International Association of Penturners

Studies in Segmenting V:
Squares and Triangles

Author: Mark James June 2019

Some design elements of these blanks are similar to those described in previous Studies in Segmenting Tutorials, but the construction process is very different and presents different challenges.

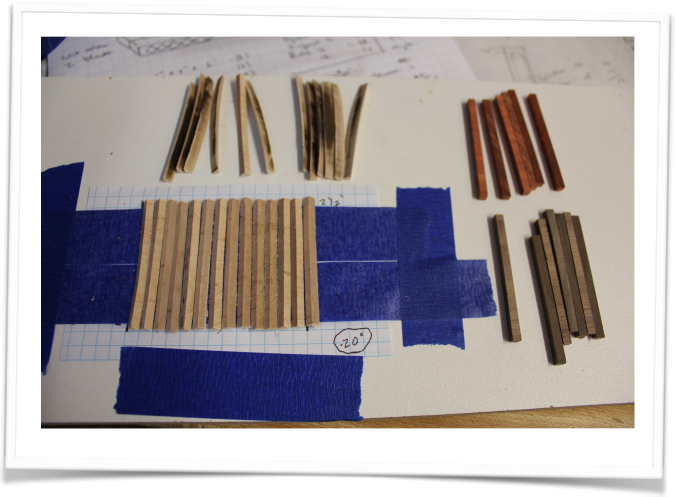
Alternating layers of triangles and squares of different dimensions, colors and patterns is the basic design. Precision and care as each step is accomplished is crucial.

All pieces begin as equal dimension square rods. I want side grain to be on the ends of the rods, so I cut my lengths from thin stock material. I am aiming for a 3 layer "Sandwich" about 2.5" wide (L-R), 2" long (Top-Bottom), and close to .25" thick. The pictures below of the square rods were 2" long. These dimensions are very approximate (At the end of this tutorial I will explain some of the math).

I then use a sanding block with a 45 degree end, and double-sided tape to temporarily hold some of the rods and sand them down into "triangle" rods. This will be a trial and error process until you get the hang of it. I always wear a face shield, never stand in front of the disk sander, expect failures and a few "fireworks".

I made a simple template out of graph paper and blue painters tape, with the tacky-side up to hold the rods in alignment. Alignment is important.

Note: At times, maple rods have begun to curl soon after I have them sanded, so I usually sand 3-4, then immediately place them on the tape-grid. Padauk, Ebony, Walnut and Yellow Heart have not given me any problems.



After the first layer of triangles are placed and aligned on the grid, I use a small paint brush to place wood glue in each angled slot, then place the next layer of square rods on. I work quickly at this point to minimize the glue setting too early - adjustments are always needed.

After all three layers are in place, aligned and glue has been applied, I place a layer of wax paper on the top, place a board on top of that and then a 10 lb weight to keep even pressure on the “sandwich.” I have not had any problem carefully removing the

blue tape after the glue is dry. After lightly sanding the “sandwich to remove excess glue, I inspect it for any flaws.

If all looks good, I then glue a veneer on each side of the “sandwich” and place back under the weighted press. I do tend to work in phases and allow the glue to dry overnight, so these take 3-4 days to construct. After the veneers have fully cured, you then have some fun design choices: Cut the “sandwich” in half and make several 2 sided blanks like that displayed below on the left, or construct a 4 sided blank as discussed in the previous Chevron tutorials (using 4 corner pieces), or get creative and make a 3 sided blank. Each has their appeal and the only key consideration is to accurately mark the ends between the pattern prior to turning/drilling to avoid tapers

3 sided design

4 sided design

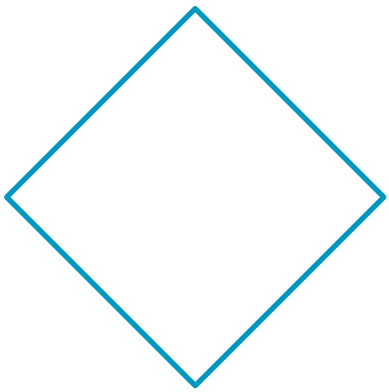
The Fun Stuff

While I have a very poor background in math, with the advent of the internet and a few basic searches, I was able to get the information I needed.

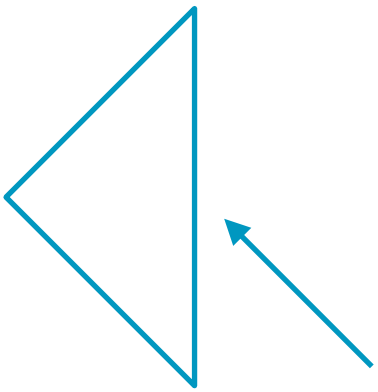
As long as your square rods are precisely square, and you sand the triangles just to the corners, you can estimate your final "sandwich" dimensions with reasonable accuracy.

A square, sanded in half, will result in an isosceles right triangle, of which the height (h), is 1/2 of the base (A). (Some guy named "Euclid" had input to this stuff).

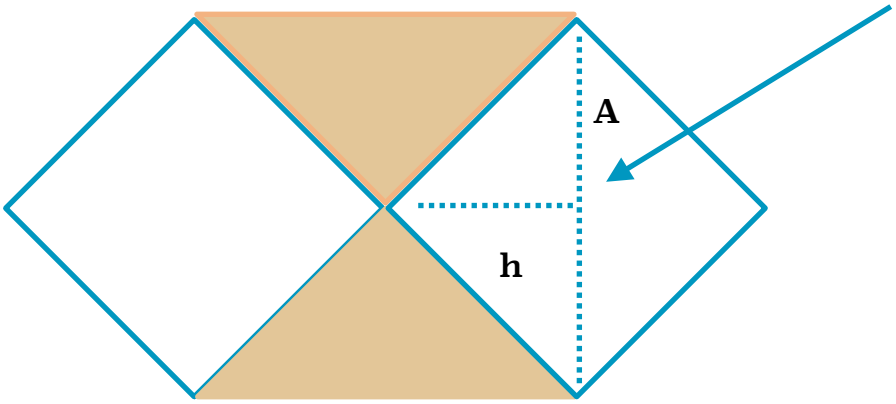
This, sanded in half



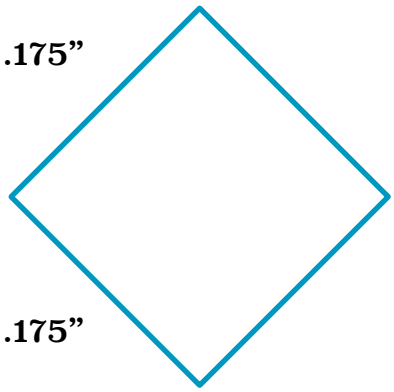
Will give you this

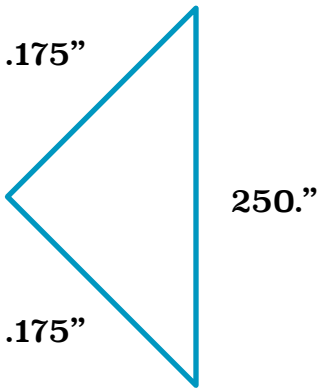


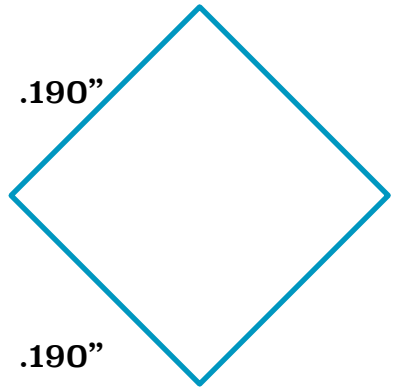
The height of your "Sandwich" (minus any later veneers), will be this side (A).

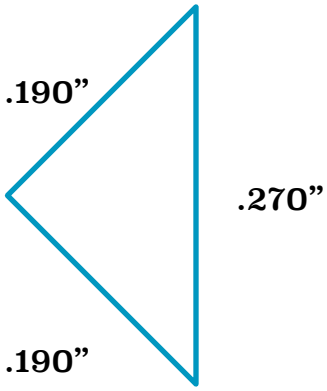


Without getting into the actual formula (calculating a hypotenuse), if you start with a square, .175" on each side (legs), the point-to-point long side (hypotenuse) will then be .25". If the square is larger (e.g., .190", then the point-to point side with be correspondingly longer, .270" resulting in a thicker "Sandwich."









Before I ride off into the sunset, here is an actual calculation of dimensions that I used for some 2 sided Ebony and Yellow Heart Blanks. We are working backwards now.

I wanted a FINAL segmented "sandwich" thickness of .250", including 2 veneers, each .033". So I subtracted the veneers (.066") from the final thickness (.250"), and got a dimension of .184" for the hypotenuse. Working backwards (in the link above), this indicated the sides of my squares needed to start as .130", the sanded triangle would be .180" on the long side, and after gluing the 2 veneers on the "sandwich" the final thickness should be close to .246".