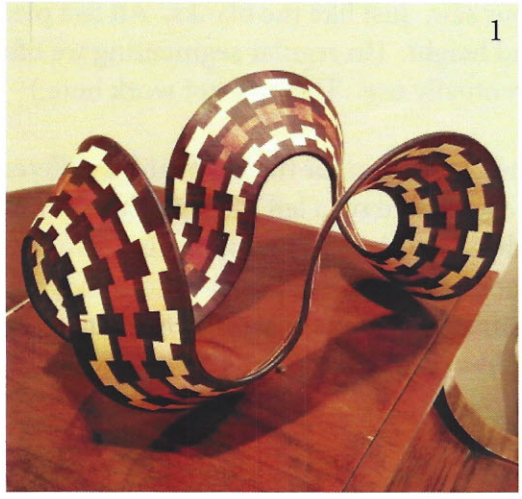
YOUR FIRST RIBBON
By Craig Sobel

For GWG June 12, 2016

I used the following tools and supplies:
Table Saw Disk Sander Lathe
Wax paper Titebond II glue Rubber bands
Hot Glue Spring Clamps
Drum sander for dimensioning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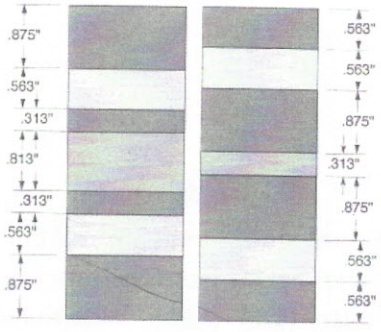
Step 1: Decide how big and how many bowls will be needed.

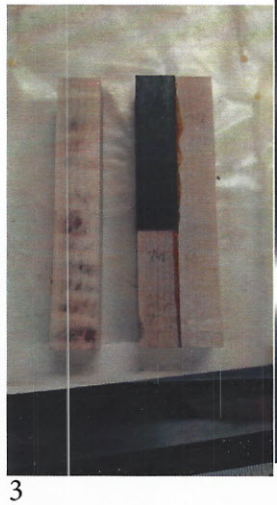


Step 2: Decide on your lamination pattern and color scheme.

Step 3: Cut all of the necessary strips to width, length & height. Add an extra width to the strips that will end up at the edges of the ribbon.
In the case of the keyboard, it is length of the strips, in the case of the caterpillar, the width of the outer edge wood. Strips cut for the Caterpillar were crosscut from boards. After laminations and compound miter cut, this would produce side grain to be glued


2

Step 4: Laminate (glue strips together), flatten bottoms, dimension tops.
In the case of the keyboard, each blank needs to be about 4" long but 2" wide. In the case of the Caterpillar, I made a boards of laminations which I cut several pieces from each. The width was 5 or so inches, the width of the boards I had available. This will also determine how many staves can be cut from the blank and how many blanks you will need. In the case of the keyboard, All strips were cut lengthwise at about 3/4 inch. Shorter strips were cut for the black key portions, First the center was glued together, one side was disk sanded, the other side was table sawed, then the sanded side was cut again to give a consistent width. Then the left and right sides were glued to each side.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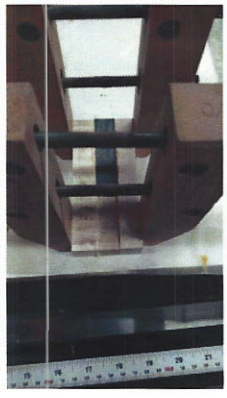
Important notes: When the blank is completed, the symmetry is critical. For the keyboard, the left and right must be exactly the same and the total must be 2". the length of the black keys should be the same or very close but when cut, each blank needs to be exactly the same total width and length. This length will determine the width of the ribbon. The width will determine the final dimension of the bowl. They need to be the same. The cut line must start at 2" and taper in to end of the black key on each side so that the black key is centered. The cut line will determine the over all length of the piece. For the caterpillar, the consistency of the brick pattern is directly related to how well centered the pattern is. This is determined by the consistent width of the strips and how well you reduce the overall width of the blank keeping the wider edges to be the same width.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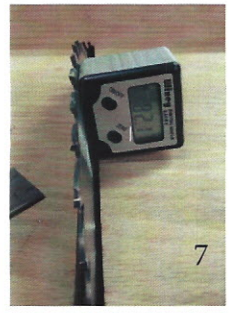
Step 5: Perform the compound miter cuts. Set the saw to 82 degrees miter and 7.93 degrees tilt. See the chart on the last page. But these dimensions will produce a 16 segment 45 degree bowl of 10" diameter. Two ways to do this, With a compound miter saw or on a table saw. I use a table saw and to do this, I built a sled. These cuts need to be pretty accurate. A test set may be useful to calibrate your saw. Just like the blanks, All test pieces must be exactly the same as your pieces in length, width and height. (In regular segmenting we often test the angle with different size wood then what we will eventually use. This will not work here.)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The cut pattern for the keyboard is different than the caterpillar. I will describe the keyboard on a left tilt saw. Cut the first side: Place the piece on the right side of the blade. The cut line is set so that you are left with all 2" of the top wood at the miter fence. Without moving the piece, slide a stop block in place against the cut piece and the miter fence, Screw it down. Now cut all of the blanks on the one side.


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Step 6: Prepare to cut the other side. Remove the right side stop block and cut one end of it to the miter angle. Flip the blank top side down and large end away from the miter fence and on the left side of the blade. Set the cut line to leave 2" at the wide end of the piece. Slide the stop block in place and screw it down before the cut.


10

Step 7: Making the cut. Caution. The blade is now tilting toward the piece you are holding so watch your fingers. Second, when you make this cut, the scrap piece will end up sitting on the blade and it will be loose. Eventually if you leave it there long enough it will kick back and strike you. You need a face shield and I recommend a heavy apron. What I have found and recommend is that if you can create a stop block for the sled and stop the cut about 1/8 before the cutoff, the piece will be stable. Retract the sled, break off the piece, remove the sled stop and recut the final bit.


11


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13

Step 8: Begin gluing staves together. Make sure large end are even. For keyboard the order of glue ups are critical, for the caterpillar, it is alternating. I glue on wax paper on a tray with a back like a miter fence, I can easily push down and to the fence to even things up. I also use a large spring clamp at the tip and at the base. Rubber bands work well. You will need lots of them soon so get a bunch. Glue up to half cones. If it is accurately cut, it should be really close. Correct for any problems on the disk sander. Combine halves to full cones. On image 14, the half cone sits on my saw. You can see just a slight gap. It is less than a 16th of an inch.

14

Step 9: True up the half cones on a disk sander and glue together. Use rubber bands to hold for gluing.

15

Step 9: Mount cone on waste block small end to head stock. You will need to flatten the small end very accurately. I reverse chuck on wide jaws and turned a flat section 3/8 inch wide and notched in at the center slightly to help with centering. My waste block has an notch it fits in to. Turn cone at 45 degrees inside and out to 1/4 inch sanded and finished.

Step 10: Part off. Cut cones in half or quarters with band saw. Disk sand them flat.

Step 11: Attach hot glue blocks to the inside and out side of every seam the same distances from the edges.

Step 12: Connect all of the pieces in the order they go with rubber bands around block. It should fit very well. Glue each section together one at a time, and allow to dry for about an hour. Use spring clamps to maintain position. Do not remove any of the rubber bands until all have been glued. I suggest leaving the bands on there when you glue.

Step 13: Remove the blocks with a heat gun, remove glue , final sand.

Step 14: Finish

Compound Miter Angles for Stave-Constructed Forms

	6 Staves		8 Staves	
Slope*	Miter Angle	Blade Angle	Miter Angle	Blade Angle
0	60.00	0.00	67.50	0.00
5	60.09	2.50	67.58	1.91
10	60.38	4.98	67.81	3.81
15	60.85	7.44	68.19	5.68
20	61.52	9.85	68.73	7.52
25	62.38	12.20	69.42	9.31
30	63.43	14.48	70.27	11.03
35	64.69	16.67	71.26	12.68
40	66.14	18.75	72.40	14.24
45	67.79	20.70	73.68	15.70
50	69.64	22.52	75.09	17.05
55	71.68	24.18	76.64	18.27
60	73.90	25.66	78.30	19.35
65	76.29	26.95	80.07	20.29
70	78.83	28.02	81.94	21.08
75	81.50	28.88	83.88	21.69
80	84.27	29.50	85.89	22.14
85	87.12	29.87	87.93	22.41
90	90.00	30.00	90.00	22.50

Courtesy of Malcolm Tibbets

Compound Miter Angles for Stave-Constructed Forms

	10 Staves		12 Staves		16 Staves		20 Staves		24 Staves	
Slope*	Miter Angle	Blade Angle	Miter Angle	Blade Angle	Miter Angle	Blade Angle	Miter Angle	Blade Angle	Miter Angle	Blade Angle
0	72.00	0.00	75.00	0.00	78.75	0.00	81.00	0.00	82.50	0.00
5	72.06	1.54	75.05	1.29	78.79	0.97	81.03	0.78	82.53	0.65
10	72.26	3.08	75.22	2.58	78.92	1.94	81.13	1.56	82.61	1.30
15	72.58	4.59	5.49	3.84	79.12	2.89	81.30	2.32	82.75	1.94
20	73.02	6.07	75.87	5.08	79.41	3.83	81.53	3.07	82.95	2.56
25	73.59	7.50	76.35	6.28	79.78	4.73	81.83	3.79	83.20	3.16
30	74.28	8.89	76.94	7.44	80.23	5.60	82.19	4.49	83.50	3.74
35	75.10	10.21	77.62	8.54	80.75	6.42	82.61	5.15	83.84	4.29
40	76.02	11.46	78.40	9.58	81.34	7.20	83.08	5.77	84.24	4.81
45	77.06	12.62	79.27	10.55	81.99	7.93	83.61	6.35	84.68	5.30
50	78.20	13.69	80.23	11.44	82.71	8.59	84.19	6.88	85.16	5.74
55	79.44	14.66	81.26	12.24	83.49	9.20	84.81	7.36	85.68	6.14
60	80.77	15.52	82.37	12.95	84.32	9.73	85.47	7.79	86.23	6.49
65	82.18	16.26	83.54	13.57	85.19	10.18	86.17	8.15	86.82	6.79
70	83.66	16.88	84.76	14.08	86.11	10.56	86.90	8.45	87.42	7.05
75	85.19	17.37	86.03	14.48	87.05	10.86	87.65	8.69	88.05	7.24
80	86.77	17.72	87.34	14.77	88.02	11.08	88.42	8.86	88.69	7.39
85	88.38	17.93	88.66	14.94	89.01	11.21	89.21	8.97	89.34	7.47
90	90.00	18.00	90.00	15.00	90.00	11.25	90.00	9.00	90.00	7.50