

# Dazzling Patterns

Veneer tiles outlined with colored epoxy make the pattern pop

BY CHRISTOPHER SOLAR

A few years ago I was inspired to make a cabinet that featured a precise geometric pattern on its sliding doors. I made the pattern with pentagons cut from thick veneer. To accentuate the geometry, I wanted strong outlines around each element. So instead of fitting the veneer pieces together seamlessly, I left consistent gaps between them that I later filled with a pigmented epoxy resin. I liked the way those doors turned out, and I've made a number of others since, refining the process along the way. The method I developed could be used for any veneered surface, including tabletops, cabinet panels, or decorative boxes.

The pattern you use could be precise and geometric or more loose and organic—it's up to you. I used a careful arrangement of identical repeating pentagons. Getting the layout right was important, and I used SketchUp to draw my pattern accurately and to decide how to position it on the door panel. Once I was happy with the result, I printed it out at 1:1 scale. You could have the printing done on large paper at an office-supply store, or print out the pattern yourself on multiple pages, as I did, and tape them together. Drawing your pattern full size by hand would also work fine.

## Preparing two panels

As the substrate for the door I selected  $\frac{5}{8}$ -in.-thick particleboard, which provides a smooth, stable surface. I cut the door blank 1 in. oversize in length and width, giving me a margin of  $\frac{1}{2}$  in. all the way around that I can trim off after the veneer work is complete. I cut a second piece of particleboard 1 in. bigger all around than my oversize door blank. This larger piece, which I call the assembly platform, serves both as the place where I assemble the tiles into a pattern, and as a clamping platen that goes into the vacuum bag with the substrate when I glue on the tiles.

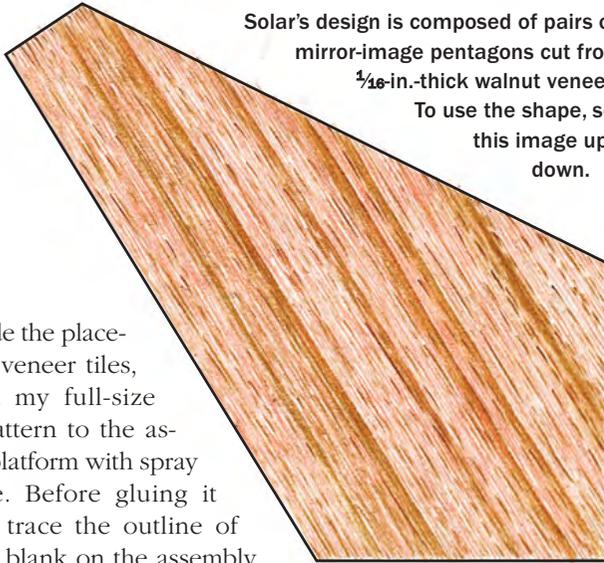


# in Parquetry

## THE BASIC UNIT

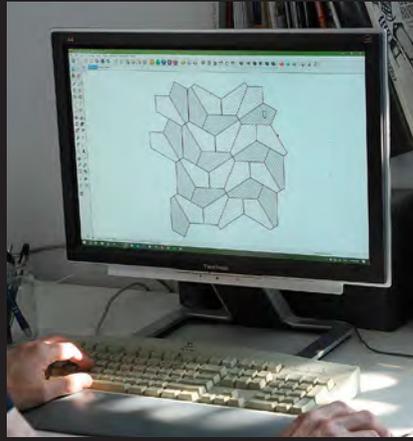
Solar's design is composed of pairs of mirror-image pentagons cut from  $\frac{1}{8}$ -in.-thick walnut veneer.

To use the shape, scale this image up or down.

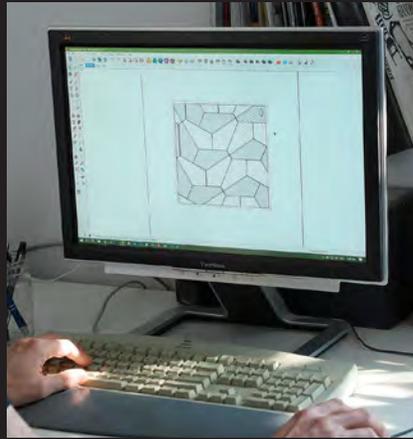


To guide the placement of veneer tiles, I mount my full-size paper pattern to the assembly platform with spray adhesive. Before gluing it down, I trace the outline of the door blank on the assembly platform, and make sure to glue the pattern within those lines. As an alternative, you could skip the paper pattern and draw your tile layout directly on the assembly platform using pencil or marker.

I'm making a sliding door (where the back is not seen), so I use phenolic-impregnated backer paper on the back side. For a hinged door I would use a commercial veneer that matches the veneer on the front. My door panels always have solid edging on all sides, applied after the veneered panel is trimmed. And on this door I wanted to cut a shallow recessed pull into the front face. So I marked out the pull location on the substrate and embedded a block of solid wood that's a little bigger than the routed pull will be.



**Pieced-together pentagons.** Solar worked in SketchUp to create his pattern of nested pentagons, adding pinstripes to represent grain direction. Then he created a frame on another layer of SketchUp and used it to find the best way to crop the pattern (center). He printed out the pattern full size on nine sheets of paper, which he taped together and used as a guide when he glued down the veneer tiles.





## Producing the pentagons

**Trace a template.** A thin plywood template makes quick work of marking out tiles on a sheet of  $\frac{1}{16}$ -in. veneer. The pentagons are not symmetrical, and the pattern is composed of matched pairs. Each tile gets marked with an X or an O depending on which side of the template was up when it was traced.



**Cut this one close.** Bandsaw out the tiles with plenty of margin, except for one long edge, which should be sawn close to the line.



**One edge gets special treatment.** Joint the long edge that was sawn close to the line.



**And saw the end square.** With a sharp blade, a zero-clearance crosscut sled, and a hold-down block to keep the veneer from buckling, saw the narrow end of the tile square to the jointed edge.

When I place the veneer tiles facedown on the assembly platform, following the paper pattern, I need them to stay put but still be adjustable. To that end, I fasten a piece of clear shelf-liner film over the assembly platform with the sticky side facing up. When the paper backing is peeled away you have a clear, sticky film covering the assembly platform, with your pattern showing through. The film is tacky enough to hold veneer pieces in place but gentle enough that

they can be lifted off and repositioned. And the film is easy to remove after the panel has been pressed.

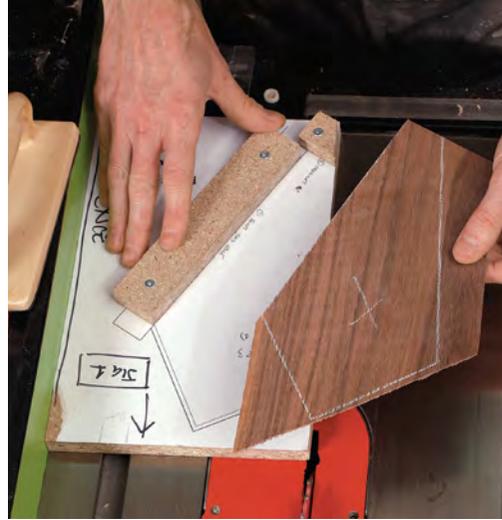
To attach the film to the assembly platform, run a strip of double-sided tape around the edge of the platform, outside the perimeter line of the door panel. Also, put one or two small squares of double-sided tape in the middle of the platform. The film I use, called Contact Paper, comes in 18-in.-wide rolls, which can be overlapped as needed to cover larger panels. Finally, screw a few cleats at the edges of the door outline. These blocks let you put the door panel in exactly the right place during glue-up, and prevent it from shifting as it gets loaded into the vacuum bag. Wrap the cleats in packing tape to ensure they don't get accidentally glued to the door panel.

### Use a template to size the tiles

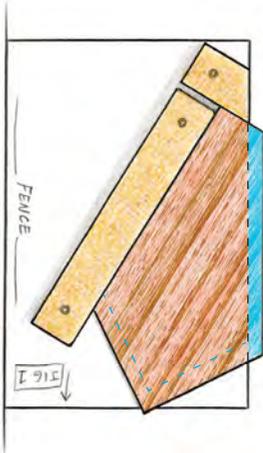
With the assembly platform ready, it's time to cut the tiles. I have used both shop-sawn and commercial veneer for them. The important thing is that the veneer be thick enough to withstand the sanding required when bringing the hardened epoxy outlines flush to the panel. Regular-weight commercial veneer (about  $\frac{1}{40}$  in.) is not really thick enough. I have successfully used commercial veneer as thin as  $\frac{1}{28}$  in. thick. Here I'm using  $\frac{1}{16}$ -in. commercial veneer (certainlywood.com), which gives me ample



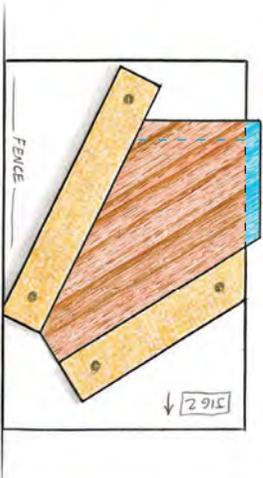
**Triple jigs for the tablesaw.** Using these jigs and the pentagonal platen, Solar quickly produces a stack of uniformly sized, crisp-edged tiles.



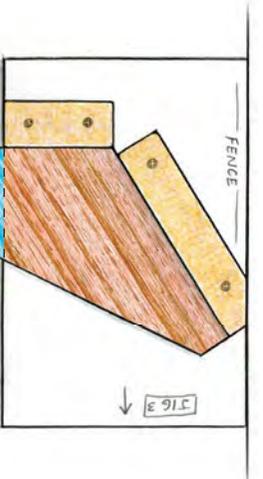
**Fences follow the drawing.** Glue a full-scale copy of the tile drawing to each of the three jigs and fix fences along the appropriate edges. The jigs position the tiles and provide zero-clearance support along the cutting edge.



**Platen for pressure and safety.** A pentagon of MDF (cut to shape using the same jigs) holds the veneer down tight and keeps fingers away from the blade. On this first jig, the tile's jointed edge registers on the long fence.



**Jig Number 2.** With three sides of the pentagon finished, the second tablesaw jig takes care of sawing the fourth edge.

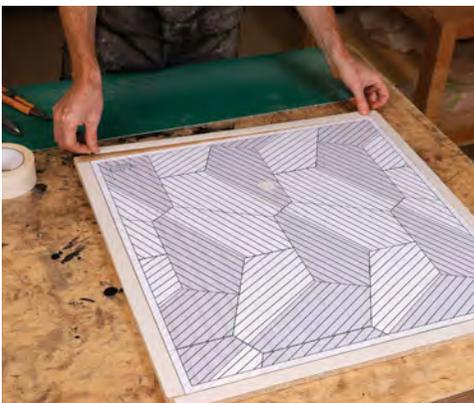


**Move the fence for the last cut.** To use the third jig, you must slide the tablesaw fence to the other side of the blade.



## Lay down the pattern

**Positioning the paper pattern.** First center and trace the door blank on the assembly panel (above), then use spray adhesive to mount the paper pattern, laying it inside the perimeter lines you just drew (right).



**Cover the paper with something clear and sticky.** To keep the veneer tiles in place after he lays them down, Solar covers the whole pattern with a layer of transparent, self-adhesive shelf liner, sticky side up. To hold the liner in place he puts strips of double-sided tape around the perimeter (far left) and adds a few small pieces in the center of the pattern. He lays down the liner and cuts it to size (center), then, having applied a second piece of liner to cover the full width of the pattern, he removes the backing paper.

thickness for sanding, though it is a little harder to work with because the tiles may not want to lie flat before they're glued down. Shop-sawn veneer cut to  $\frac{1}{16}$  in. thick is another good option, giving plenty of thickness and nice flat tiles. But of course it is time consuming to produce.

Before cutting out the tiles, I made a pentagon-shaped template out of thin plywood and used that to trace tiles on the veneer. The template is sized so that I'll end up with gaps of about  $\frac{1}{8}$  in. between tiles. I roughly cut the tiles with either a knife or the bandsaw (depending on the thickness of the veneer) and then trim them to final size. For these pentagons I start by trimming one long edge straight with a shooting board. I then use tablesaw jigs to accurately cut the remaining four sides, giving me a stack of identical tiles. How much time you want to spend on jigs is up to you, but it is important to have veneer pieces with clean, crisp edges. Any ragged edges will be very noticeable once the resin infill is added.



**Locating cleats.** Plywood blocks wrapped in packing tape and screwed down to the assembly panel at intervals along the perimeter of the pattern will ensure that the door panel is properly located when gluing on the tiles.

## Time to install the tiles

Now I start pressing veneer tiles on the sticky assembly platform, following the pattern underneath and aiming for even gaps between the pieces. Commercial veneer usually has a smooth side and a rougher side, and I put the smooth side facedown on the platform. Where tiles run off the edge of the panel, I mark them and then trim them to fit with a knife or saw.

Once the veneer pattern is complete on the assembly platform, it can be laminated to the door panel. I use epoxy rather than a water-based glue to avoid introducing moisture that would make the veneer tiles expand or curl. I use a vacuum press to apply even pressure, but for smaller panels you could get by with cauls and hand clamps.

With this glue-up it's important to use enough epoxy to bond the tiles firmly to the substrate, but not so much that excess squeezes out into the grooves. A thin foam roller is ideal for laying down a thin, uniform coat of epoxy. I laminate both sides of the door in one go, spreading epoxy on one side of the door panel, flipping it over onto pointed blocks, and coating the other



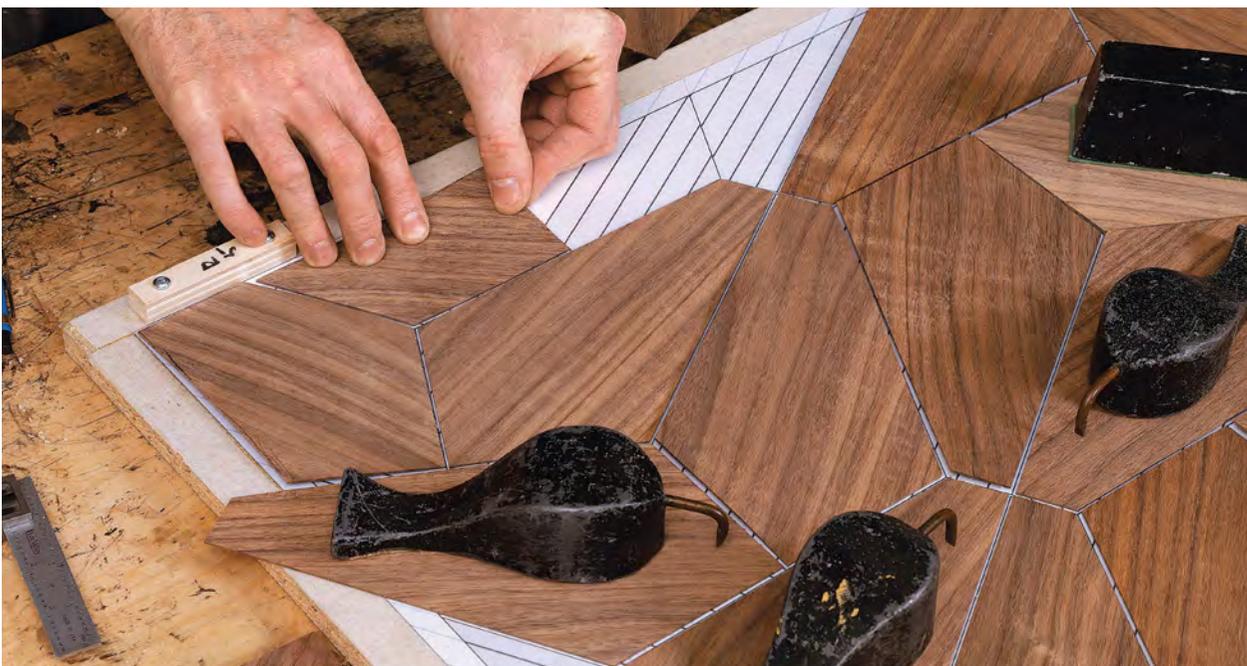
**Fill in with full tiles.** With his tub of tiles at hand, Solar lays the tiles face down on the sticky pattern, judging the evenness of the gaps between them by eye.



**Mark partial tiles at the perimeter.** Work your way around the edge of the pattern, laying in tiles and marking where they need to be cut.



**Saw or slice along the lines.** With this  $\frac{1}{16}$ -in.-thick veneer, Solar saws on the lines; with thinner veneer you could use a knife.



**Place the partial pieces.** Because the  $\frac{1}{2}$ -in. margin will be cut off after glue-up, the placement and sawing of the outer edges of the tiles needn't be precise. If the tiles lift a bit despite the sticky surface, use weights to press them flat.



## Glue-ups front and back

**Coat the substrate completely.** Solar rolls on West System epoxy, mixed to a 5 to 1 ratio, thoroughly coating the surface of the substrate. When using epoxy, be sure your workspace is well-ventilated.

**Go light on the tiles.** Without worrying about applying a full coat, roll some epoxy on the tiles, too, being careful not to move them.



**Let the locators do their work.** Carefully lining it up inside the locating blocks, Solar gently sets the substrate onto the tiles.



**On with the backing.** To create a balanced construction, Solar glues a backer sheet to the inside face of the sliding door. Then, to avoid getting epoxy on the vacuum bag, he will wrap the whole package in plastic sheeting.

side as well. I roll a very light coat onto the back side of the veneer tiles.

### It's press time

Once the epoxy is rolled out, wait 15 to 20 minutes for it to soak in before proceeding. Lower the panel into place on the assembly platform, taking care to fit it between the locator cleats and straight down onto the veneer tiles. The back side of the panel is now facing up, so the backer sheet can be put in place and secured with a few pieces of masking tape around the edges. A sheet of plastic film wrapped over the top will protect the vacuum bag from stray epoxy, and the whole thing is slipped into the vacuum bag with some breather mesh on top. I leave this assembly in the vacuum press for a few hours or until the epoxy is cured.

When the package comes out of the vacuum press, release the panel from the assembly platform by removing the cleats and slicing through the plastic film around the edges of the panel.



**No cauls needed.** With the door and assembly panel in the vacuum bag, Solar checks to see that all seems right. Then he'll leave it in the bag under pressure overnight.



**Open carefully.** Once the package comes out of the vacuum bag, remove the locator blocks and then slice around the perimeter of the door (above), cutting through the sticky film. Then lift off the door, turn it over, and peel back the film (right).



**Resize a skinny gap.** If a tile shifted and you have a gap that needs widening, score it with a knife and follow up with a chisel.



**Clean gaps mean good adhesion.** To prepare for filling the gaps with pigmented epoxy, clear away any dried epoxy left in the gaps after the vacuum pressing.

The plastic film can be peeled off, hopefully revealing a perfect veneer pattern with clean consistent gaps between the pieces. If some epoxy did squeeze into a veneer gap, it can be picked out now with a narrow chisel, utility knife, or the corner of a card scraper held on edge.

### Going into the grooves

Now I brush shellac along all the grooves on the panel, paying particular attention to end-grain areas. I will be filling the grooves with epoxy of a contrasting color, and the shellac seals the edges of the tiles and keeps the epoxy from bleeding into them. I have used walnut and white oak veneer without needing this step, but found out the hard way that maple needed to be sealed. If you're not sure how your veneer will behave with the resin, use some scraps to make a small test panel.

Before the grooves are filled with resin, their open ends need to be plugged to stop the resin from flowing out. I use a hot-glue

gun to place a small dab of glue everywhere a groove runs off the edge of the panel. I put these glue dams in the 1/2-in. margin that will be trimmed off the panel later.

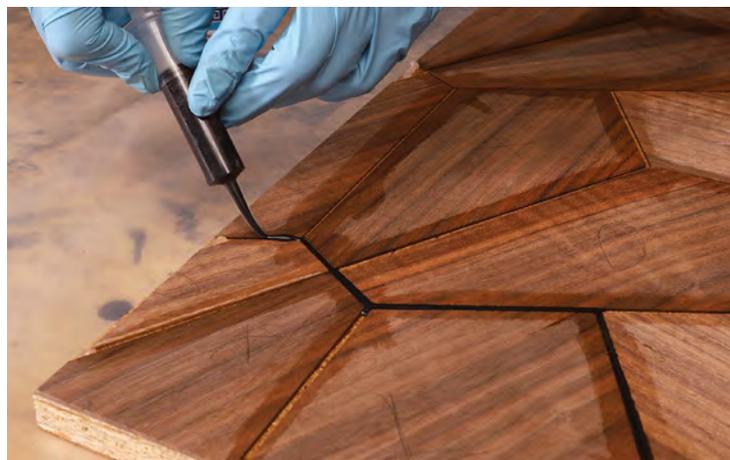
To fill the grooves, I mix some epoxy and pigment. For black lines I add a small amount of graphite powder, and for white I use a liquid pigment made for epoxy. The main challenge in filling the grooves is avoiding air bubbles. I don't just trowel the resin into the grooves like grout because pockets of air can become trapped under the resin. I prefer to use a dental syringe to lay a thin bead of resin directly into the grooves. The resin tends to settle a bit as it cures, and I try to put in enough resin so the grooves look slightly over-full. Don't worry if you spill resin on the veneer, as it will all be sanded clean. The resin itself will have air bubbles in it as a result of mixing, and these can be removed by quickly but carefully passing the flame of a propane torch over the wet resin lines. The heat of the torch will cause all the tiny bubbles to rise to the surface, expand, and pop.



## Fill the gaps

**Shield the tiles with shellac.** To prevent the pigmented infill epoxy from bleeding into the tiles, brush a coat of shellac along all the gaps. At each of the open points at the edge of the pattern, build a little dam with hot glue (inset). This will prevent the infill epoxy from flowing out.

**Fine black lines.** Solar blackens the epoxy by mixing in graphite powder. Then he uses a dental syringe to lay precise beads of epoxy into the gaps. To make white epoxy, you can use liquid pigment made for epoxy.



**Bubbles begone!** To avoid having air bubbles trapped in the epoxy (and revealed when it is sanded flush), Solar heats the wet epoxy with a propane torch; this coaxes trapped bubbles to rise, expand, and pop. Be sure to apply enough epoxy that it sits proud of the tiles, so when sanding the hardened epoxy you can stop when you reach the level of the veneer.





**Saw the panel to size.** Once the infill epoxy has hardened, cut off the  $\frac{1}{2}$ -in. margin around the panel.



**Sanding for flatness.** Using a thickness sander (or a random-orbit sander with 100-grit paper), sand the surface until all the infill epoxy is level with the veneer and all the tiles have been sanded clean.

### The final flattening

When the resin infill has hardened, trim the panel down to final size at the tablesaw, cutting away the excess  $\frac{1}{2}$  in. on all sides. The panel now has to be sanded to remove excess resin, leaving clean veneer tiles and sharp outlines. A thickness sander is perfect for this, and a few light passes is usually enough to do the job. A random-orbit sander will also work, starting with 100 grit. If you use a handheld sander, be sure to sand evenly and don't let the sander tip off the edges of the panel or it will quickly chew through the veneer. Also, be sure to wear a respirator. In either case, I stop sanding as soon as the excess resin is gone and the wood is clean. The final sanding is done after the door edging has been applied.

I mill solid edging to match the door veneer, usually somewhere between  $\frac{1}{8}$  in. and  $\frac{1}{4}$  in. thick, and slightly wider than the thickness of the door panel. I glue on the edging and trim it flush with a block plane. At this point I can fine-tune the fit of the door in the cabinet (planing the edging as needed), and drill sockets on the back for whatever door hardware is needed (sliding door rollers or hinge cups).

Then I finish sanding the face of the door, working up to 220 grit with a random-orbit sander. The visible parts of the door edging are also sanded and the sharp edges are eased. The door is ready for finish now, and for me that means a coat or two of a wipe-on oil like Rubio Monocoat. □

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**Sanding for finish.** After gluing on and flushing up the door's solid edging, finish-sand the tiles with a random-orbit sander, working up to 220-grit paper. For the finish, Solar wipes on Rubio Monocoat.

