INSTRUCTIONS

for Building

The Tiny Wine Rack

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A Few Remarks about the Tiny Wine Rack

Robert Penoyer

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A WARNING – PLEASE READ

Woodworking can be dangerous! It's up to you to determine if you can safely use the tools and perform the tasks needed to complete this and any other woodworking project. If you are unsure, STOP! Get advice from someone knowledgeable or do some careful studying on your own. Be safe!

Always wear at least an appropriate N95 dust mask or respirator when sanding or spraying paint. For advice about dust masks and respirators, visit this link:
https://woodworkingtoolkit.com/best-dust-masks-respirators/

READ, UNDERSTAND, AND FOLLOW ALL OF THE INSTRUCTIONS AND WARNINGS THAT CAME WITH YOUR TOOLS. BE CAREFUL!

This Is Not Standard Documentation – Fill In the Blanks

I generated the original material in this ZIP package just for me, not for a general audience. This gave me the freedom to create a minimal amount of written design documentation. And it allowed the documentation to be technically incomplete. I simply carried some ideas around in my head.

So I suggest that if you want to build the Tiny Wine Rack, carefully look things over and determine ahead of time if you have enough information to go forward.

It might be sufficient to simply guess at any needed information if you can't find it in the included files.

Please be aware that there might be mistakes in the documentation that I accounted for during the build but failed to note in the documentation.

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The Tiny Wine Rack

Figure 1. Two Views of the Tiny Wine Rack

The Tiny Wine Rack was made as an attractive, convenient device for storing and displaying wine bottles in a location with limited available space. It accommodates two standard wine bottles with diameters of up to 3 3/4". The design is simple but attractive. With the exception of two cove cuts that are made on a table saw, all of the cuts, edges, and surfaces are straight.

Some of the Tiny Wine Rack's features:

- Footprint: 7 1/2" x 11"
- Height: 8 3/4"
- Materials: 7/8" padauk (Sides, Base, Shelf); 1/8" plywood (splines secured in dados to secure the Shelf to the Sides)
- **GRAIN DIRECTION: In order to give the rack the nicest appearance from the front (facing into the bottle tops) the wood is cut so that the front and back of the rack expose the long grain, but the tops of the Sides and side edges of the Base expose the end grain. This is very unusual, so keep track of grain direction. Technically speaking, this**

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makes all of the pieces wider (measuring across the grain) than they are long (measuring in the direction of the grain.)

- Glue: Tite Bond II or equivalent
- Screws: Four #8x2 1/2" flat head (countersunk; square drive or your choice)
- Nails are optional: Four 18-gauge, 1 1/2" (A nail gun can be used secure the Sides to the Base before drilling pilot holes and inserting the screws.)
- Finish: Minwax Sanding Sealer; Minwax Wipe-On Poly

The Details

The four main pieces and two splines are shown in Figure 2. The odd coloration around the dados is where tape was used to prevent finish from getting into areas that will be glued.

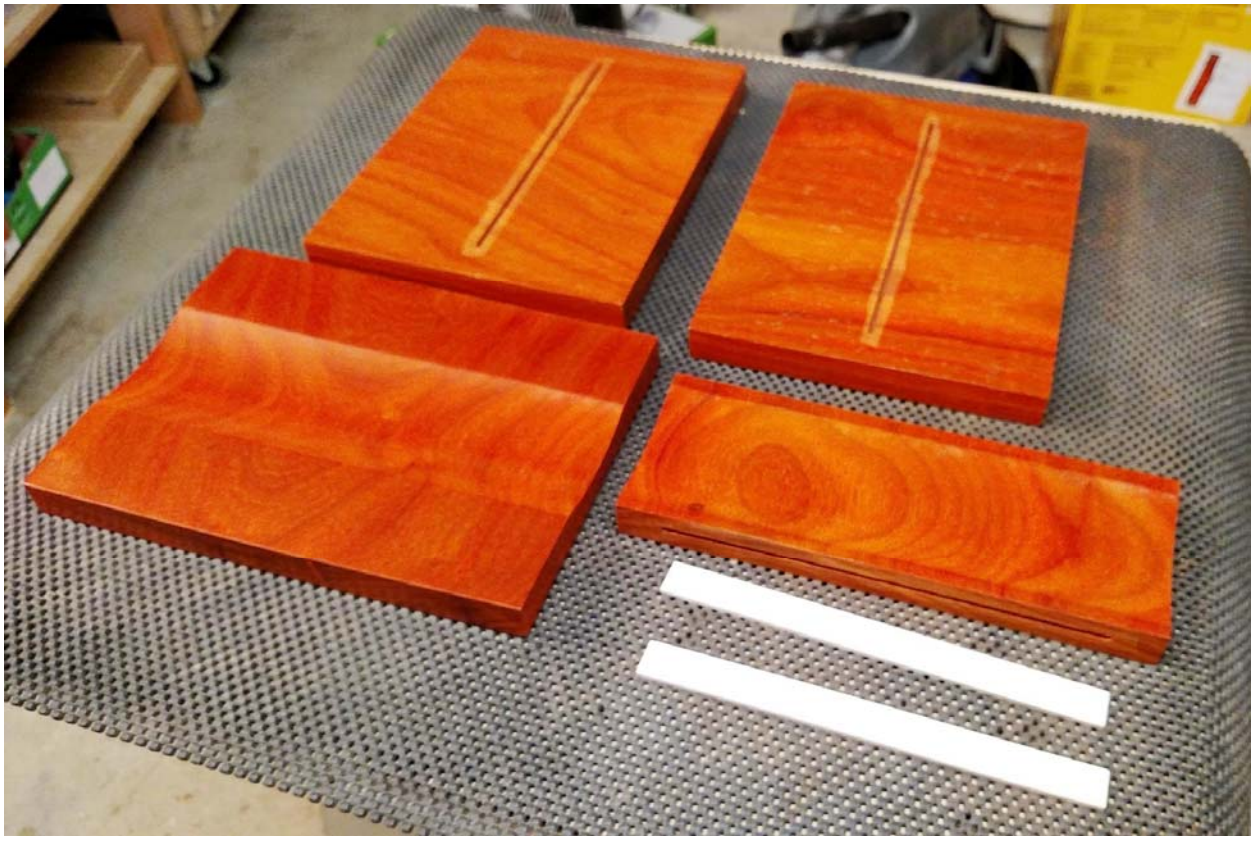

Figure 2. All of the Wine Rack Components

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Non-standard Dimensioning

My attitude toward dimensioning is to make it "good enough." Professional mechanical designers follow certain conventions regarding dimensioning. I'm not that careful. So understand this ahead of time when you find any dimensioning that is unconventional.

A SketchUp File and an Equivalent PDF File

File *Wine_Rack_03.*skp is the SketchUp design for the Tiny Wine Rack. This file is useful since I think all of the necessary details are incorporated here. So, for example, if you find a dimension or other detail missing, it can be determined by examining this file. And, you can orbit and move the model around for a better look at everything.

File *Wine_Rack_03.pdf* contains all of the images and dimensions from the SketchUp file. Use this if you're not familiar with SketchUp.

The information that follows will help to make clear the details of some of the components and construction so that possible misunderstandings might be avoided. Use the included SketchUp or PDF file to follow along with these descriptions.

Perspective View

Look at the Perspective View page to see the overall configuration of the Tiny Wine Rack.

The four main parts of the assembly can be seen. The splines and the dados that the splines fit into are not visible in this view

Exploded View

Look at the Exploded View to see all of the components identified with each in its correct relative location.

The Splines and their mating dados can be seen in this view. The Splines are designed to be slightly shorter than the dados to allow for build errors and for easy adjustment of the positions of the Sides and Shelf.

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Assembly View

Look at the Assembly View. This is a plan view showing the overall dimensions and the relationships of all the major components to one another.

Sides View

Look at the Sides View. The dado is clearly shown. It's easily cut using a 1/8" router bit that's set for a depth of 3/8". Of course, you'll want to make multiple passes advancing the depth of the bit in smaller steps of maybe 1/8" at a time to avoid overstressing the bit.

Shelf View

Look at the Shelf View. The Shelf is captured between the two Sides using the dados cut into the Shelf and Sides together with two 1/8" plywood Splines. This view shows the dados on each side. The dados are cut just as described in the Sides View.

The Shelf contains a 1/4"-deep cove cut 3" wide. The details of cutting the cove will be described later.

> ***Cut More Than One Piece: Cut at least one additional piece with the same width as the Shelf. This will be used later during assembly.***

Base View

Look at the Base View. The Base contains a cove cut 1/4" deep and 3" wide, just like the Shelf. The details of cutting the cove will be described later.

Splines View

Look at the Splines View. The Splines are simple rectangular pieces of 1/8" plywood. The width of each Spline is 11/16". This is 1/16" narrower than the total depth of the two dados that will be joined to it. Be sure that the dados are cut to a depth of 3/8" (3/8" + 3/8" = 3/4" = 12/16") so that there will be enough depth

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for the Splines but not so much that there is insufficient glue surface for joining the Splines to the dados.

Cutting the Coves in the Shelf and Base

The coves, that is, the depressions that will hold the wine bottles in place, are cut on a table saw using a special technique.

Do not attempt this advanced technique if you are not thoroughly familiar with cutting wood on a table saw. If you're confident with using a table saw, be sure to watch this entire YouTube video before attempting your own cove cut:

https://youtu.be/vVlvwJelz9s

The video recommends "using nothing more than a standard, general-purpose saw blade." However, **I recommend using a ripping blade with flat cuts on the teeth** to get the best quality cut with the least amount of tool marks. But the choice of blade is up to you.

There are sources available online that can determine the fence angle and other parameters necessary to cut the desired cove. Here are two websites where you can enter the details of your saw blade and the desired cut. These pages will tell you the settings that you will need to get the results you want.

https://www.finewoodworking.com/2005/12/21/cove-angle-calculator
(Click on "Click Here to Use the Calculator")
or
http://www.thewoodpecker.net/cove/cove.htm

I used the second link to find the parameters in Figure 3. I entered these values:

- Blade Diameter: 10
- Desired Cove Depth: 0.25
- Desired Cove Length: 3
- Desired Apex Offset: 0
- Miter Gauge Midpoint Angle (0° or 90°): 0

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Click the "Perform" button to get the desired result:

- Fence Angle (Degrees): 18

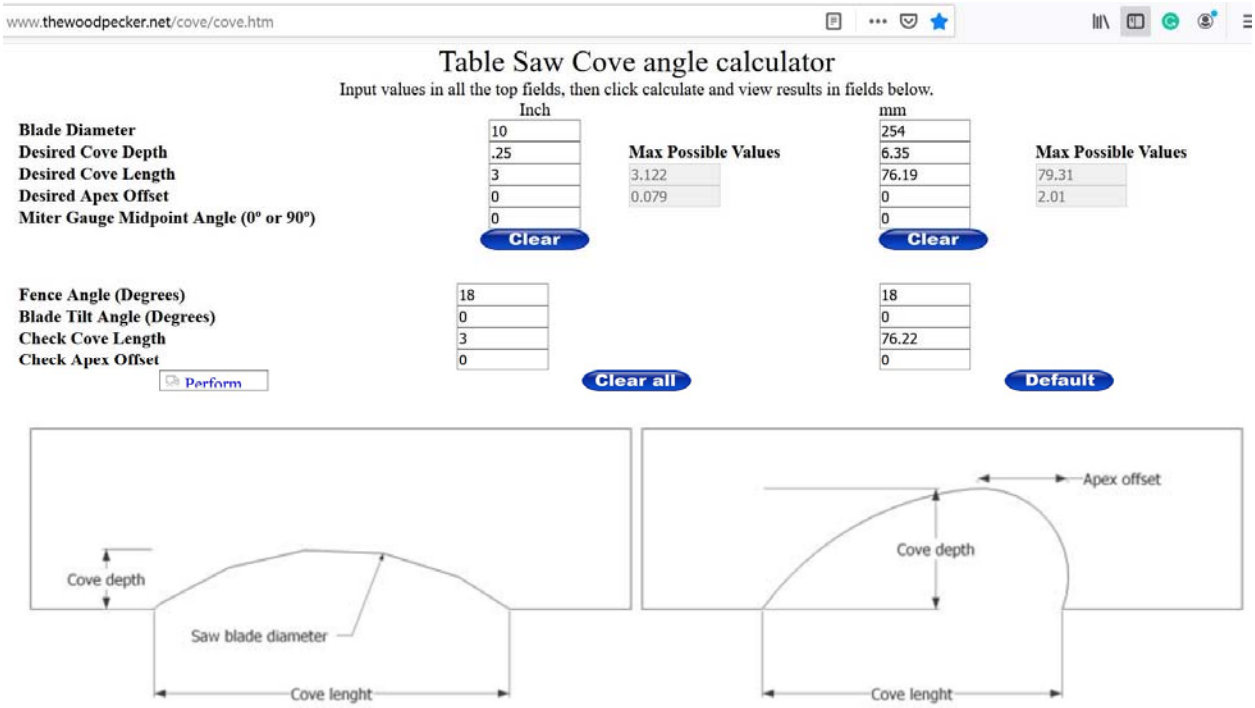

Figure 3. Using a Cove Angle Calculator

So set your fence to 18° (that is, 18° from perpendicular to the blade) to get a cove 1/4" deep and 3" wide using a 10" blade.

Centering the Cut: It's not easy to center the cove cut exactly where you want it. I recommend starting with a workpiece that's wider than your final cut. Once the cut is complete, simply trim the piece to the desired width while keeping the cove cut centered on the piece.

Advance the Depth of Cut Slowly: Follow the procedures described in the YouTube video at the link on Page 7. Be sure to advance the depth of the cut in small steps to improve safety and reduce stress on the blade and workpiece. **Make your final pass by advancing the depth just a tiny amount to get the cleanest final cut possible.**

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Sanding

Sand all of the parts before assembly and before applying the finish. I used 120-grit paper with a random-orbit sander followed by 220-grit on the ROS.

Sand the coves by hand—along the direction of the grain—using 120- and 220-grit paper. Try your best to remove any tool marks.

Applying the Finish

Apply the Finish Before Assembly

I chose to apply the finish before assembly. It would have been difficult to get into all of the corners if the finish were applied after the Rack is assembled.

Use Tape to Keep the Finish Out of Glue Areas

Tape off the dados in the Shelf and Sides using narrow strips of blue tape. The tape prevents any finish from getting into areas where glue will be applied. Narrow strips of tape are necessary so that the taped off areas won't extend into the places that will be visible after assembly.

Dealing with Large Open Grain Wood

If you opt to use padauk, you will find that it has large open grain, much like mahogany. So I used one coat of Minwax Sanding Sealer on all surfaces.

Applying the Final Finish

I followed the sanding sealer with one coat of Minwax Wipe-On Poly on all surfaces.

I then applied a second coat to all surfaces except the sides of the Shelf that will mate against the Sides.

Finally, I applied a third coat to the top of the Shelf and the top of the Base. These areas will have direct contact with the bottles, so an extra coat of protection is helpful.

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Assemble the Side/Shelf/Side

Dry Fit—*It's a Must!*

Start with a dry fit of all pieces.

- Be sure the plywood Splines fit properly in the dados. They should be shorter than the dados so the Shelf and Sides can slide back and forth for a nice flush fit along their ends.
- Be sure the Sides and Shelf can be adjusted so that their ends can be made flush
- Be sure the Sides and Shelf can be fit together snugly without the Splines bottoming out in the dados
- Be sure the Side/Shelf/Side assembly sits flat on the Base with little or no rocking from corner to corner. A little bit of rocking is acceptable since clamps can be used to correct a small problem like this.
- Be sure the Shelf can be made square to both Sides and the Sides can be made square to the base. **Put the extra piece cut on Page 6 between the Sides, laying it on the Base. Pressing the sides against both the shelf and extra piece will ensure that the Sides are parallel to one another.**
- Mark the bottom edges on both Sides so that the same edges used in the dry fit will be at the bottom when the assembly is glued

Glue the Splines into the Shelf

Begin by inserting the Splines into the Shelf without any glue.

Carefully Tape the Splines: With the Spline fully inserted in the Shelf, apply blue tape to the top and bottom of each spline so that the edge of the tape comes right up to the surface of the Shelf. Ideally, you should not be able to see the surface of the spline before it enters the dado once the tape has been applied to the Spline.

Carefully Tape the Shelf: Now apply blue tape to each edge of the Shelf so that the edge of the tape comes to the surface of the Spline. When you're done you should not be able to see the surfaces of the Shelf or Spline where the Spline enters the dado in the Shelf. If you've done the taping correctly, any glue squeeze-out will go onto the blue tape, not the Shelf or Spline.

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Apply glue:

1. Remove one of the Splines
2. Apply glue to about the center 1" of the dado in the Shelf
3. Let the glue fall to the bottom of the dado
4. Press the spline into the dado. The glue will resist the spline so that you will have to press the spline to get it completely seated in the dado.
5. Be sure that the spline is centered along the length of the dado with equal gaps at both ends of the dado
6. Remove any and all glue squeeze-out. Leave no residue that might interfere when the Shelf joins with the Side.
7. Remove the blue tape from the surface adjacent to the newly glued joint

Repeat Steps 1 through 7, above, for the second Spline.

Let the glue cure for at least 1 hour.

<u>Assemble the Side/Shelf/Side</u>

Be sure to remove any residual dried glue from the Shelf and Splines.

Be sure the extra piece that you cut on Page 6 is within reach.

Read through these steps and understand them before attempting to apply glue. Be sure that you can follow them smoothly without interruption.

1. Lay one side on a table with the dado facing upward and the bottom edge of the side facing <u>toward</u> you. (You should have marked the bottom edge of each Side per the bottom bullet on Page 10.)
2. Dry fit one of the Shelf's Splines into the dado so that the cove on the Shelf faces away from you
3. Be sure that the edge of the Shelf lies flush with the surface of the Side
4. Be sure that you can slide the Shelf back and forth so that each end can become flush with each end of the Side. (If you cannot slide the Shelf far enough in each direction, remove some material from the end of the Spline so that you can.)

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5. Repeat Steps 2-4 with the second Side inserted over the other Spline. (Leave the first Side connected with the Shelf.)
6. Remove the second Side and lay it aside.
7. Remove the Shelf from the first Side
8. Apply glue to about the center 1" of the dado in the first Side
9. Let the glue fall to the bottom of the dado
10. Press the Spline in the Shelf into the dado in the first Side. BE SURE THE BOTTOM EDGE OF THE SIDE FACES TOWARD YOU AND THE COVE OF THE SHELF FACES AWAY FROM YOU.
11. The glue will resist the spline so that you will have to press the Shelf to get it completely seated against the first Side
12. Slide the Shelf until both ends are flush with the ends of the shelf
13. Lay the second Side on the table with its dado facing up and the bottom of the Side facing <u>away</u> from you
14. Apply glue to about the center 1" of the dado in the second Side
15. Let the glue fall to the bottom of the dado
16. Pick up the Shelf and the first Side together. Turn the assembly so the bottom of the first Side faces away from you, and insert the spline into the second side. BE SURE THE BOTTOM EDGES OF BOTH SIDES FACE AWAY FROM YOU AND THE COVE OF THE SHELF FACES TOWARD YOU.
17. The glue will resist the spline so that you will have to press the Shelf to get it completely seated against the first Side
18. Slide the Side until both ends are flush with the ends of the Shelf
19. Carefully check for any glue squeeze-out and remove it
20. Lift the Side/Shelf/Side assembly and place it on top of the Base with the bottom edges of both Sides on the Base.
21. Slide the extra piece from Page 6 on top of the Base between the Sides
22. Apply a clamp across the two sides so that it squeezes the Shelf, the Sides, and the extra piece together, thus ensuring the Sides are parallel
23. Be sure that the edges of both Sides and the Shelf are flush at both ends
24. Apply clamps as needed so that both ends of both Sides sit flush against the Base
25. Use a square to ensure that everything is as square and even as possible

Let the assembly cure for at least one hour before removing the clamps and the extra piece.

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Assemble the Side/Shelf/Side Assembly to the Base

No glue is used to secure the Side/Shelf/Side assembly to the Base.

Place the assembly upside down on a table. The bottom edges of both Sides should be facing up. The cove of the Shelf should be facing down.

Place the Base upside down on the Sides. The cove of the Base should be facing down.

Carefully move the Base around so that its ends are flush with the ends of the Sides and the spaces from each Side to each edge of the base are equal. This can be tricky, so be very careful.

Nails or Clamps

Using an 18-gauge nail gun at this step is the easiest way to proceed but clamps can be used instead.

If you DO HAVE an 18-gauge nail gun: Once the Base is aligned with the Sides as evenly as possible, pop a 1 1/2", 18-gauge nail through the bottom and into each side about 1" from each end. Be careful to center the nails along the edge of the Sides so that they don't blow out from the Sides. The nails are located below the lightly colored felt pads in Figure 4.

If you DO NOT HAVE an 18-gauge nail gun: Align the Base with the sides as evenly as possible and judiciously clamp it into place. Use more clamps as needed. Double-check the alignment after the clamps are firmly set. Reset the alignment and the clamps as necessary.

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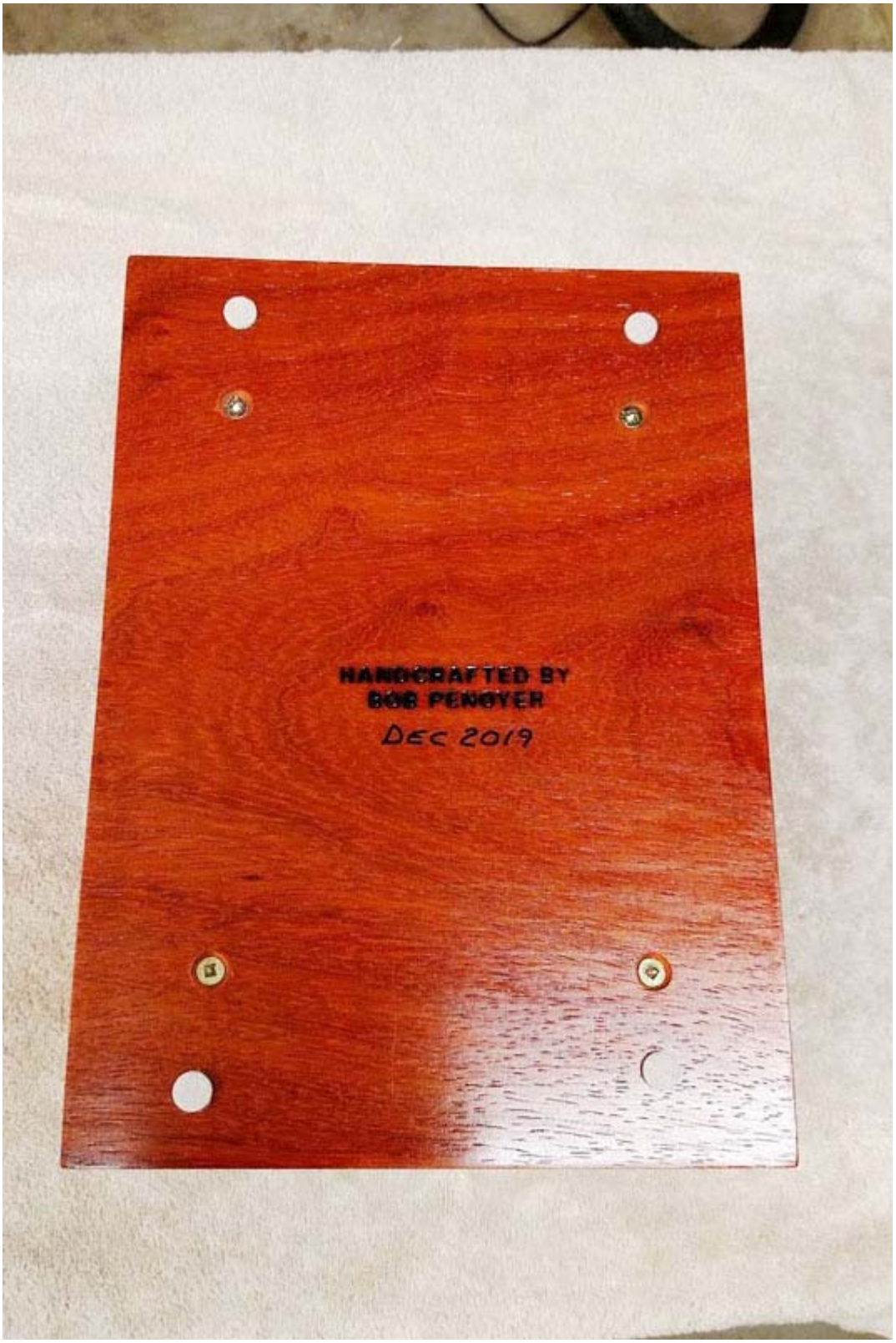

Figure 4. Placement of Screws, Nails, and Felt Pads

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Screws

Four #8 x 2 1/2", flathead screws (countersunk; square drive, star drive, or your choice) are needed to secure the Sides to the Base.

Drill and countersink four 7/64" pilot holes for the screws through the Base and into the Sides, one near each end of each Side. Locate the holes about 1 1/2" from each end and centered along the edge of each Side. Figure 4 shows the placement of the screws.

Final Details

It's a nice touch to add small felt feet to the bottom of the Base. Figure 4 shows the locations of the lightly colored pads. The pads are placed over the heads of the nails. The pads will protect the finishes on both the bottom of the Rack and any surface on which it's placed. It also gives the Rack a nice, solid feel on any shelf where it's placed.

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