure all the surfaces are level and true. Adjust as necessary.

Picture #6 – 1910
Caption – Check the walls and end caps to make sure they are the same dimensions.



Picture #7 1888
Caption –Trimming the end caps to exactly 2 ¼ with an oscillating sander. Wrapping a block with sandpaper and sanding my hand is another option.

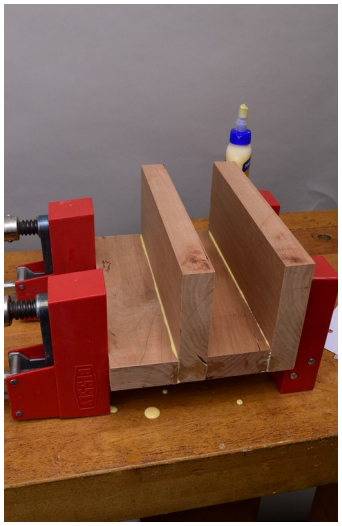
The faces of the boards are of little concern. One face is inside and will not be seen. The outer faces are turned away.

To lessen the amount of movement of the insert in the completed vase, drill a shallow hole on the inside of each end-cap as shown in picture 8. The insert has a slight curve at the bottom which will sit in the hole at the center of the end-cap. This decreases the “wobble” of the insert. Which end-cap is the bottom will not be determined until glue up is completed, so drill the shallow hole in both end-caps.

Picture #8– 1904
Caption – Drill a 1 3/4” hole, 1/4” deep in both end caps to limit movement of the insert.

Glue Up

Picture #9 – 1911
Caption - One set of clamps can be used to glue both pairs of sides at one time.



Apply glue to the edges of one narrow and one wide board as a set. Apply the glue liberally over the entire edge. Wood will be turned away gaps will appear when any part of the edge is missing glue. Align all edges of the board and clamp. Clamps without parallel faces will cause the wood to move as pressure is applied. Clamps with parallel faces will keep the edges more in alignment and give you fewer alignment problems. My preference is a yellow carpenters glue as the adhesive. Clamping pressure should be sufficient to have squeeze out, but not so much as to starve the joint for glue.

Clamp the first pair of sides and set them aside. Glue up the second pair of sides in a similar manner. Glue up each set and then glue up the two sets rather than glue all six boards at the same time.
It is important that the excess glue be removed from the first inch of the inside joints. The end caps need to come in full contact with all edges and dried glue creates a gap.

Picture #10 - 1913
Caption – Clean up the inside joints where the end caps will contact the walls. Dried glue will create a gap if not removed.

After the glue has cured, glue and clamp the end caps to one pair of sides as shown in Picture 11. The six sides of the box rarely meet perfectly, but the better the alignment is at this stage, the easier things are later.

Picture #11 - 1918
Caption – Inspect the end caps carefully and apply more clamps as needed to achieve tight glue lines.

The final step in glue up is mating the two sides as shown in Picture 12. Inspect the form carefully and adjust pressure, or add additional clamps, to achieve tight glue lines.

Picture #12 – 1958
Caption – Final glue up is to mate the two sets. Check for glue squeeze out along all edges and add additional clamps as needed.

Preparing for the Lathe

With the glue fully cured, it is time to set the center points on the two end caps. This is an important step. If the center points are not set correctly, wall thickness will be inconsistent which increases the risk of blowing through a wall.

Picture #13 - 1920
Caption – Use a center finder to locate the center line and mark the point with an awl on both end-caps.

With the center points marked, determine which end will be the top and which end the bottom. The end cap with the most visible gaps should be the bottom. Create a dimple at the center point on both ends to aid in mounting the box between centers.

The holding method of choice is a screw chuck, or wood worm. Holding power comes from screwing into the end-cap and the vase bottom registering against the top of the chuck jaws. The hole drilled must correspond to the shaft diameter inside the threads of your screw chuck. Too large a hole means that the screw threads do not fully bite into the wood. Too small, and the screw chuck cannot be turned into the wood. My screw chuck has an inner shaft of .35 inches, slightly less that a 3/8's inch drill bit.

Picture #14 – 2007
Caption – Measure the inside shaft of your screw chuck and select your drill bit size accordingly.

For a solid hold, a screw chuck needs a flat for registering the jaws of the scroll chuck. Mount the box between centers with the bottom at the tailstock end. Picture 15 Use a parting tool to remove any unevenness across the bottom. Position the tool at right angles to the lathe bed, and move the point into the wood until you are close to the live center. Take off as little wood as is necessary to insure a flat for the top of your chuck.

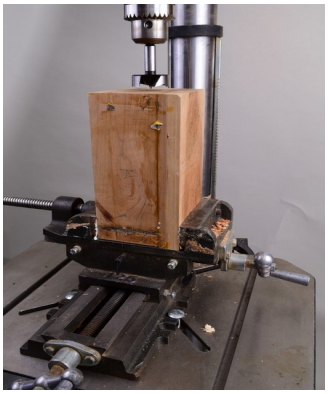
Truing the top end cap will occur once the box is mounted on the screw chuck.

Picture #15 - 1921

Caption – Mount the bottom of the box at the tailstock end of the lathe and use a parting tool to clean up any irregularities in the surface.

The hole for the screw chuck must be drilled at the center point. A twist bit walks as it enters the wood, resulting in a hole slightly off center. My shop has a floor drill press with a machinist vise. The vise clamps on two sides of the box keeping the box in alignment with the drill bit and holding the box solidly. The position of the box can be adjusted in small increments increasing the accuracy. The vise also holds the box solidly against the rotation forces of drilling.

Picture #16 - 1902



Caption – A machinist vise allows the position of the box to be adjusted in small increments.

The screw chuck hole can also be drilled with a hand drill. Start by creating a dimple at the center, then drill with a 1/8” bit, and then a 1/4” bit before drilling at the final size. Starting with a small hole and working up minimizes the walking issue.

If you are drilling by hand, or on a drill press without a vise, the box will rotate as you drill. Use the leverage of a clamp positioned at the bottom to hold the box against the rotation forces of drilling. The clamps make it easier, and safer, to hold the box while drilling.

Picture #17 – 1927

Caption – Use a clamp to hold the box against the rotational forces of drilling. Note the foot on the clamp.

Preparing the Jam Chuck

Before turning the vase we need to prepare a jam chuck. The jam chuck increases the stability of the form while turning and reduces fly off risk. The jam chuck needs a taper to center it in the glass insert hole and a clean shoulder to jam against the top-cap. Mount scrap wood between centers and turn the jam chuck. Picture 18

Picture #18 - 1935
Caption – This taper will be mounted in the insert hole and held in place by the tailstock.

Forming the Vase

Mount the box on the screw chuck as shown in Picture 19. Lock the spindle, and begin to thread the box onto the screw chuck. Bring up the tail stock and use the point of the live center to help guide the box as it is turned. The box should be turned until it solidly seats against the tops of the four jaw chuck.

Picture #19 - 1930
Caption – Lock the spindle, lock the screw chuck in the scroll chuck, and screw box until it is solidly seated against the scroll chuck jaws.

Drilling the Insert Hole

Drilling the insert hole before shaping the vase retains maximum mass and rigidity for drilling. The insert will have irregularities on diameter over its entire length. Drill a 1 3/4” hole and then enlarge the hole until there is a tight fit to the insert. Making the hole too large allows the insert to rattle in the vase. Take your time and creep up on it. The insert hole can be drilled with a smaller bit and enlarged to the required diameter. Using a large bit speeds up forming the hole, but is not necessary. Using a smaller bit just means that it takes longer.
Reference a Primer for Drilling on the Lathe?
If you have vibration while drilling, stop the lathe, lock the spindle, and re-tighten the box. Remember to unlock the spindle!

Picture # 20 – 1940
Caption – The glass insert will have irregularities. Drill and then enlarge the hole until the insert fits with little play.

Enlarged the hole with the tip of a skew. Raise the tool rest so the tip of the skew is on center, position the skew horizontal with the lathe bed and advance the skew tip straight into the wood engaging just a small amount of wood, and then push the skew into the opening. Test fit the insert and enlarge the open until the insert slides all the way to the bottom.

Picture # 21 – 1946 or 1945
Caption – Enlarge the hole gradually with the tip of a skew.

Shaping the Form

Place the tapered jam chuck into the insert hole and bring up the tailstock. Picture 22 A spindle roughing gouge is the appropriate tool to take down the edges. It is good practice to stop the lathe before moving the tool rest as the diameter of the turning decreases.

Picture #22 – 1948
Caption – Bringing up the tailstock with a jam chuck increase the stability while shaping the vase.

As the edges are cut down, stop the lathe and consider what the final shape should be. Remember, the sidewalls are only one inch thick. Designing on the lathe risks cutting through a wall.

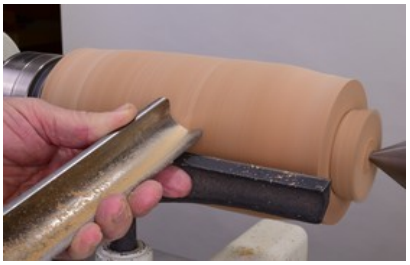
The first design decision is the diameter of the top and bottom. These two sizes are critical components of the final form. My rule is that top and bottoms should never be the same size. This is a matter of sixteenths of an inch, not large amounts. The human eye is reacts to very small changes in a form. Get it right, and the form sings. When it is wrong, the eye turns away.

The top diameter is set by the size of the insert hole, plus a margin of wood. This equates to a top diameter of 2 ½ inches. The jaw size of the chuck impacts the bottom diameter. Using my smaller chuck allows greater freedom in setting the bottom diameter. A range of 2 ¾ to 3” for a bottom keeps the form from being bottom heavy and pleases my eye. The cross grain of the bottom cap will begin to appear in this range of diameters.

The second design decision is the point of curve change. Think in terms of 20/80, 30/70, 40/60, 60/40 or 70/30. Moving the point at which the curve changes, changes the form significantly. Picture 23. Again, the limited amount of material in the side walls means this decision needs to be made before a tool is placed on the wood.

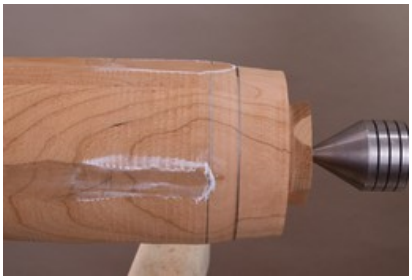
Picture # 23 - Form Image of 3.psd *(I Photoshopped in the image on the right. The two images I put together are in the additional images folder. Let me know if this doesn’t work)*
Caption – Moving the curve change changes the form dramatically.

Turn several vases with differing curve change points, and see which is most pleasing to the your eye. Eye training can be more important than learning how to turn the vase itself. I find my eye prefers the curve change at 25/75.



With the design decisions made, it is time to shape the form. Take the edges down with a spindle roughing gouge. Picture 24. When edges have been eased, stop the lathe and draw a line at the bottom edge of the flats around the blank. Picture 25 If the bottom edge touches the line all four times, the center line is true and you have the option of leaving the flats on the form. If the flats are not symmetrical, then turn away the flats.

Picture #24 – 1966
Caption – A spindle roughing gouge is the appropriate tool for taking down the edges of the box.



Picture #25 - 1951
Caption – The four flats of this form do not line up and should be turned away.

Pictures # 26 – 1968 or 1967
Caption – Set the curve change point on the vase.

Draw a pencil line at the point of curve change. Picture 26 With a bowl gouge, cut from the curve change line to the bottom and then from the line to the top, striving for a cut line with no valleys or ridges. To gauge when you are about to go through a wall, watch the amount of end cap showing. Picture 28 When the full thickness of the end-cap shows, you are through the wall.

Picture # 28 – 1976
Caption – Gauge the wall thickness by measuring the end amount of end-cap that shows.

Refine your curves by presenting your bowl gouge slightly below a horizontal position. Picture 29. Inspect the form closely. Fill any holes with a mixture of glue and sanding dust, pushing it into the hole. The wood fibers in the mix will keep the repair from being highlighted by your finish. Allow the glue to dry before sanding.

Picture # 29 – 1982
Caption -A bowl gouge held horizontally can be used to refine curves.

Picture # 30 – 1993
Caption Fill any gaps with a paste of sanding dust and yellow glue to avoid conflicts with your finish.

Sandpaper presented diagonally across the vase is the final step in shaping. The wide surface area of the strip of sandpaper will knock down any high spots. I prefer a grit of 150 – 180 for this operation. Coarser grits leave sanding marks that are difficult to remove. Finally, sand through the grits, reversing lathe rotation with every change of grit.

Picture #31 1994
Caption – Holding a strip of sandpaper diagonally against the form will smooth out high spots.

Complete the Bottom

The final step is to remove the vase from the screw chuck and complete the bottom. A strap wrench is invaluable in removing the vase from the screw chuck. Picture 32

Picture #32 - 1999
Caption – A strap wrench is invaluable in gripping the completed base when removing from the wood chuck.

Place your tapered jam chuck in a 4 jaw chuck at the headstock, and true it up. Put the vase mouth on the jam chuck and bring up the tailstock. Many live centers will slip into the screw chuck hole and center the vase. If yours does not, glue a 3/8” dowel in the hole and center the tip of your live center on the dowel. Picture 33. Finish the base by a shallow depression in the center. Glue a plug in the screw chuck hole, if needed, and sand, blending it into the surrounding area.

Picture 33 – 2004
Caption – Mount the completed vase between centers to finish the vase bottom.

Final Thoughts

A technique that allows you to make usable hollow forms from a single board is a valuable addition to turners library of projects. This technique easily scales up as seen in Picture 34, a 14 inch vase from 8/4 boards, or down for smaller projects.

Picture 34 _ 1843
Caption – This technique can be scaled up to larger forms as seen in this 14” hollow form made from a 2” board.

What really makes this a winner is when it is presented to your spouse with a boutique of flowers in the center.

Dennis Belcher retired from a 30+ year career in the investment world to his lifelong passion of working with wood. A member of the Wilmington Area Woodturners Association (North Carolina), Dennis demonstrates for clubs and participates in juried art shows. Contact Dennis at Dennis.M.Belcher@gmail.com or visit his website, DennisBelcher.com.