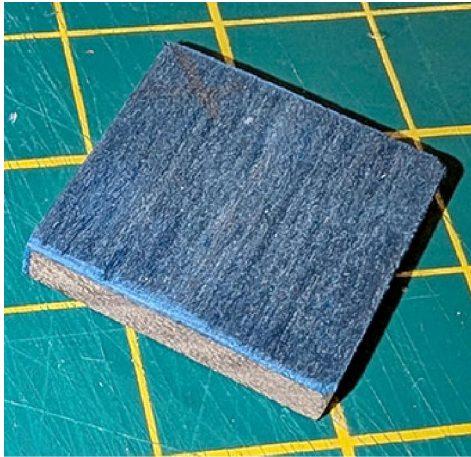


veneered 360 HERRINGBONE ASSEMBLY INSTRUCTIONS

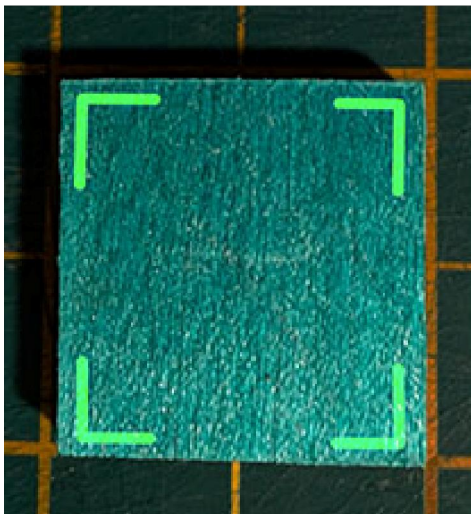


These instructions are intended to be used in conjunction with or as a supplement to the herringbone 360 tutorials by Don Ward or Darrin McArthur as most of the assembly process is exactly the same. If you have never attempted to make one of these blanks before I would recommend you try making two or three by Don or Darrins method to get used to the processes, pitfalls, head scratching and general heartache that you will encounter before attempting this.

In this file I will show my approach to the tiles, how I make them and their orientation within each layer of the blank as these are the main differences. The tiles are all timber and dyed tulip wood veneer and I use wood glue for bonding as this gives me time for little final adjustments during the construction process.

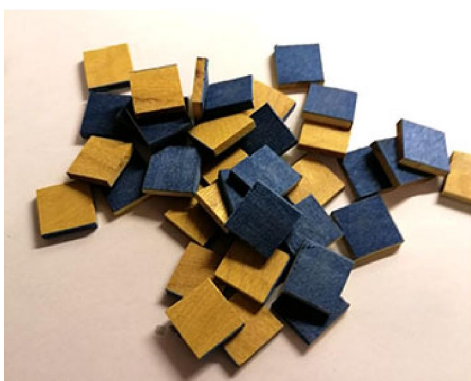


Each tile has veneer on one face and an adjacent side forming an L shape around the tile. It is important that each tile is same thickness. I usually make the tiles around 3.5mm to 4.5mm (1/8 to 3/16 inch) thick, anything larger than 6mm (1/4 inch) the tiles may lose their rectangular appearance when the final blank is turned down, this is important especially if you intend to make a thin pen with the blank.



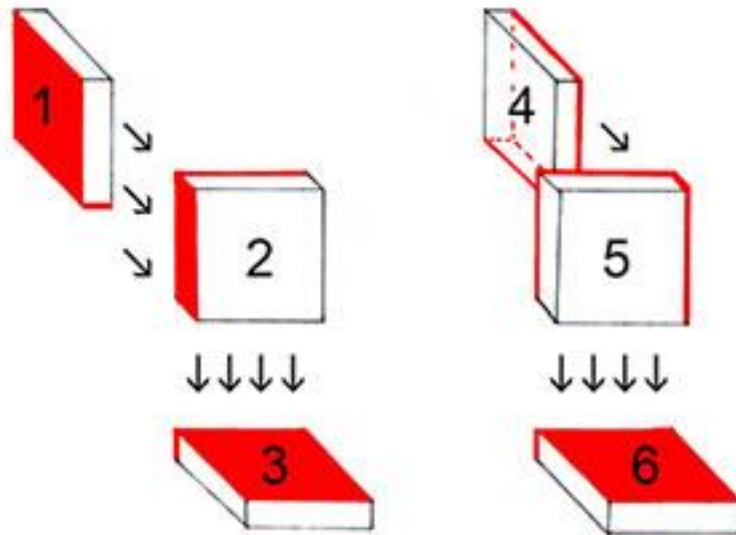
While it's good practice to have each tile a perfect square, if your machinery is anything like mine sometimes you may need to rework or resquare a tile and I'll talk about that at the end of the instructions. What is important is that the angles of each of the sides and faces are perfectly square with each other. The size of the tiles usually depends on the timber material I have available to start with but in general I make them 20mm to 25mm square (13/16 to 1 inch). An important point to

remember the bigger you make the tiles the more you have to remove when turning the blank down.



Using the sizes and thickness I've discussed, if I make 72 tiles, using 6 tiles in each layer and therefore 12 layers, I can normally get a finished blank to be 70mm (2.5 to 3 inch) long once the ends have been trimmed from the blank. Obviously if you need a longer blank than this then more layers will need to be added.

TILE ORIENTATION

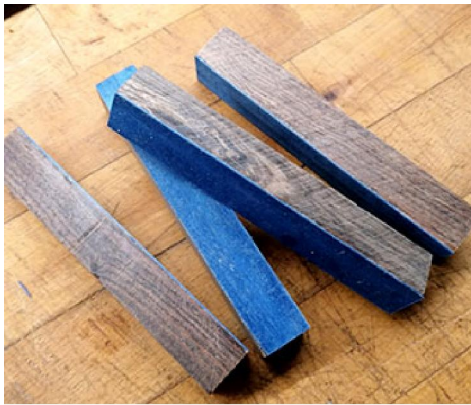


This is my master plan for the tile orientation, unfortunately my skills with 3D graphics are not entirely up to scratch but I hope you get the picture. If you have already made a 360 herringbone blank before you'll understand the concept in the diagram. I'll go through each step in the construction anyway so hopefully all will become clearer. The six tiles make a layer and tiles 1, 2 and 3 when put together are the exact mirror image of 4, 5 and 6 when also put together. Eventually both halves will come together to complete the layer.



A completed layer can be seen here and multiple layers of the same thing gives an impression of highlighted or accented rectangles in the final blank.

MAKING THE TILES



In this example I started with some blocks of timber and bonded veneer on one face with the grain of the veneer running in the same direction as the grain in the timber. Trim off any excess veneer.



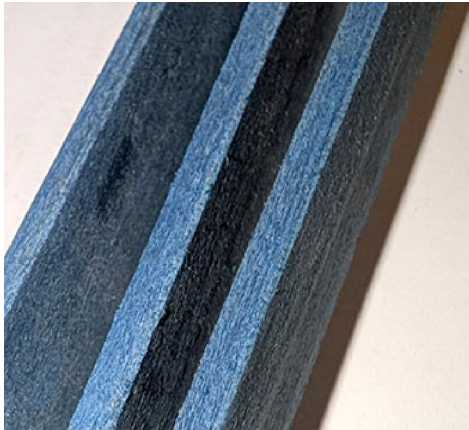
I then ran the blocks through my bandsaw cutting through the veneered face to give strips approximately 5mm thick. Seems obvious but is the easiest way to get veneer on the thin face of what will eventually be a tile.



Because my bandsaw tends to drift a little I then run the strips through a thicknesser, it's very basic but does the job well. This also removes any saw marks from the faces of the strips but more importantly guarantees each strip is exactly the same thickness. If you are confident your bandsaw is set up and cuts true there is no need for this stage.



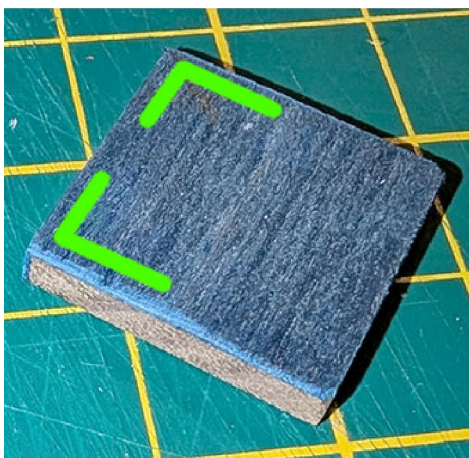
Then bond veneer to the face of the strips, again with the grain of the veneer running in the same direction as the strip of timber. I usually make the veneer slightly larger than the strip taking care to remove any excess glue with a damp cloth before clamping the veneer to the strip. This will guarantee a good L edge/face. When the glue has set remove any excess veneer with a sharp craft knife.



Lightly sand any excess glue or overhang veneer you may have missed with fine sandpaper taking care not to remove too much veneer from the thin face/edge.



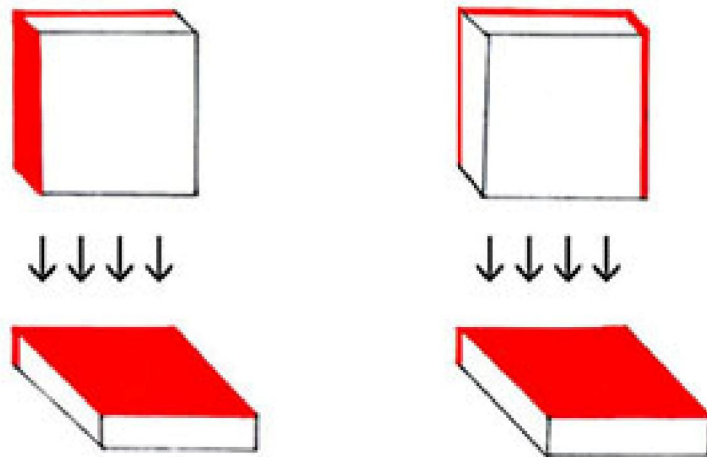
Finally I cut the strips in to square tiles, I have a purpose built crosscut sled for my mini table saw that gives me fairly accurate square cuts. Remember to measure the width of the strips as this will give you the size to cut for your tiles and allow for the width of your saw blade cut as well.



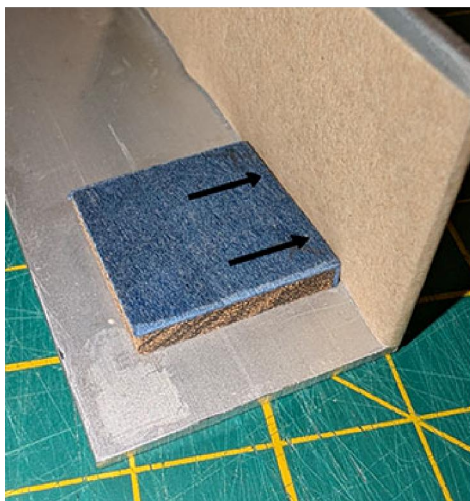
Remove any rough edges or strands left over from cutting with fine sandpaper again taking care not to remove too much veneer. Check that the angles are exactly square 90 degrees especially these angles. I usually mark the good corners with a pencil, set aside any tiles that are not exactly square on these corners for reworking later. Repeat this process until you have enough tiles for your blank.

CONSTRUCTING THE LAYERS

There is more than one way to orientate the tiles to give the accented rectangular effect we are looking for but I have been using this design for a while now and it seems to work quite well.

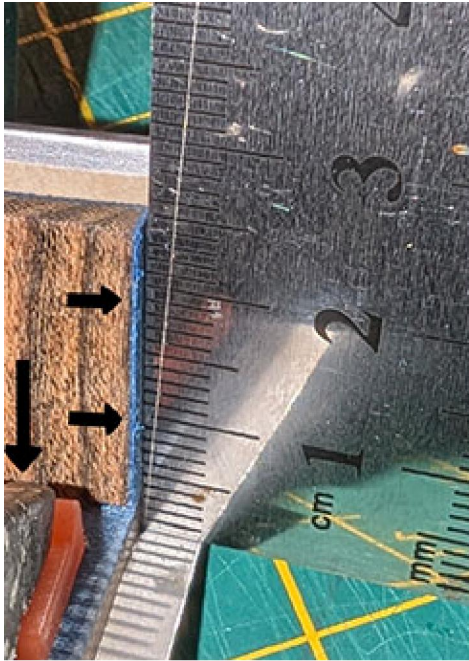


I start by constructing what I call L segments, I make them in pairs and try to keep the same pairs together throughout the process. You don't have to do this but it's a system that works for me.



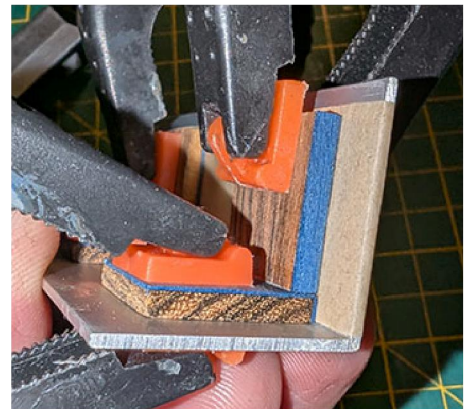
I use aluminium square brackets about 80mm (3 inch) long as jigs and either end of the brackets are perfectly square to the length as I need to use these ends later in construction. I cover one of the inner sides of the bracket with grease proof paper or baking paper or parchment being careful not to let any overlap on to the other inner side. This will stop any excess glue sticking to the bracket and is easily replaced if torn or if any glue deposits are left on it after use. Place two tiles

on the bracket at either end so that the smaller veneered face is pushed hard against the paper and then clamp them making sure the tiles are absolutely square to the bracket.

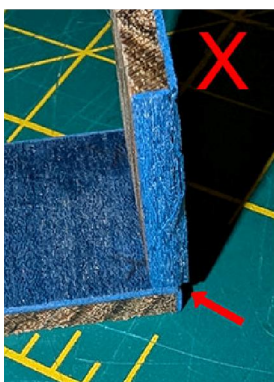


Take a tile and apply a small amount of glue to an edge and orientate it as in this example. Push it firmly down on to the bottom tile so that any excess glue is pushed out. I use a steel ruler to align the two tiles, place it against the bottom tile and slide the top tile until both edges are in alignment. It's easy to wipe off any excess glue that may have transferred to the steel ruler. Then clamp the top tile in position and check that either tile has not moved. Remove any excess glue from between the two tiles, I use a small damp paintbrush for this. Repeat this process with the other bottom tile on the bracket but as a

mirror image of this one.

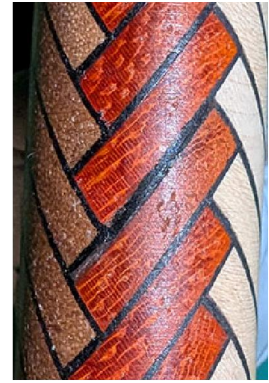
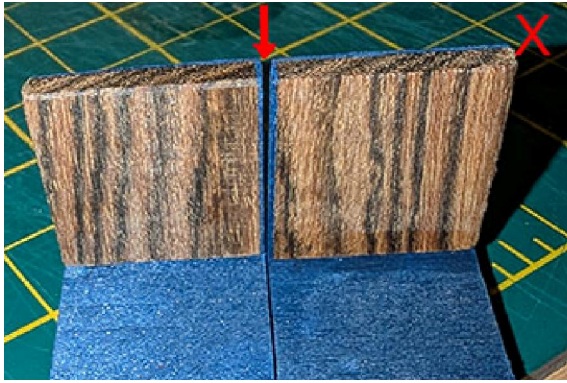


Once the glue has set remove the L segments from the bracket, sand off any excess glue or paper fragments with fine sandpaper and check for any misalignments.

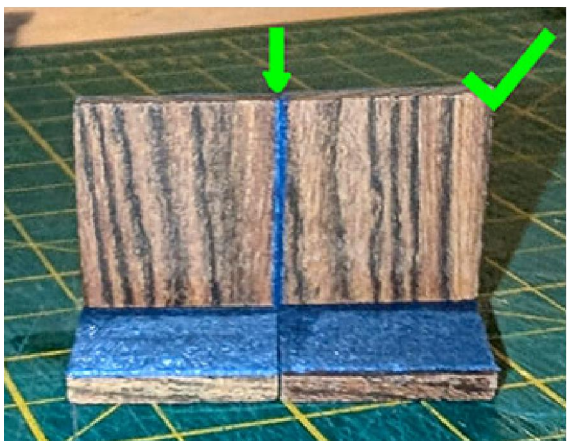


An overhang left unchecked at this stage, even a small one, can leave voids and ruin the final blank.





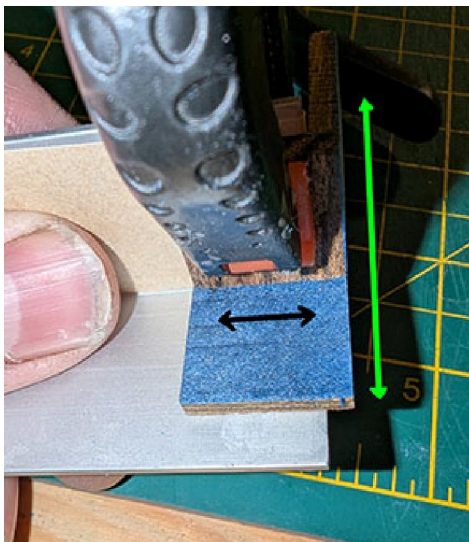
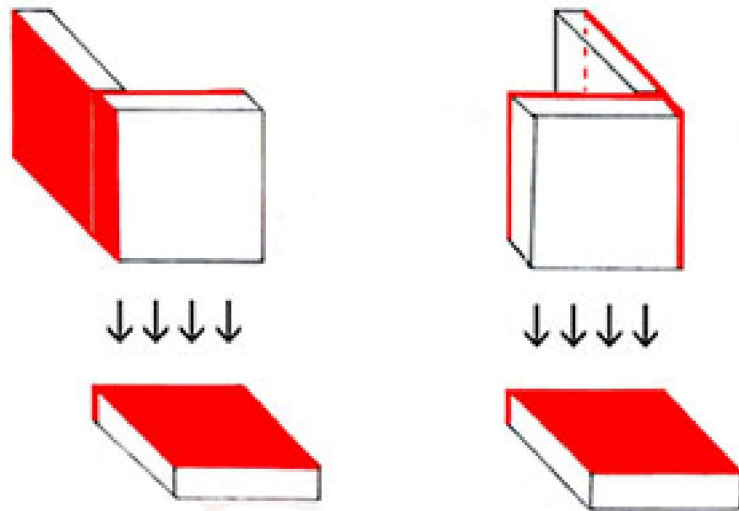
Bring both L segments together with the small veneered faces facing each other, if there are any gaps it means either something has gone wrong in the gluing stage or the tiles weren't perfectly square to begin with. Continuing with these segments would pull the entire layer out alignment and again ruin the blank.



Ideally this is what you're looking for, no gaps and as square as possible.

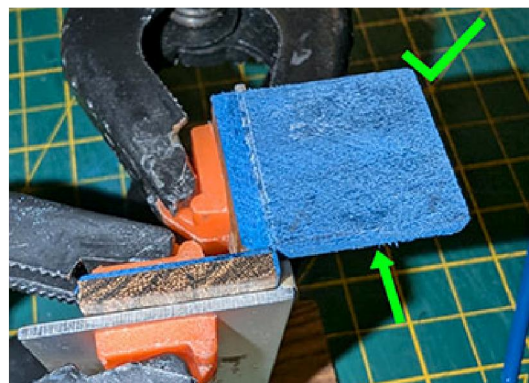
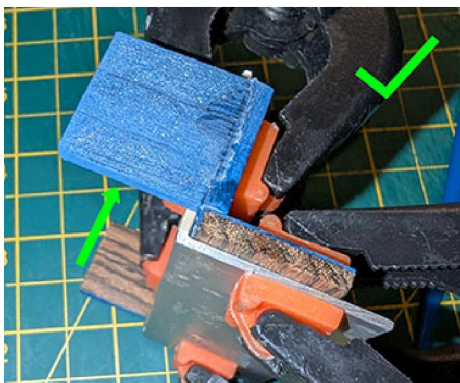
I have quite a few aluminium brackets and usually make these in batches of ten to twelve, unfortunately that means lots and lots of clamps and I never seem to have enough.

STAGE 2

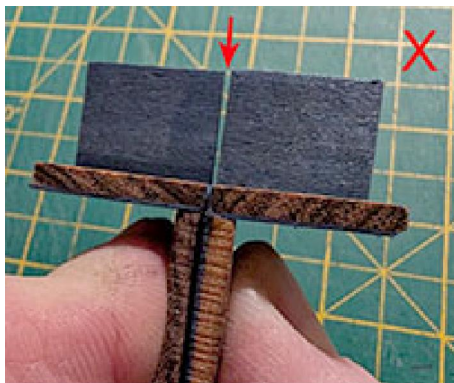


Stage 2 of the construction involves using the square ends of the aluminium brackets. Again place a tile with the smaller veneered face hard against the paper at either end of the bracket, only this time slightly hanging over the edge, place a L segment on top and push in and down on the bottom tile and clamp it in place. You can now move the bottom tile until aligned. Clamp the bottom tile now, remove the L segment and apply a little glue to it. Push the L segment firmly in and down on the

bottom tile again pushing out any excess glue, clamp it and remove any excess glue, check that everything is still in alignment. Repeat this process with the tile on the opposite end of the bracket but as a mirror image.



So again we remove the assembled mirror halves from the bracket, sand off any excess glue or paper fragments and check for any misalignments. Bring the two halves together and check for any gaps.



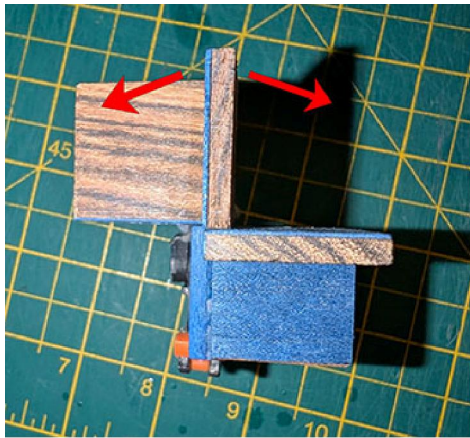
Whilst clamping these two halves together may reduce the gap or even remove it, it would pull the entire layer out of alignment again and cause gaps ruining the final blank.



Ideally this is what you're looking for, no gaps and as square as possible.

STAGE 3





Stage 3 of the construction involves clamping both mirror halves together. What can happen at this stage, especially if you have chosen to make thin tiles, is the halves can drift like the cover of a book under the pressure of the clamps.

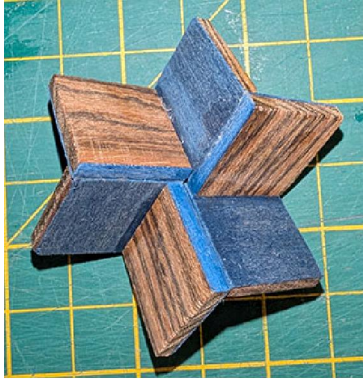


I use small aluminium brackets covered in baking paper to ensure the two halves are absolutely square. Remember to remove any excess glue from between the tiles after gluing, then place in the little bracket and clamp it on both sides.

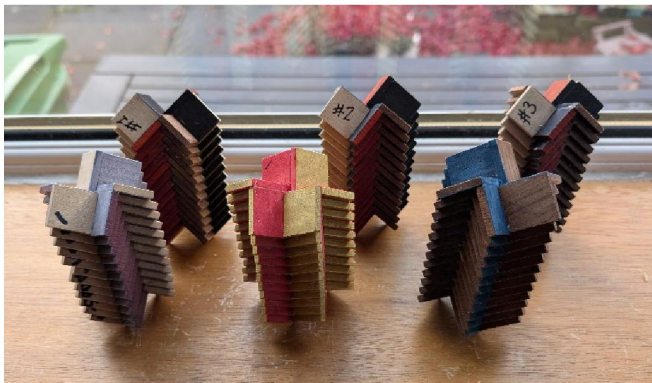


Place a small bracket on the opposite side of the layer and repeat with clamps. This might seem a little excessive but can make a big difference in keeping the halves square whilst the glue sets.

Remove the clamps and small brackets when the glue has set, check for any drifting or misalignment and remove any paper fragments that may have transferred from the brackets.



When you have enough completed layers stack and bond them together in the same process as described in Don or Darrins tutorials, as I've said I use wood glue but you may decide to use epoxy glue at this stage. Using wood glue I can apply lots of it making sure both faces of each layer are completely covered and when the layers are sandwiched together and compressed I can wipe off the excess glue the comes out with a damp cloth, hand towel or small paint brush.



Once I have assembled the blank I usually set them aside for a few days.

CENTERING, DRILLING AND TURNING THE BLANK



Once I'm happy that everything is truly bonded and stable I remove what I call the wings from the blank and square the ends. I then remove any extreme edges from the length of the blank on a disk sander.



At this stage it's quite easy to find the centre of the blank as it will be highlighted by the veneer. I use a small centre drill bit and drill in just enough so I can then locate the blank between centres on my lathe.



I use a prong drive and live centre and turn the blank down to just under 20mm, if you are using pen jaws on your lathe or a pen vice and pillar drill for drilling the blank I'd suggest turning down to around 30 mm. This will keep enough integrity in the blank and avoid any blow out whilst drilling.



The reason I turn down the blank to just under 20mm is so I can mount it in a collet chuck, this keeps even pressure all around the blank whilst drilling. It also means I have less to remove from the blank once it's mounted on a tube or core and ready to be turned to shape. When drilling the blank take short steps removing the bit completely from the blank between each plunge, try and avoid getting too much heat in the blank as well as this can affect the integrity of the blank.

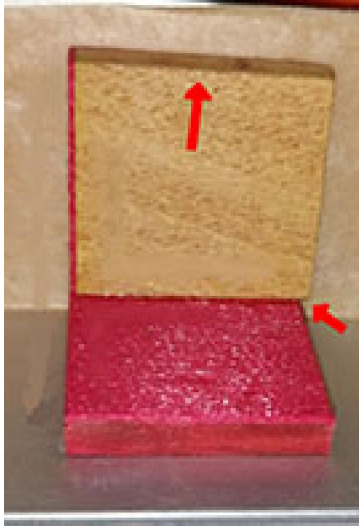
When the blank is bonded to a tube or core and finally ready to be turned to shape I soak the blank in thin CA, this will help keep the blank together as it's turned down. I do this at least two or three times during this process especially as I get close to the required diameter and shape I want. I use a slow rpm on my lathe and take light cuts as the blank can be very fragile at this stage.

REWORKING AND USING REWORKED TILES

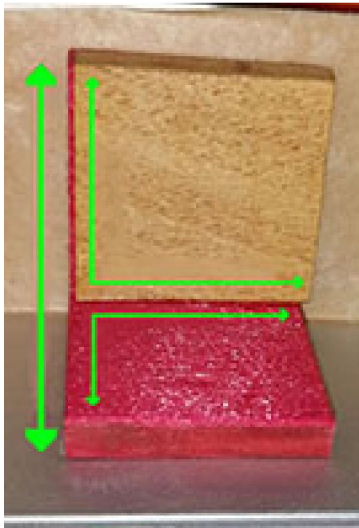
Once you have made a few 360 herringbone blanks and turned them in to pens it becomes apparent that more than 90 percent of the materials you use and put in to making them end up as trimmings or shavings. Also what is on the outside of the blank is of less importance to what ends up in the middle. With that in mind I more often than not rework tiles rather than discard them when they are not quite perfect or square.



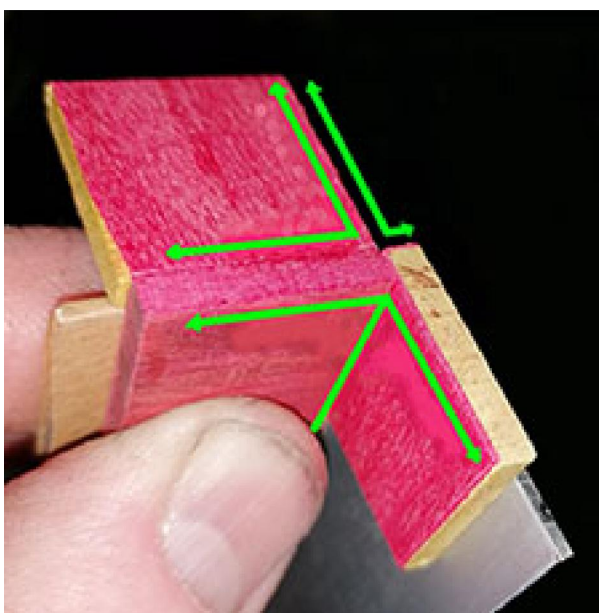
I have a simple jig on my disc sander that allows me to re square the tiles. Unfortunately reworking tiles like this means some tiles end up a little narrower, but are still perfectly usable as long as the edges, faces and angles that will end up on the inside of the blank are true.



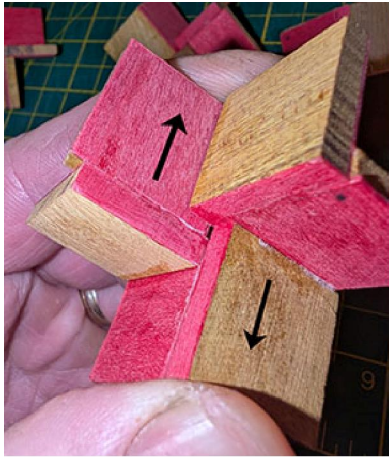
This is quite an extreme example, there's an overhang and the top tile is not even square at the top. The bottom tile has been reworked and is narrower and the top tile was the end of a strip and I only needed it to have enough tiles to make a blank. Its still perfectly usable though.



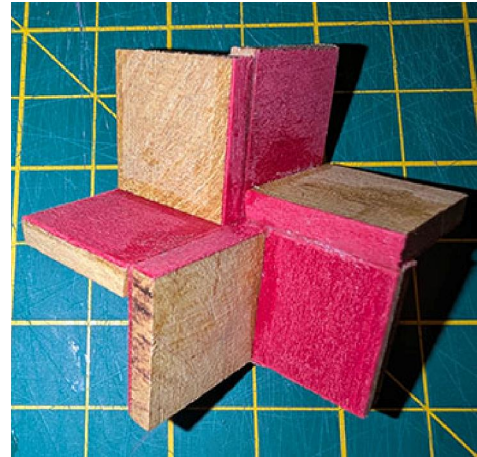
What's important is that these angles and faces are absolutely square and true as these will end up in the inside and the centre of the final blank.



Again in this example you can see some of the outer edges have overhangs or a little missing veneer but the inner angles and faces are square and these will be in the centre of the blank and the flaws will end up on the outside and eventually be trimmed off.



In this example both halves have overhangs or flaws on the outer edges and when brought together will not align. We only need to slide them slightly so the centres align.



This pen had many reworked tiles in it and flaws on the outer edges of the blank but ended up not too bad in the end.

I hope these assembly instructions have been of some help or use, this is only my approach to 360 herringbone blanks. Using wood glue obviously extends the time involved in making them but does allow time for correcting errors or having to use more complicated jigs. These blanks are definitely a challenge and sometimes heart breaking when they go wrong but also very rewarding when it all comes together just right. Good luck.

Thanks to Don Ward, Darrin McArthur and Joseph Schneider from the IAP for their help and inspiration and Dave Fox for keeping me right.