Making A Tulip (2014)

A word about special tools. Making tulips does require a degree of precision. I use a table saw to cut prisms and I make sure of the blade angle with a Wixie gauge. I use a disk sander to get the curve of the petals. I use a chuck with small diameter jaws to hold the fairly small cylinder for hollowing. I either use a bit with a #2 Morse taper or a Forstner bit in a Jacob's chuck to drill a starting hole for hollowing. I use the Jacob's chuck to drill the hole for the stem. And I find the EZ tool with the smallest round cutter works well for hollowing. There a many other ways to get the same results. However these work for me and make things relatively easy.

Step 1 - select a board. Bloodwood is a striking red, soft maple and holly are pale white, purple heart is has good color but fades with time and of course there are browns and blacks to choose from. There is also a nice orange wood called chakte viga and a good yellow called either pau amarillo or satinwood. A wood with interesting patterns can be very effective. However you do not want a wood where the grains have strikingly different porosity. Stay away from oak or elm. Learning with maple or even poplar may save some expensive wood.

Of course you can use a pale or white wood and color it. One trick is to use water or food colors and a water-based finish.

Step 2 – cutting prism cross-sections. Most commonly you start with a board that is either three or four quarters thick. At this point you want to select how many petals your tulip will have. You could choose any number, but here I will assume you choose either three or four. You want to rip strips where the cross-section is either a square or a 60/120 degree diamond. (See figure 1.) Cutting the square cross-section is relatively easy with a table saw. Set the distance between the fence and the blade just a smidgen less than the thickness of your board and rip the piece. Then rotate the cut piece 90 degree and rip it to exactly the same width.

Cutting the 60/120 degree prism is a little more involved. The blade will be tilted **30** degrees away from the fence, of course. (**Never have the fence on the wrong side of the tilt**.) But before you are ready to make the cuts you need to make a spacer that is at least as long as your board. You will make the first cut with the board next to the fence and the second cut with the spacer between fence and your board. The trick is to make the spacer the correct width so that the sides of your prism are exactly equal. This means that the spacer has to be as wide as the sum of the length or the 30 degree cut face plus the kerf. The kerf is not just the width of the blade, but the width of the blade tilted at 30 degrees.

OK, how do you get the right width for the spacer? One way is to calculate it, knowing the width or your board and the kerf of the blade. The spacer is 1.155 times the sum. Another way is to make the first 30 degree cut and measure its length. Then mark that length on the bottom of the end of your board and draw a line parallel to the cut at the 30 degree angle. Now position your board far enough away from the fence so the next rip would give you the prism. Finally measure the distance you have moved your board from the fence. That is the width of the spacer.

The way to do this is to have two waste boards that have exactly the same thickness as the real board; and another board that you will use for the spacer. Cut both waste boards at 30 degrees. Now cut and try the spacer with one of waste boards. Compare the width of the cut with the 30 degree face of the other waste board. If they are not the same you adjust the width of the spacer; a little wider if the width was too short or a little narrower if the width was too long. This means that you go back and forth, cutting the trial spacer at 90 degrees and then the two 30 degree trial cuts, one against the fence and the second with the spacer. All this sounds bad, but it really isn't. You get it right on the second or third try. By the way if the spacer is a tiny bit too narrow, thicken it with a layer or two of duct tape.

The spacer is a little more effort. However, in the next steps you only deal with three pieces, not four. And the three petal tulip looks better. Once you have the spacer and boards of equal thickness, you can cut as many tulips as you want.

There are two ways of setting the blade at 30 degrees. You can use a 30/60/90 triangle of you can use a Wixie. The Wixie is much better.

Step 3 – cutting the prisms to length. How tall do you want your tulip to be? A good size is for the tulip to be about twice as long as the diameter. The diameter is twice the thickness of your board for either the three and four petal arrangements. Of course, you can pick any ratio that you like. Suppose you started with a three quarter board, the diameter is an inch and a half and the length is three inches. Cut the prisms to about four and a half inches. This leaves three quarters of an inch for the tenon in the chuck and three quarters of an inch space to turn the bottom of the tulip.

Dry fit the three or four prisms. The joints should be tight, i.e. the angles must be pretty exact.

Step 4 – matching and marking. Assemble the three or four prisms and look at the end grain. Try to get a reasonably symmetric pattern either by rotating pieces and/or flipping them end over end. Trying to get this symmetry is nice, but, after all, this is wood and grains are not always straight or even. Once you have the arrangement you like, write numbers on the ends so you can remember how to reassemble them. You want to mark all the external faces with a straight, perpendicular line (but not the internal faces). This line determines to size of each petal. Having the petal and the body about the same length works. Alternatively you might make the petals just a little more than half the total length. (These are the lines across the faces in figure 2.)

Next you mark each of the two external faces with a curve. The curve goes from the top of the edge between the two external faces, across the face and down to the perpendicular line. Each prism has two faces and the two lines form a point on the outer edge. This line should from a very steep angle with the side face and a not very steep angle with the top. The two lines determine how "pointy" the petal is. (See figure 2.) I cut a template from a thin piece of plastic or cardboard. You flip the template between the two faces. When you reassemble the prisms, the petal edges point out and lines on adjoining pieces form a steep "V".

Step 5 – cut away wood. You now want to remove the wood that will not be in the petal. You can use a band saw or a disk sander. If the cross section is square, the band saw or sander is probably all set up.

One caution however, the first cut is straightforward. The bottom of the piece is missing and the second cut is not supported. **Hold the bottom section tight against the table. Do not let the piece slip and draw your fingers into the blade.** Even after sawing you probably want to smooth the cut on a disk or belt sander. So unless it is a particularly oily wood, skip the band saw and just use the sander to remove all the wood. You want the sanded faces to be clean and relatively smooth. You want the line that marks where the sanding ends to be perpendicular across the face and the curved edge where the two sanded faces meet to be relatively straight.

Again, if the cross-section is square, the disk is perpendicular to the table. If the cross-section is a 60/120 diamond, you have to tilt the table down 30 degrees. Use either a triangle or the Wixie.

Step 6 – glue up. Put a thin layer of glue on the internal faces. Try to keep the glue from the sanded areas. Assemble the four pieces with the petals pointed out and squeeze to get good joints. You can use clamps if the cross-section is square. But you just have to rub and squeeze if it is the 60/120 diamond. You want to be sure that the lines that determine the size of the petals are all aligned. And you can use a piece of paper to remove the squeeze-out between the petals.

After the glue dries, true up the bottom end. You want to have a clear view of the point where the prisms meet. I have a good sled and make a thin cut on the table saw. You could use the disk sander.

Step 7 – turning the outside. Use an awl to make a hole in the bottom where the prisms meet. Mount the bottom on the headstock with a drive-center. Use a pointed cone live-center on the tailstock. The cone point should fit nicely down between the petals. Turn a tenon on the bottom and remount the tulip in a chuck. If the jaws of your chuck are too large for the small diameter tenon, you can make a jam chuck for the tenon. But you should glue the tenon into the jam chuck. You will be hollowing fairly far out on a small cylinder and just a tight fit may not hold.

Now turn the outside of the tulip. If it is a conventional tulip, the petals will turn in toward the axis. You can use almost any gouge to get a cylinder. I have used either a roughing or spindle gouge, or a skew. The petals turn toward the axis. It is a good idea to mark the bottom of the petals with a pencil line around the cylinder. (The line that was there has been turned away.) Turn a smooth and fairly gentle slope from the bottom of the petal toward the tips. I use a skew, but a detail spindle gouge works as well. Be sure your tools are sharp.

Open petals point out, of course. So you start between the tips and the bottom of the petals and carve a cove down toward the bottom. Continue straight beyond the bottom of the petals making a cylinder. Move successive cuts toward the tips. When you are finished, you have half a cove from just a bit below the tip to the bottom of the petal and a cylinder from the bottom of the petal to the bottom of the tulip. You should leave just a small bit of the outer edge at the tip of the tulip. This will give a nice sharp petal. If you don't, the petal will have a rounded end. Mark the bottom of the petals with a pencil.

Step 8 – turning the inside of the petals. Remove the tail-stock and be sure the chuck is tight. I drill out a starting hole. You can use a Jacob's chuck and a Forstner bit, but I have a bit with a #2 Morse taper. The depth should be about a quarter of an inch short of the bottom of the tulip. You can mark the drill

bit. Hollow out the petals, but don't go too far into the body at first. The open spaces between the petals mean you will be "cutting air". Near the tips you are cutting air almost all of the rotation; but near the body, you are cutting wood almost all the time. I have used a number of small hollowing tools. Miniature scrapers work. A small hollowing tool Mike made for me works very well, as does the small round EZ tool.

Get the petals thin and even.

I now use a brad point bit and a Jacob's chuck to drill a small hole for the stem. The hole extends beyond the bottom of the tulip. I use a 3/16 inch dowel for the stem of a three inch long, one and a half inch wide tulip. I use a thin stirrer from Starbucks to measure the depth of the hole. Be sure it extends well beyond the bottom of the tulip.

Step 9 – turning the bottom. The first part of turning the bottom is to finish turning the inside of the bottom. Round out the bottom to about an eighth of an inch from what will be the bottom of the tulip. The small hole lets you avoid the "dimple" at the bottom problem. I use a Popsicle stick to measure how far I have extended the hole.

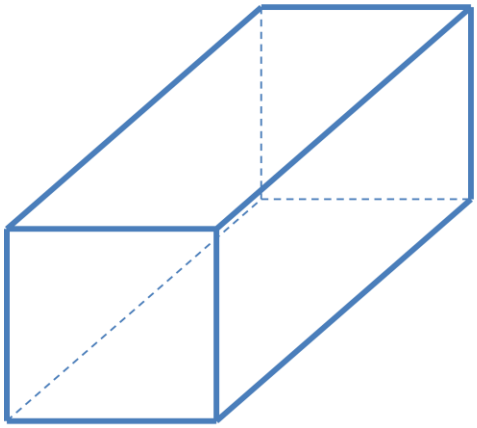
Turn the outside of the bottom keeping the wall thickness about the same as the petals'. It is a good idea to mark the position of the bottom of the hole and where you want the bottom of the tulip to be. (Remember, you can't make the inner diameter larger than the outer and the bottom of the inside deeper than the bottom of the outside. But you might try.) I use either a sharply pointed spindle gauge or the EZ tool.

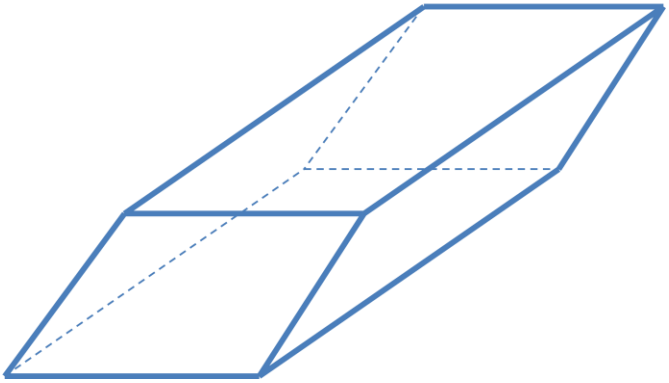
When the spindle has become fairly thin at the very bottom, sand the inside and the outside. Remember that there is a hole in the spindle and you need enough strength to hold the tulip as you sand. I use long nosed pliers to hold the sand paper for the inside. **Do not put your fingers in the tulip.** Why don't I turn the outside with the bottom "tenon" just a little larger than the stem, sand and then drill the hole? A dimple will cause the drill bit to go off-center.

Put a piece of dowel in the hole and continue to turn down the very bottom. Continue to sand as you get the "stem" nearly to the diameter of the dowel. Finally use a skew chisel to cut the stem at its thinnest point. The dowel will hold the tulip as the stem parts off.

Step 10 – Show off your really cool tulip.

Prisms





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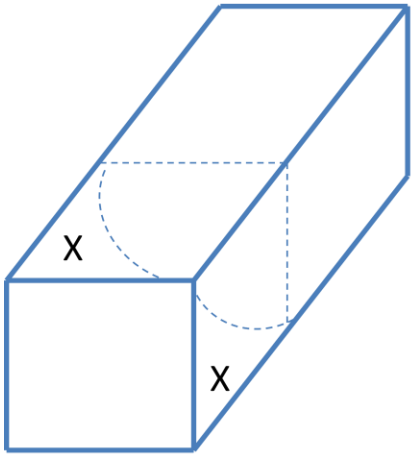
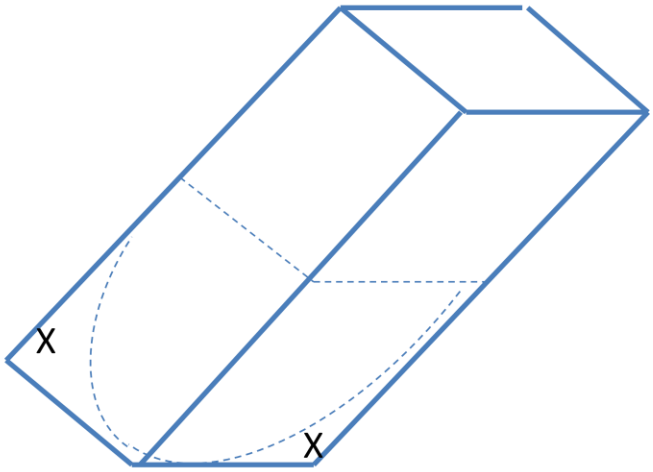
outer edge





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Marks for removing wood