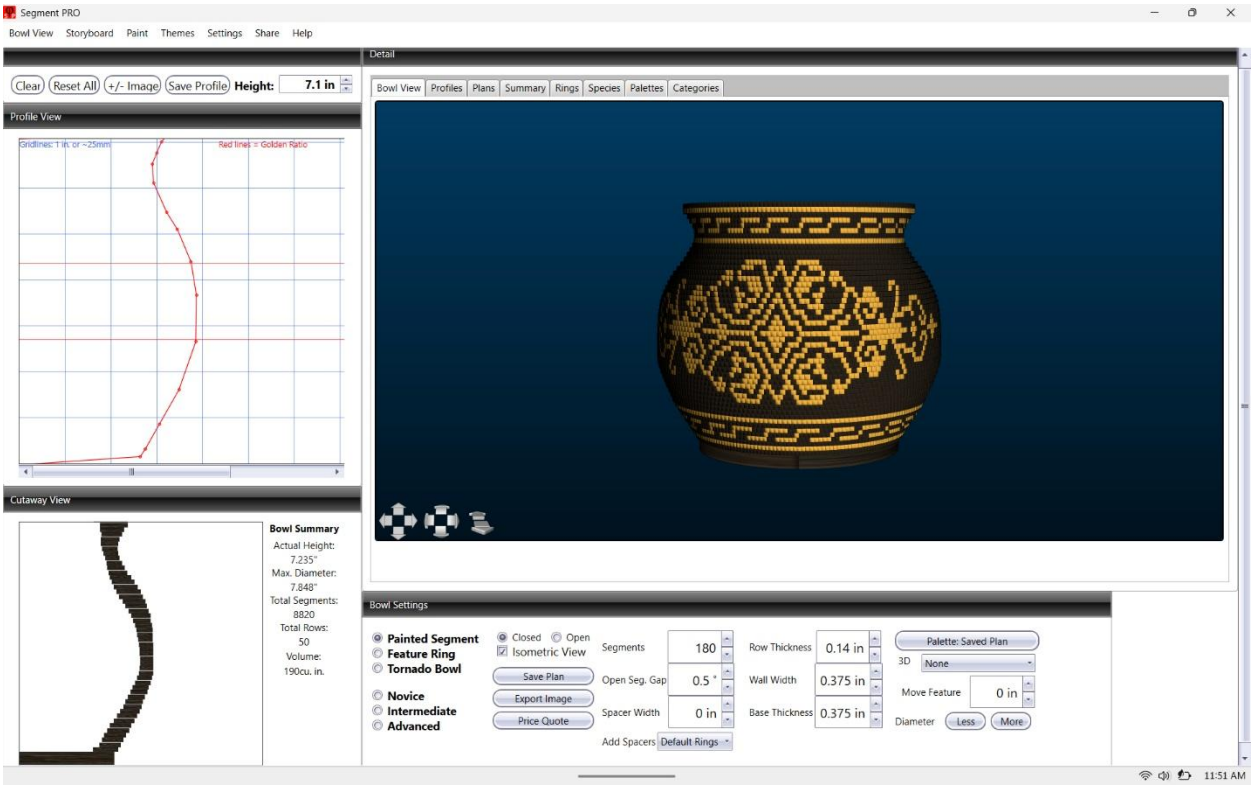
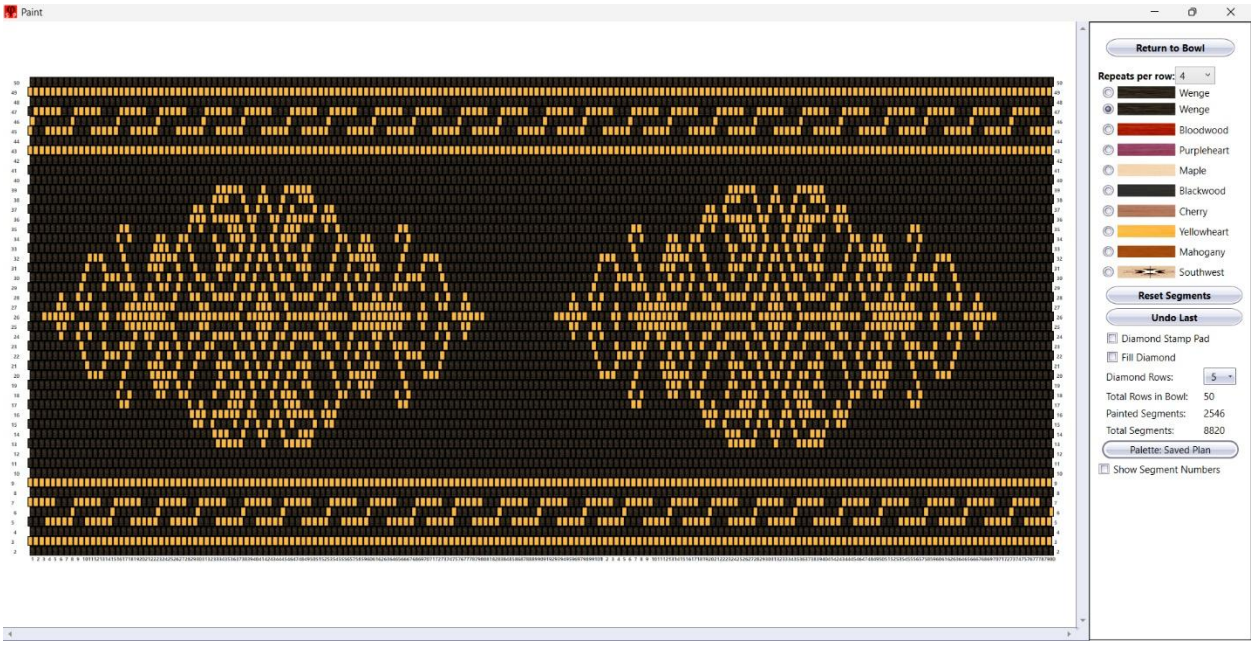
I use Segment Pro software to layout segment designs. The design used in this writeup is a Tom Lohman design and he provided the Segment Pro project file.

Below are some screen shots of the Segment Pro project.

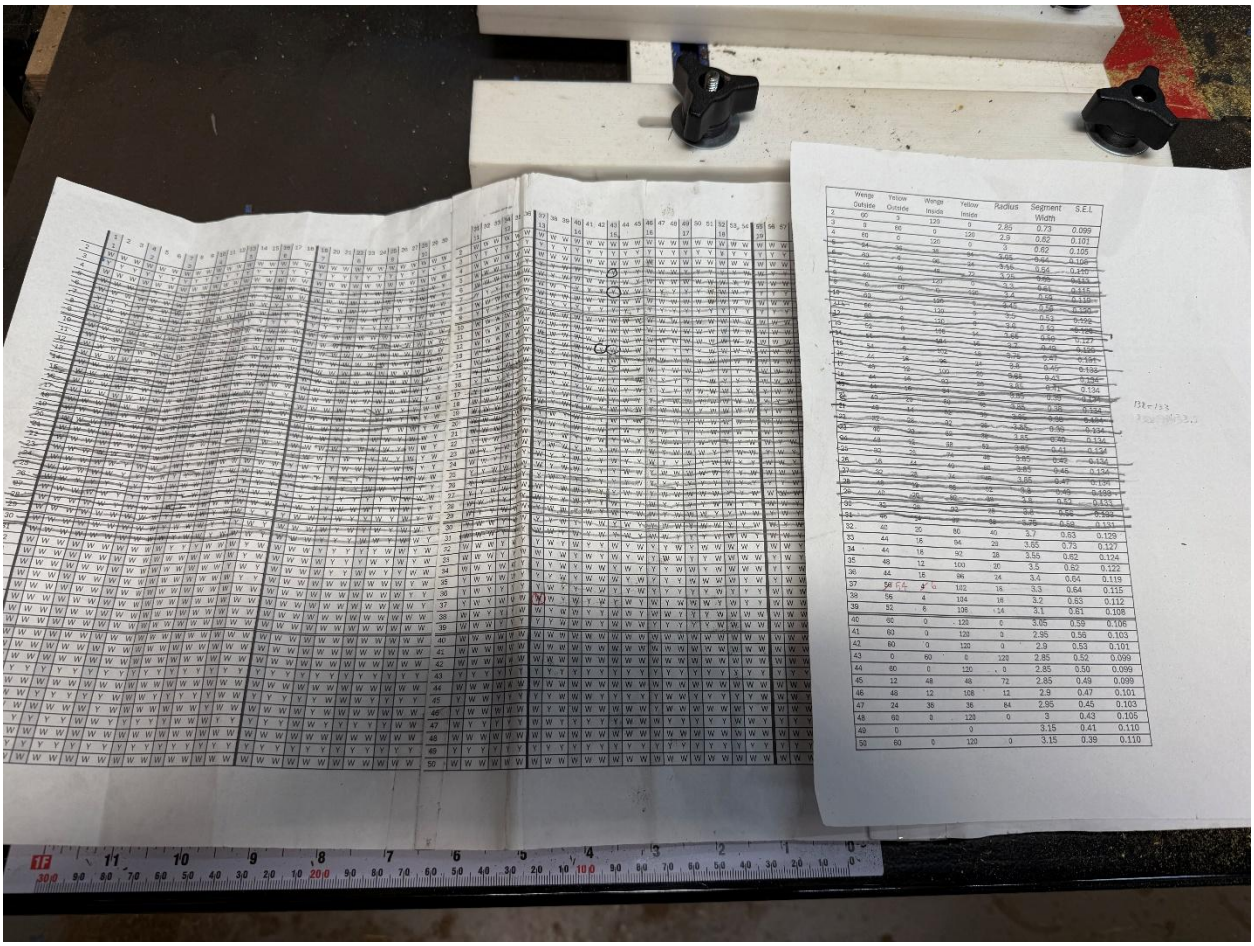




This is the Segment Pro output for the project. It contains information about the number and size of segments needed by row. There are 49 rows in the piece.

	Board		Segm	Ring					Diameter		Species			
Ro	Width	Length	S.E.L.	Type	Species	Segs	Thick	Angle	Outer	Inner	Wen	Lgth	Yell	Lgth
1	.00	.0	.000	disk	Wenge	0	.375	.00°	5.6"					
2	.73	38.2	.101	closed		180	.140	1.00°	5.8"	4.3"	180	38.2		
3	.62	39.0	.103	closed		180	.140	1.00°	5.9"	4.7"			18(	39
4	.62	39.5	.106	closed		180	.140	1.00°	6.1"	4.8"	180	39.5		
5	.64	40.0	.109	closed		180	.140	1.00°	6.2"	5"	60	13.2	12(	26.6
6	.64	40.5	.112	closed		180	.140	1.00°	6.4"	5.1"	156	35.1	24	5.3
7	.63	41.1	.115	closed		180	.140	1.00°	6.6"	5.3"	60	13.6	12(	27.3
8	.61	41.6	.118	closed		180	.140	1.00°	6.7"	5.5"	180	41.6		
9	.59	42.2	.120	closed		180	.140	1.00°	6.9"	5.7"			18(	42.2
10	.56	42.7	.123	closed		180	.140	1.00°	7"	5.9"	180	42.7		
11	.53	43.1	.125	closed		180	.140	1.00°	7.1"	6.1"	180	43.1		
12	.52	43.6	.127	closed		180	.140	1.00°	7.3"	6.2"	180	43.6		
13	.50	44.0	.129	closed		180	.140	1.00°	7.4"	6.4"	158	38.6	22	5.3
14	.49	44.3	.131	closed		180	.140	1.00°	7.5"	6.5"	160	39.4	20	4.8
15	.47	44.7	.132	closed		180	.140	1.00°	7.6"	6.6"	156	38.7	24	5.9
16	.45	45.1	.134	closed		180	.140	1.00°	7.7"	6.8"	140	35	40	9.9
17	.43	45.4	.135	closed		180	.140	1.00°	7.8"	6.9"	148	37.3	32	8
18	.41	45.7	.136	closed		180	.140	1.00°	7.8"	7"	136	34.5	44	11.1
19	.39	45.8	.137	closed		180	.140	1.00°	7.8"	7.1"	138	35.1	42	10.6
20	.38	45.8	.137	closed		180	.140	1.00°	7.8"	7.1"	120	30.5	60	15.2
21	.38	45.8	.137	closed		180	.140	1.00°	7.8"	7.1"	128	32.5	52	13.1
22	.39	45.8	.137	closed		180	.140	1.00°	7.8"	7.1"	124	31.5	56	14.2

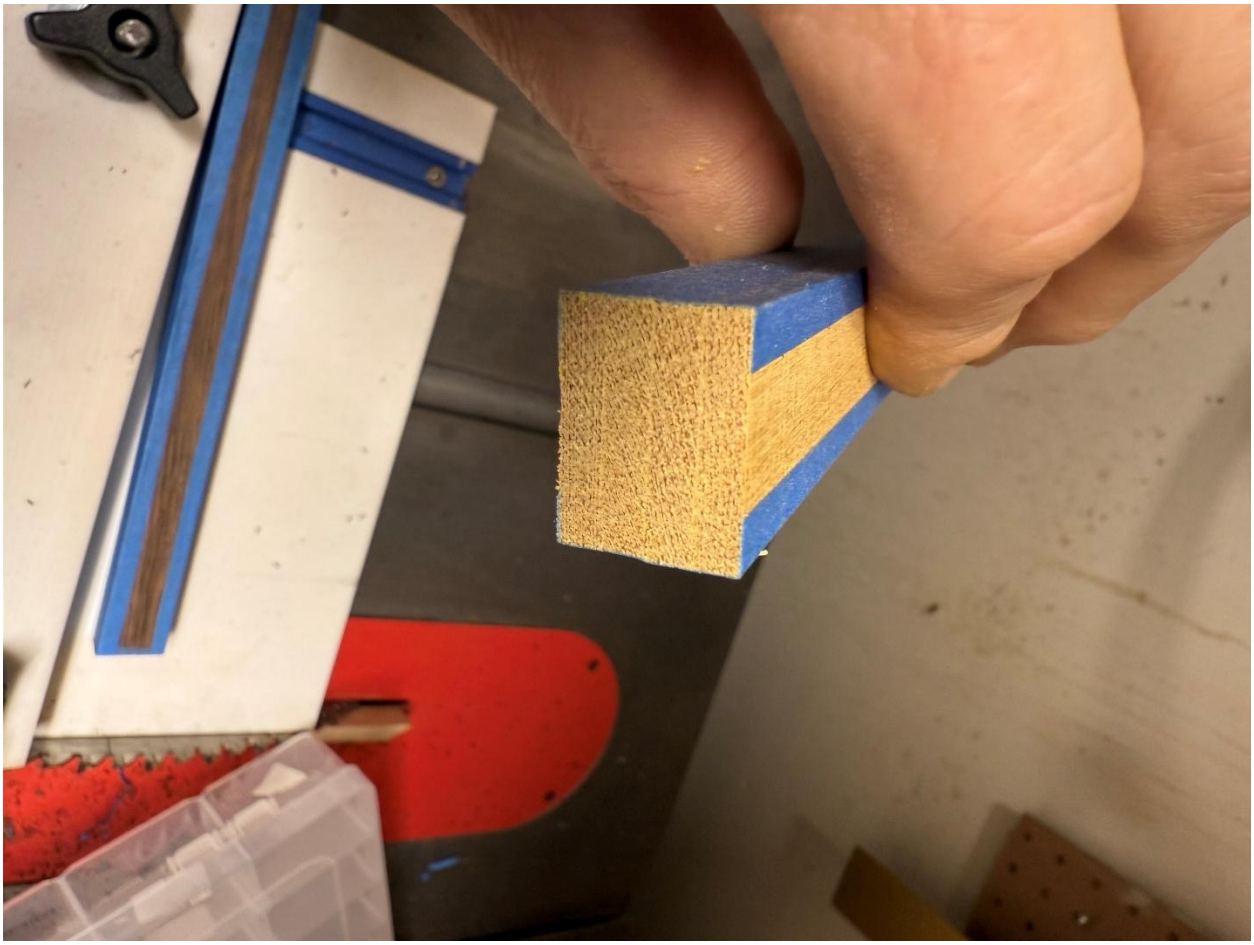
I have a custom spreadsheet that displays the Segment Pro output into a more detailed segment cut list.



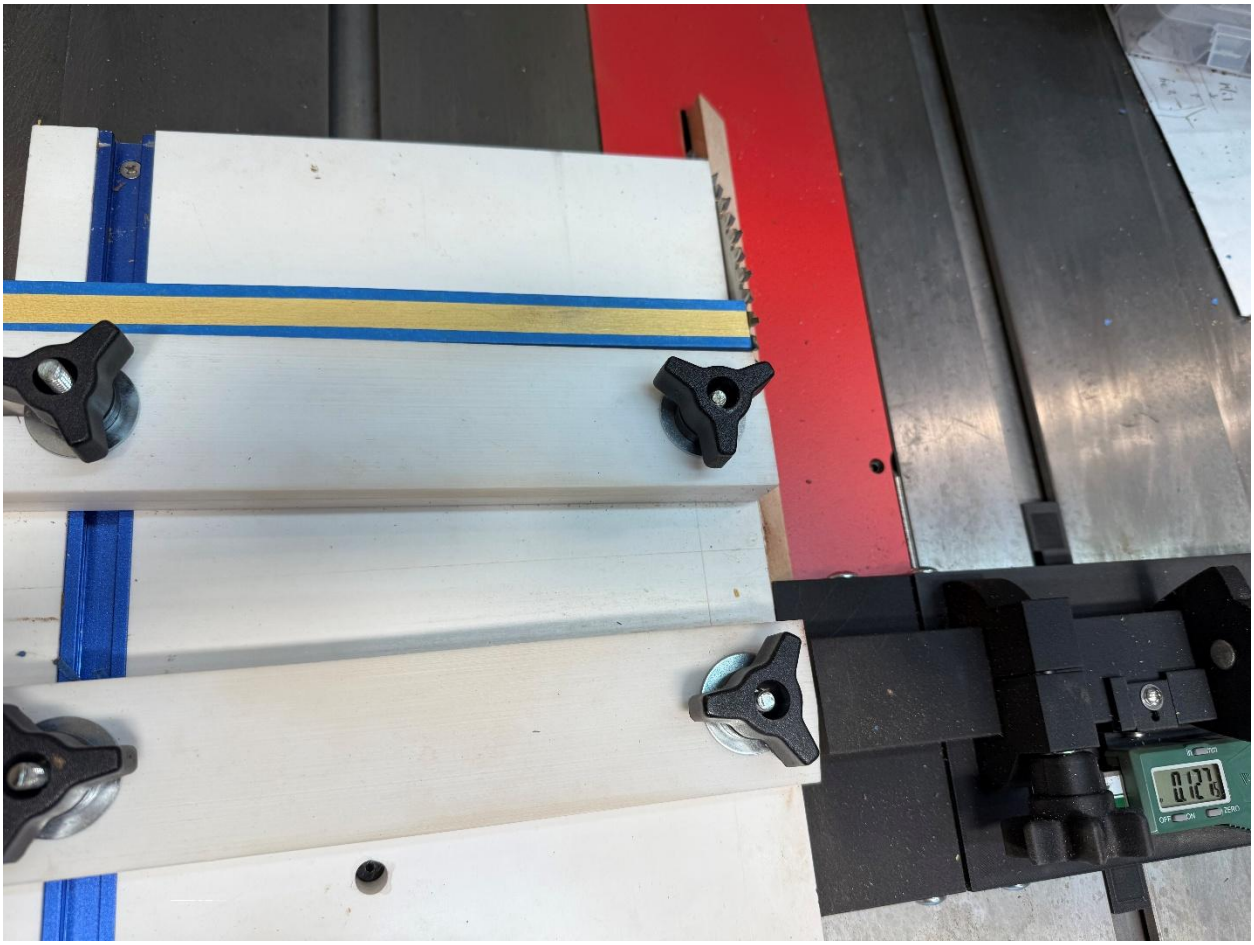
	Wings Outside	Yellow Outside	Wings Inside	Yellow Inside	Radius	Segment Width	S.E.L
2	60	3	120	0			
3	0	60	0	120	2.85	0.73	0.099
4	60	0	120	0	2.9	0.82	0.101
5	54	36	108	12	3	0.82	0.105
6	60	6	96	24	3.05	0.84	0.108
7	48	48	84	36	3.15	0.84	0.108
8	60	0	120	0	3.2	0.75	0.113
9	42	54	72	48	3.3	0.81	0.115
10	60	0	120	0	3.4	0.84	0.118
11	36	60	60	72	3.45	0.75	0.106
12	60	0	120	0	3.5	0.83	0.122
13	30	66	48	84	3.6	0.78	0.112
14	60	0	120	0	3.65	0.86	0.127
15	24	72	36	96	3.7	0.79	0.116
16	60	0	120	0	3.75	0.87	0.131
17	18	78	24	108	3.8	0.81	0.119
18	60	0	120	0	3.85	0.87	0.134
19	12	84	12	120	3.9	0.82	0.121
20	60	0	120	0	3.95	0.88	0.134
21	6	90	0	132	4	0.83	0.124
22	60	0	120	0	4.05	0.89	0.134
23	0	96	0	132	4.1	0.84	0.127
24	60	0	120	0	4.15	0.9	0.137
25	0	96	0	132	4.2	0.85	0.129
26	60	0	120	0	4.25	0.91	0.139
27	0	96	0	132	4.3	0.86	0.131
28	60	0	120	0	4.35	0.92	0.141
29	0	96	0	132	4.4	0.87	0.133
30	60	0	120	0	4.45	0.93	0.143
31	0	96	0	132	4.5	0.88	0.135
32	60	0	120	0	4.55	0.94	0.145
33	0	96	0	132	4.6	0.89	0.137
34	60	0	120	0	4.65	0.95	0.147
35	0	96	0	132	4.7	0.9	0.139
36	60	0	120	0	4.75	0.96	0.149
37	0	96	0	132	4.8	0.91	0.141
38	60	0	120	0	4.85	0.97	0.151
39	0	96	0	132	4.9	0.92	0.143
40	60	0	120	0	4.95	0.98	0.153
41	0	96	0	132	5	0.93	0.145
42	60	0	120	0	5.05	0.99	0.155
43	0	96	0	132	5.1	0.94	0.147
44	60	0	120	0	5.15	1	0.157
45	0	96	0	132	5.2	0.95	0.149
46	60	0	120	0	5.25	1.01	0.159
47	0	96	0	132	5.3	0.96	0.151
48	60	0	120	0	5.35	1.02	0.161
49	0	96	0	132	5.4	0.97	0.153
50	60	0	120	0	5.45	1.03	0.163
51	0	96	0	132	5.5	0.98	0.155
52	60	0	120	0	5.55	1.04	0.165
53	0	96	0	132	5.6	0.99	0.157
54	60	0	120	0	5.65	1.05	0.167
55	0	96	0	132	5.7	1	0.159
56	60	0	120	0	5.75	1.06	0.169
57	0	96	0	132	5.8	1.01	0.161
58	60	0	120	0	5.85	1.07	0.171
59	0	96	0	132	5.9	1.02	0.163
60	60	0	120	0	5.95	1.08	0.173
61	0	96	0	132	6	1.03	0.165
62	60	0	120	0	6.05	1.09	0.175
63	0	96	0	132	6.1	1.04	0.167
64	60	0	120	0	6.15	1.1	0.177
65	0	96	0	132	6.2	1.05	0.169
66	60	0	120	0	6.25	1.11	0.179
67	0	96	0	132	6.3	1.06	0.171
68	60	0	120	0	6.35	1.12	0.181
69	0	96	0	132	6.4	1.07	0.173
70	60	0	120	0	6.45	1.13	0.183
71	0	96	0	132	6.5	1.08	0.175
72	60	0	120	0	6.55	1.14	0.185
73	0	96	0	132	6.6	1.09	0.177
74	60	0	120	0	6.65	1.15	0.187
75	0	96	0	132	6.7	1.1	0.179
76	60	0	120	0	6.75	1.16	0.189
77	0	96	0	132	6.8	1.11	0.181
78	60	0	120	0	6.85	1.17	0.191
79	0	96	0	132	6.9	1.12	0.183
80	60	0	120	0	6.95	1.18	0.193
81	0	96	0	132	7	1.13	0.185
82	60	0	120	0	7.05	1.19	0.195
83	0	96	0	132	7.1	1.14	0.187
84	60	0	120	0	7.15	1.2	0.197
85	0	96	0	132	7.2	1.15	0.189
86	60	0	120	0	7.25	1.21	0.199
87	0	96	0	132	7.3	1.16	0.191
88	60	0	120	0	7.35	1.22	0.201
89	0	96	0	132	7.4	1.17	0.193
90	60	0	120	0	7.45	1.23	0.203
91	0	96	0	132	7.5	1.18	0.195
92	60	0	120	0	7.55	1.24	0.205
93	0	96	0	132	7.6	1.19	0.197
94	60	0	120	0	7.65	1.25	0.207
95	0	96	0	132	7.7	1.2	0.199
96	60	0	120	0	7.75	1.26	0.209
97	0	96	0	132	7.8	1.21	0.201
98	60	0	120	0	7.85	1.27	0.211
99	0	96	0	132	7.9	1.22	0.203
100	60	0	120	0	7.95	1.28	0.213
101	0	96	0	132	8	1.23	0.205
102	60	0	120	0	8.05	1.29	0.215
103	0	96	0	132	8.1	1.24	0.207
104	60	0	120	0	8.15	1.3	0.217
105	0	96	0	132	8.2	1.25	0.209
106	60	0	120	0	8.25	1.31	0.219
107	0	96	0	132	8.3	1.26	0.211
108	60	0	120	0	8.35	1.32	0.221
109	0	96	0	132	8.4	1.27	0.213
110	60	0	120	0	8.45	1.33	0.223
111	0	96	0	132	8.5	1.28	0.215
112	60	0	120	0	8.55	1.34	0.225
113	0	96	0	132	8.6	1.29	0.217
114	60	0	120	0	8.65	1.35	0.227
115	0	96	0	132	8.7	1.3	0.219
116	60	0	120	0	8.75	1.36	0.229
117	0	96	0	132	8.8	1.31	0.221
118	60	0	120	0	8.85	1.37	0.231
119	0	96	0	132	8.9	1.32	0.223
120	60	0	120	0	8.95	1.38	0.233
121	0	96	0	132	9	1.33	0.225
122	60	0	120	0	9.05	1.39	0.235
123	0	96	0	132	9.1	1.34	0.227
124	60	0	120	0	9.15	1.4	0.237
125	0	96	0	132	9.2	1.35	0.229
126	60	0	120	0	9.25	1.41	0.239
127	0	96	0	132	9.3	1.36	0.231
128	60	0	120	0	9.35	1.42	0.241
129	0	96	0	132	9.4	1.37	0.233
130	60	0	120	0	9.45	1.43	0.243
131	0	96	0	132	9.5	1.38	0.235
132	60	0	120	0	9.55	1.44	0.245
133	0	96	0	132	9.6	1.39	0.237
134	60	0	120	0	9.65	1.45	0.247
135	0	96	0	132	9.7	1.4	0.239
136	60	0	120	0	9.75	1.46	0.249
137	0	96	0	132	9.8	1.41	0.241
138	60	0	120	0	9.85	1.47	0.251
139	0	96	0	132	9.9	1.42	0.243
140	60	0	120	0	9.95	1.48	0.253
141	0	96	0	132	10	1.43	0.245
142	60	0	120	0	10.05	1.49	0.255
143	0	96	0	132	10.1	1.44	0.247
144	60	0	120	0	10.15	1.5	0.257
145	0	96	0	132	10.2	1.45	0.249
146	60	0	120	0	10.25	1.51	0.259
147	0	96	0	132	10.3	1.46	0.251
148	60	0	120	0	10.35	1.52	0.261
149	0	96	0	132	10.4	1.47	0.253
150	60	0	120	0	10.45	1.53	0.263

The Segment Pro output is used to determine the amount of each wood species (wenge and yellowheart) that is required to build the piece. In this design each row of segments is 0.14 inches thick, and each row has 180 segments. All the segments for a given row will be the same width. The segment width for a given row is determined by the row diameter. The segments are cut from thin slats that are 0.14 inches thick, 0.75 inches wide and 20-24 inches long.

To reduce the number of table saw cuts the slats are taped up as stacks of four slats. These taped up slats are referred to as a stick. In this way, a single table saw cut will yield four segments of almost identical size.

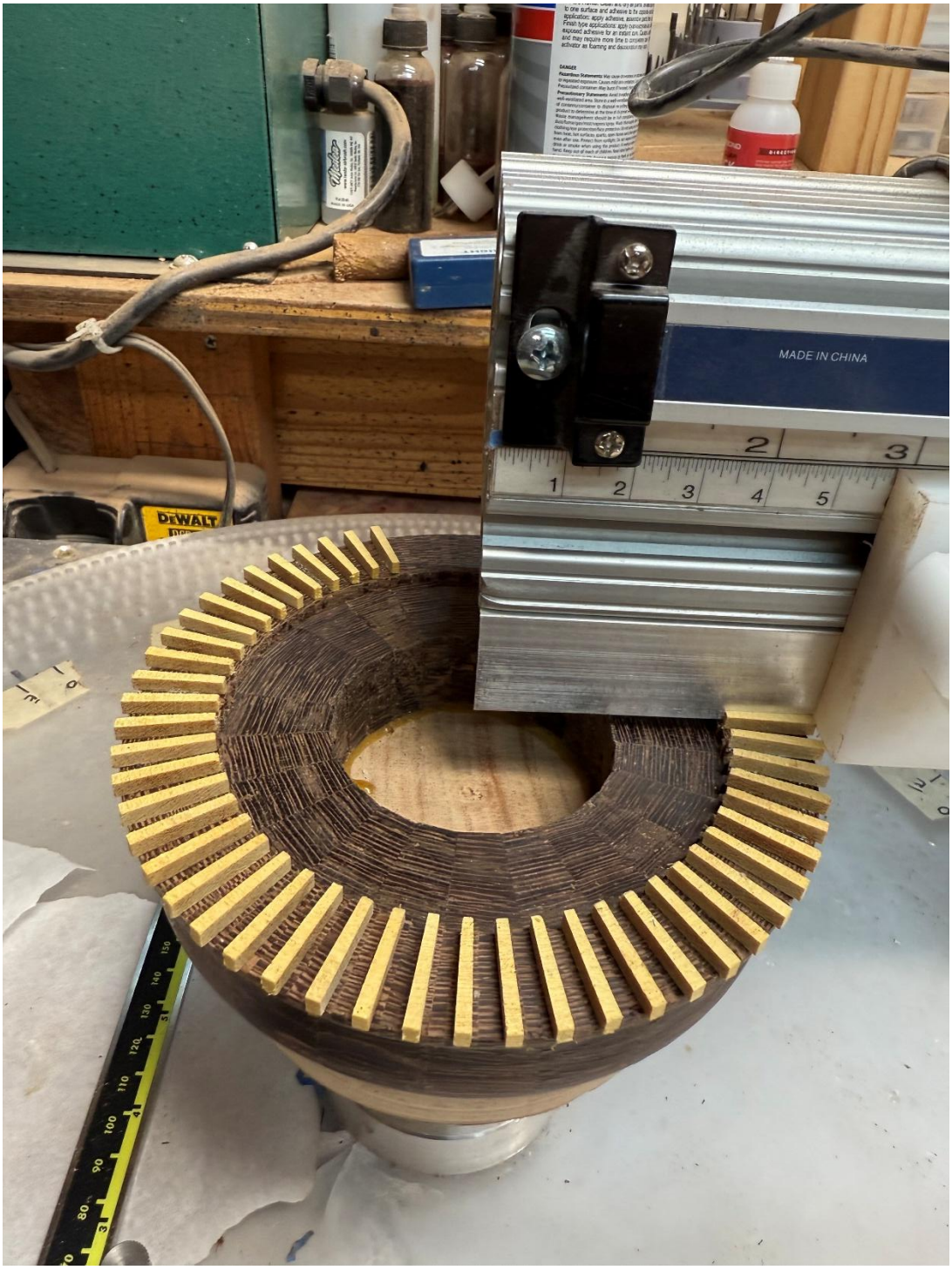


A special jig known as a sled is used to cut the sticks into segments. The two fences on the sled are adjustable and the angle between the sled fences must be exactly 2 degrees (180 segments by 2 degrees = full 360 degree circle) for this project. It is critical that all segments for a given row be almost exactly the correct width. If the size of one or more segments in a row varies too much the subsequent or previous rows will not line up correctly. In a piece this detailed, with very narrow segments (0.1 inch - 0.135 inch) the width of each segment must be within 1-2 thousandths of an inch of the correct width.



As segments are cut, they are put in bins by width. Frequently segments that are unusable for the current row may be usable later for rows of larger or smaller diameter.

I use a Tom Lohman jig for adding rows. This jig is the larger of the two jigs Tom sells. This jig can produce rings of up to 288 segments. The jig has an indexing disk (see opaque plate at bottom) with index stops for the various segments/row. This piece uses the index stops for 180 segments/ row. The piece starts on a faceplate with a waste block.



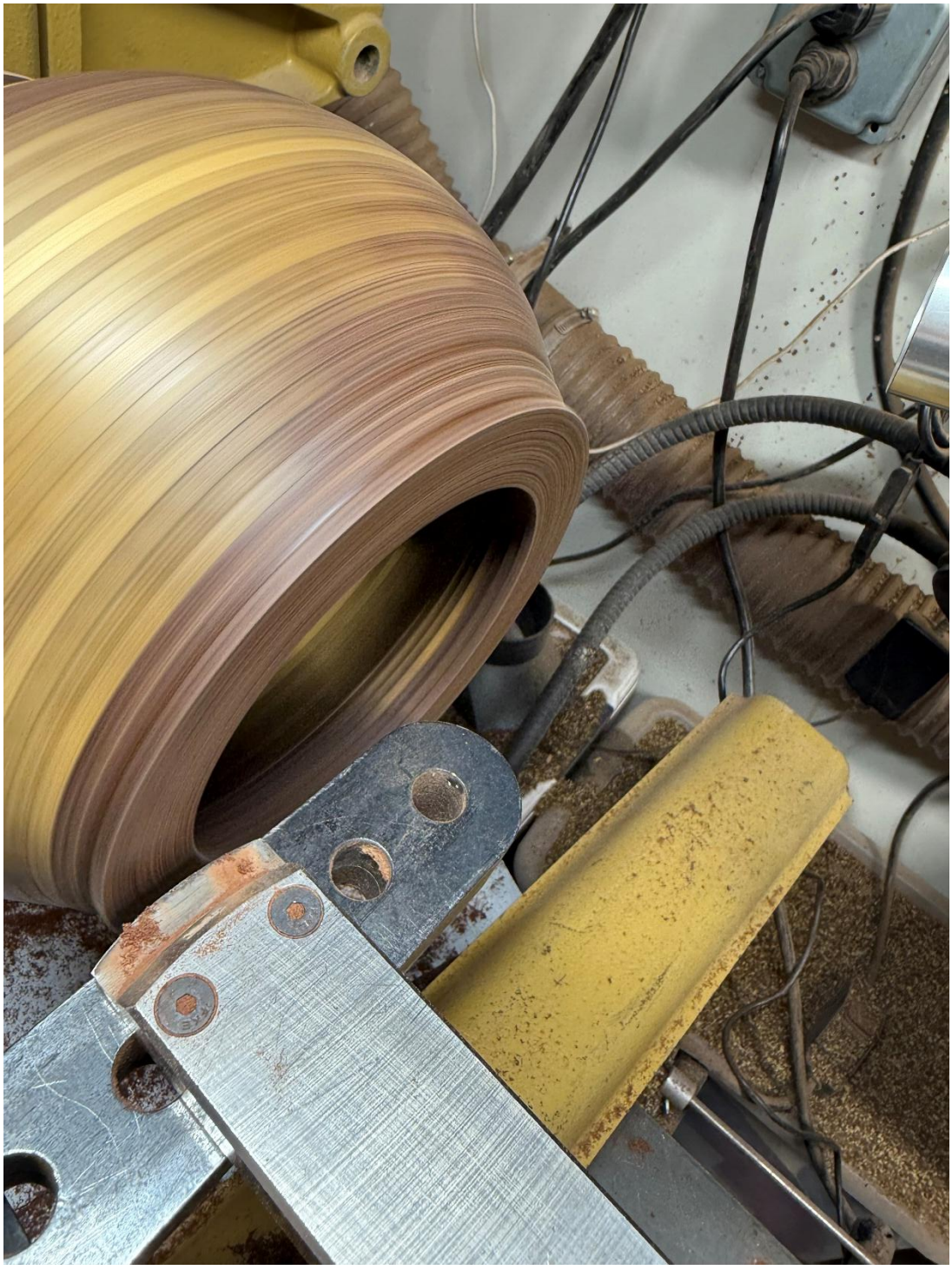
In Tom Lohman's technique every third segment is glued for a row. This leaves spaces to insert two segments between the glued segments. I use Titebond Thick and Quick glue for gluing these segments. With Titebond Thick and Quick glue the segments only need to be pressed in place for 5-6 seconds before moving to the next segment index position. I use tweezers to place and press each segment.

Once every third segment is glued in place the in-between segments can be inserted. I use Titebond II glue for this step. Titebond II is easier to apply, has longer worktime and provides some slickness when pressing in the in-between segments. The glue can be applied liberally as squeeze-out is not an issue. Any squeeze-out will be removed when the row is flattened on the lathe.

Once a segment pair is inserted, they must be pressed into position.

After all the segments have been glued for a row, the piece is taken to the lathe to flatten the row. Each row must be “perfectly flat” before the next row is applied.

I use various negative rack scrapers to flatten the rows. It is important that the outside top edge of a flattened row is crisp.



I use a straight edge across the row to verify the row is flat and the outside top edge is crisp. After adding some rows, the outside of the piece is shaped. The inside is then hollowed to uniform wall thickness. Shaping the outside and hollowing the inside incrementally minimizes the reach required when hollowing the inside of the piece. After the last row is complete a parting tool is used to remove the piece from the faceplate. The piece in reverse-chucked using a Cole jaw chuck and the bottom is shaped.

Apply finishes. This piece is named Beads. The piece is finished with Minwax Warm Gloss wipe-on polyurethane.