

I am sure that great mathematician Archimedes, was also a woodturner. He famously claimed that he could lift the Earth off its foundation and turn if he were given one solid point, and a long enough lever. In my quest to find a way to accomplish my ideas I was far away from such a blatant claim. I was humbler but I need a solid and reliable Common Reference Point.

1. Common Reference Point.

And this is what unites all three jigs. Central reference point.

Why so? I am dealing with two-three separate spaces:

1. Flat and balanced piece of wood.
2. Lathe
3. Table saw or Band Saw
4. Lathe again

It must be a perfect match, perfect centering while transferring wood blanks between these spaces – simple but reliable and quick to reproduce again and again.

2. Blanks must be flat from the lathe point of view. Simple flattening with a planer wouldn't work as there will be slim but noticeable differences.
3. I put them on face plate of warm screw and flatten on lathe.
4. It is there on lathe where I add low profile waste block and create a reference point.
5. Why low-profile waste block. To comment.

Interrupting myself, let me comment on where this all started.

With **Oriental box idea.**

Jimmy Clews. Chad Eames. Tomislav Tomasic. Jason Breach Axminster company representative. Many other turners have a say on the topic on YouTube.

I learned how to cut 4-sided rectangular blank or how to convert 4-sided into 8-sided.

To show/draw simple jig.

But immediately question surfaced: why 8-sided? What about 6-sided or 7-sided or 9-sided or 10-sided or... 11-sided, 12-13 sided?

Because dividing into two only doubles. Never mind accuracy...

In order to achieve absolute precision and repeatability, I needed a common precise reference point.

Based on already existent **One-Way tail stock attachment.**

All my future efforts were aimed at imitating and matching it.

As close as possible. Such a way that there will be no or virtually no lateral shifts/movements in joints.

How did I create these bolts? Trial and error.

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Project #1 Oriental box. Reference to Pagoda.

1. To prepare a round Well DRY blank of desired height.
2. To flatten both sides.
3. To glue with CA or epoxy (longer/better) two shallow waste blocks to your wood blank promptly flattening this blank on the lathe. Importance of each time creating reference holes.
4. With compass and a ruler to Tout number of sides to your liking using simple formula:

(Draw on white board)

5. To draw lines using fine-tip permanent marker to outline shape of your box.
6. To transfer blank to cutting jig
7. Using Band Saw to cut scallops off!
(To mention how quality of cut depends on tuning of bandsaw)
8. To transfer blank back to lathe. To half-empty it and wait a day (week?) minimum. To finish box later not the same day.
9. To cut the lid the same way but to create recess first. (To wait after first cut)

Improving bandsaw marks was an issue. Better now.

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Project #2 polygonal platter (top of the vase, etc.)

1. To prepare dry flat piece of lumber.
2. To mount on late with face plate or warm screw.
3. To flatten. To glue waste block only to one side.
4. To create a reference hole.
5. To reverse and flatten on the other side using Damiano's flattening jig.
6. To mark all necessary sides using simple formula.
7. To transfer to table saw jig.
8. To cut scallops.
9. Job is done. The rest is silence (platter).

Project 3. Inverse concave box

1. To prepare blank (from close grain wood) glue waste blocks.
Almost like with Oriental box...
2. To practically finish box except final emptying stage making lid very tight so it can be held together with the body under pressure.
3. Insert into jig.
4. Enjoy the fresh air!

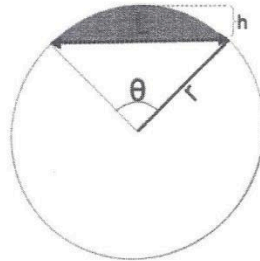
Radius of a circle based on the chord length and arc height.

$$r = \frac{L^2}{8h} + \frac{h}{2}$$

where

L is the chord length

h is the height above



the chord

$$r = \frac{L^2}{8h} + \frac{h}{2}$$

where:

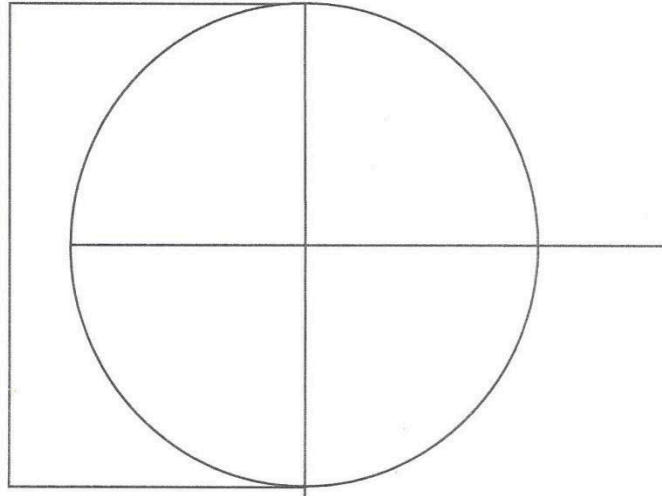
- r is the radius of a circle
- L is the length of the chord. This is the straight line length connecting any two points on a circle.
- h is the height above the chord. This is the greatest distance from a point on the circle and the chord line.

A useful application of the math construct is in construction where the formulas computes the radius of an arch.

Inverse concave box

"Negative cut" formula

L- Height of the object



H Depth of the cut

Formula: $R = H/2 + L \times L/8H$

R - Distance to pivot

L	H	R=
100	10	130

Chord Length = $2 \times r \times k = d \times k$ (where r is radius, d is diameter)

Number of corners	k
6	0.500
7	0.434
8	0.383
9	0.342
10	0.309
11	0.282
12	0.259
13	0.239
14	0.223
15	0.208
16	0.195
17	0.184
18	0.174
19	0.165
20	0.156
21	0.149
22	0.142
23	0.136
24	0.131