

Serving Tray



Serving Tray Project Overview:

This project requires basic woodworking skills and access to woodworking machines. Woodworking machines have sharp cutting edges and are **NOT** forgiving. You should be properly trained in the use of these machines. Ensure that you wear safety glasses and hearing protection, use push sticks, hold-downs, clamps and a cutting sled to cut the project parts safely.

This serving tray is made from cherry and big leaf curly maple veneer, but could be made from any combination of hardwoods. The overall size is 14 ¼" wide and 19" long. The height is 2 ¾". The thickness of the sides is ½". The bottom panel is 3/8" thick.

The construction process involves making 2 templates. These templates are used in shaping the side and end pieces of the serving tray on a router table or with a hand held router.

In this project I hand cut veneers from a figured piece of curly maple and laminated it on a ¼" MDF substrate for the bottom panel. The underside of this panel is cherry veneer. You could use solid wood, but you will need to allow for wood movement. You could also use a piece of ¼" hardwood plywood. This would be treated the same way as the veneer panel that is described in this project with the exception that the groove in the sides and end pieces would be ¼" wide not 3/8" wide.

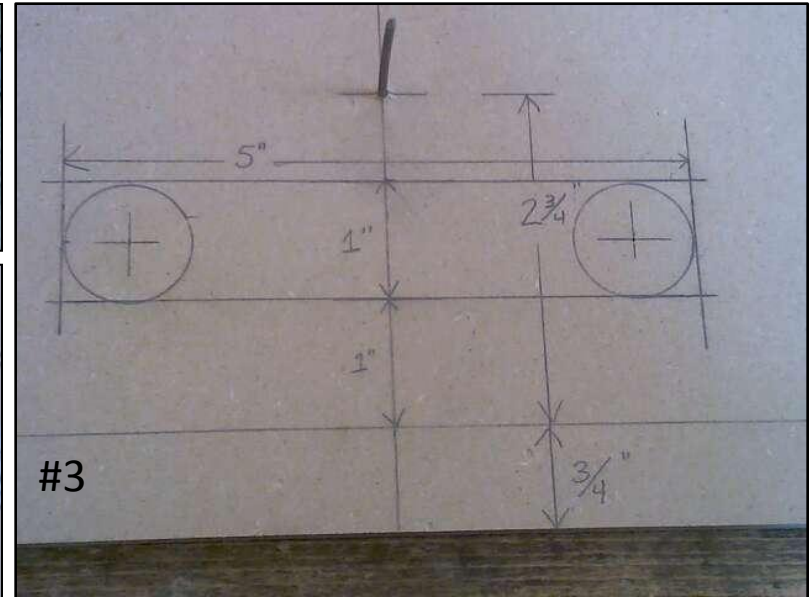
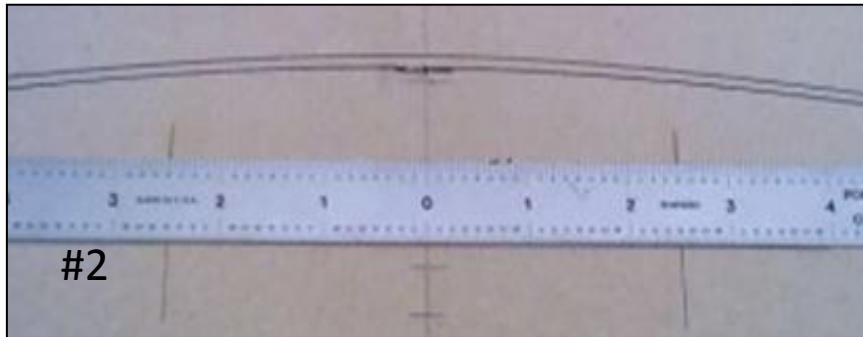
Materials Needed:

- Approximately 8 linear feet of rough sawn cherry. ¾" thick and 3 ¼" wide.
- Approximately 4 feet of curly maple or other highly figured hardwood, ¾" thick for hand cut veneer.
 - Option: ¼" hardwood plywood.
- 150 and 180 grit sandpaper and 0000 steel wool.
- Minwax wipe-on poly urethane.
- Glue (white or yellow wood glue)
- Paste wax

Tools & Equipment Needed:

- Table saw:
 - Cross cut sled
 - Key miter jig.
- bandsaw
- Hand held jig saw
- 8" jointer
- Drum sander
- Drill press with 1" drill bit and 1/16th drill bit.
- Router (hand held and router table)
- Block plane
- Chisels
- Clamps

Creating Templates: Tray Ends Layout & Measurements



Step #1:

The overall size of this tray is $14 \frac{1}{4}$ " wide and 19" long and $2 \frac{3}{4}$ " tall. You will need two templates for this serving tray. These templates will be used to hold the wood for the sides and ends in order to shape them with a router. This ensures that the pieces are all uniform and will fit together. **Accurate measurements are critical.**

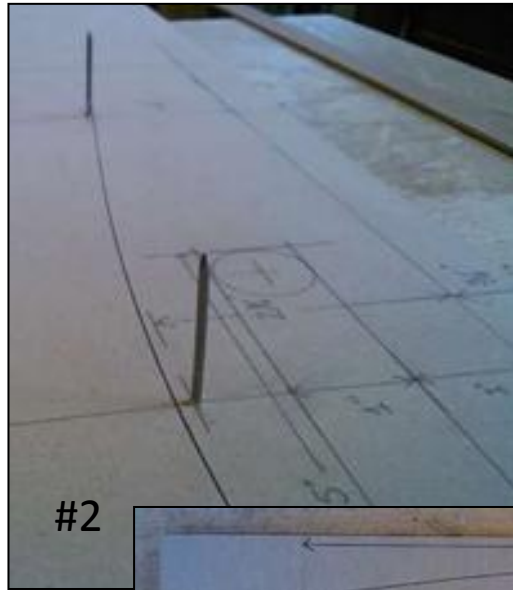
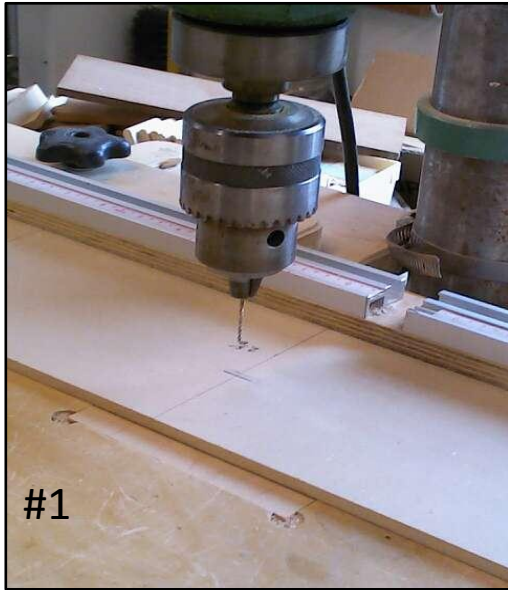
This template is for the end pieces. The process is to create a template by drawing the shape of each part on $\frac{1}{4}$ " thick piece of medium density fiberboard (MDF). Cut a piece of MDF, slightly larger than the end piece, 18" long and 5" tall as in photo #1.

Measure and mark a line $\frac{3}{4}$ " from the bottom of the MDF (#3). This is for a cleat that will be attached to the template.

Mark the center of the MDF board at 9". Measure from the center line $7 \frac{1}{8}$ " to the right and left. Use a square and draw vertical lines (#1). The height of the tray is $2 \frac{3}{4}$ " at the corners and $2 \frac{3}{4}$ " high at the center of the end pieces. Mark these dimensions accordingly. This identifies the parameters of the end pieces.

The end pieces also have an oblong hole that serves as a hand hold. This hand hold is 5" long and 1" tall. The ends are round. Layout the hand hold on the MDF as indicated in photos #2 & #3.

Creating Templates: Shaping Tray Ends



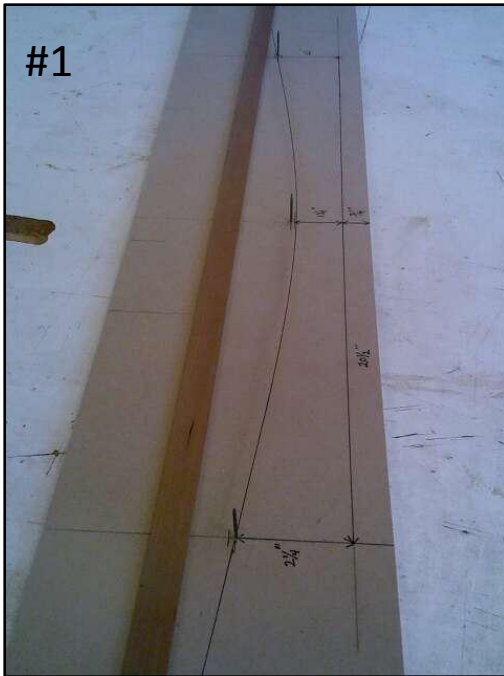
Step #2:

Now that the overall size of the end pieces and the hand hold have been laid out on the MDF, you now have to create the arch. The simplest way to create this arch is by bending a thin piece of wood using the center and end points as fulcrums.

Use a 1/16" drill and drill holes at the center and corners as indicated in photo #1. Insert finish nails through the holes from the back side of the MDF as shown in photo #2. Ensure that the nails are perpendicular to the surface of the board.

Use a 1/8" x 3/4" strip of solid wood and bend it using the finish nails as fulcrum points, photo #3. Use a fine felt tip pen and trace along the outside edge of the bent wood. You will now have the shape of the end piece. Photo #4.

Creating Templates: Shaping Tray Sides



Step #3:

Now you will need to create the template for the side piece.

Cut a piece of MDF, slightly larger than the side piece, 23" long and 5" tall as in photo #1.

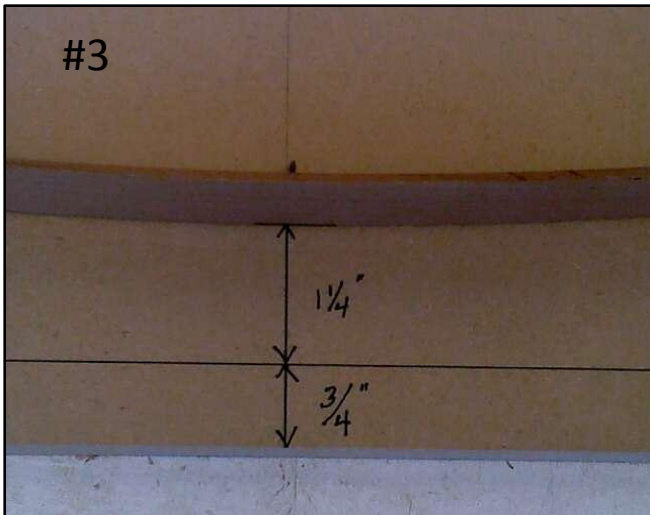
Measure and mark a line $\frac{3}{4}$ " from the bottom of the MDF (#2). This is for a cleat that will be attached to the template.

Mark the center of the MDF board at 11 $\frac{1}{2}$ ". Measure from the center line 9 $\frac{1}{2}$ " to the right and left. Use a square and draw vertical lines (#1).

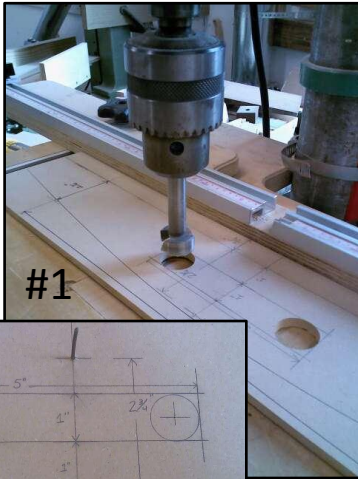
The height of the tray is 2 $\frac{1}{4}$ " at the corners and 1 $\frac{1}{4}$ " high at the center of the side pieces. Mark these dimensions accordingly. This identifies the parameters of the side pieces.

As in step #2, use a $\frac{1}{16}$ " drill and drill holes at the center and end points as indicated in photo #1. Insert finish nails through the and use a $\frac{1}{8}$ " x $\frac{3}{4}$ " strip of solid wood and bend it using the finish nails as fulcrum points, photo #2.

Use a fine felt tip pen and trace along the edge of the bent wood. You will now have the shape of the end piece. Photo #1.



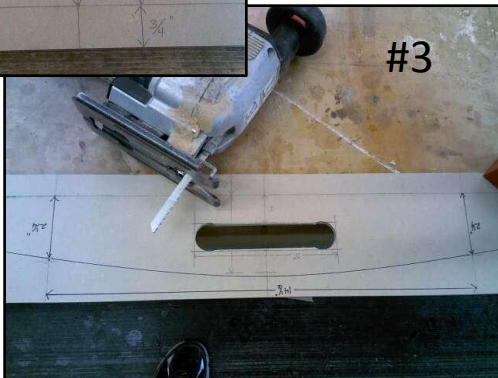
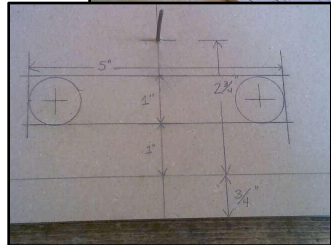
Creating Templates: Cutting Hand Holds



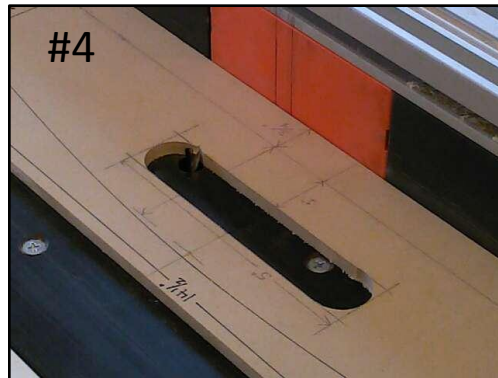
#1



#2



#3



#4



#5



#6

Step #4:

You need to cut the template for the hand holds.

NOTE: *The templates must be carefully cut and sanded to ensure that the edges and transitions are smooth and do not have any bumps or divots. The ball bearing guide on the router bit will translate any imperfections to the final piece.*

Use a 1" drill bit as shown in photo #1 to drill the two holes that define the end of the hand hold.

Use a jig saw and cut remainder of the hand hold. Cut 1/16" away from the line. Photos #2 & #3.

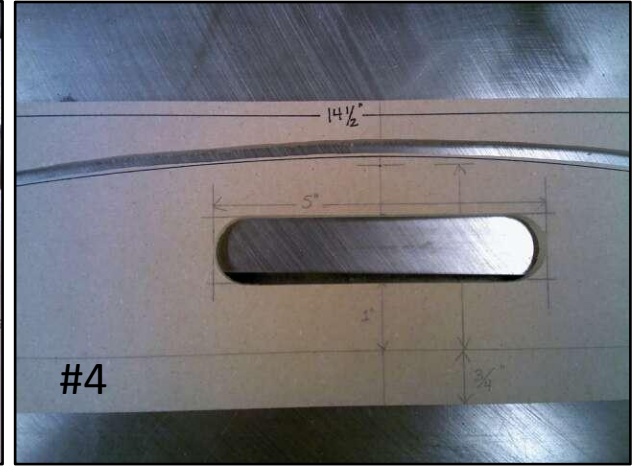
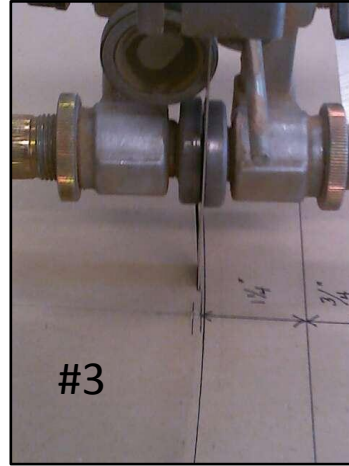
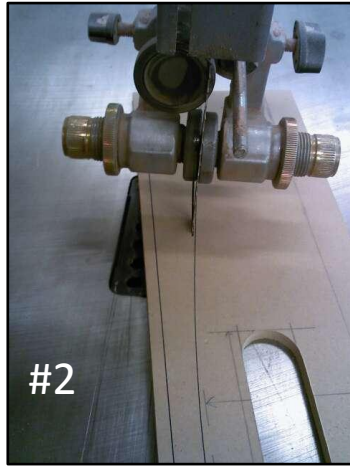
Use a router table with a 1/2" straight cutting bit to finish the straight cuts in the hand hold as shown in photo #4. **Careful positioning of the router bit is essential.**

Note Although photos #5 & #6 show that the template has already been rough cut to from the arch, the focus in this step is to focus on the cutout for the hand hold. Step #6 will cover the final shaping of the templates.

Use a half-round file to smooth the transition from the straight cuts to the holes as shown in photo #5.

You could also use the file to create a slight arch in the top of the hand hold. This arch should follow the shape of the end piece as shown in photo #6.

Creating Templates: Cutting Templates

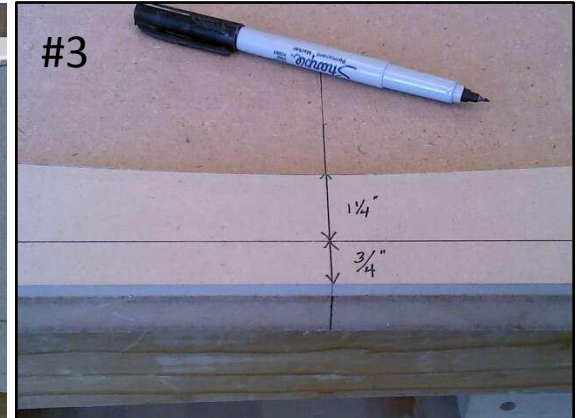
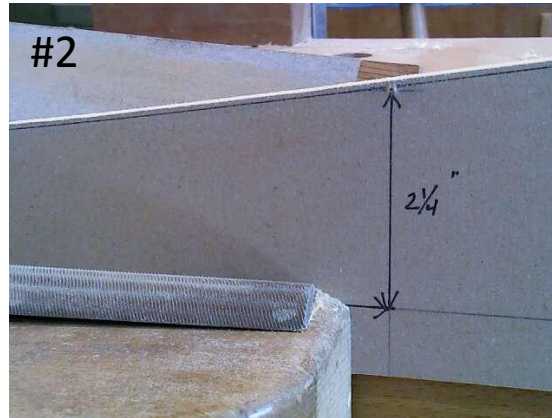


Step #5:

Using the bandsaw carefully follow the outlines of the end and side pieces by cutting $1/16''$ outside the lines as indicated in the photos #1-3. Leave the lines as shown in photo #4. You could also use a hand held jig saw.

You will use a file to shape the end and side pieces to their finished shape.

Creating Templates: Smoothing Template Edges



Step #6:

The templates have been rough cut.

Use a smooth file to clean and smooth the edges. File the edges down to the line. Photos #1 & #2. Run your finger along the edge in order to feel any bumps or dips. Continue the filing process until the edge is consistently smooth and even.

In order to ensure that both the convex (end) and concave (sides) shapes are symmetrical, mark a center line on a piece of paper or MDF as shown in photo #3. Line the templates on the center line and flush with the edge of the paper or MDF. Use a fine tipped pen and trace the template. Now, flip the template over and line up the base and center line and trace the template again. Compare the two lines. Any variance will be evident.

File the high spots and continue the tracing process detailed above until there is no difference from side to side. This will ensure that both the right side of the template and the left side are symmetrical. Repeat process for both templates.

Creating Templates: Attaching Cleats



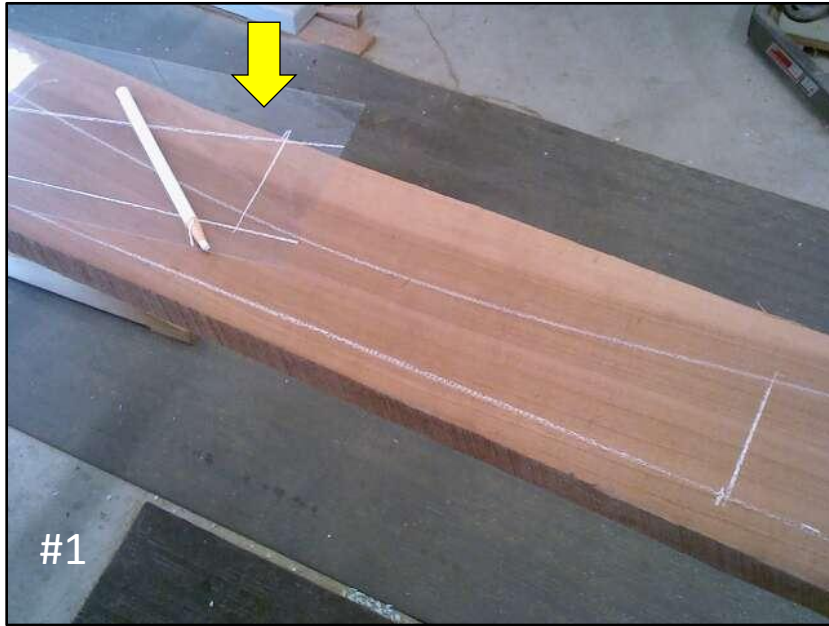
Step #7:

The purpose of the templates is to ensure that the individual component parts are cut accurately and consistently. Now that the templates are cut and shaped, you will add $7/16$ " thick, $3/4$ " wide hardwood cleats. These cleats hold the wood for the sides and ends in place and ensure that the final pieces are shaped accurately and consistently. **NOTE:** *The thickness of the cleats should be slightly thinner than the thickness of the side and end pieces which are $1/2$ " thick.*

Drill five $1/16$ " holes $3/8$ " from the outside bottom edge of each template as shown in photos #1 & #2. Use a countersink bit to countersink the holes so the wood screw are flush with the surface of the template.

Also drill 2 holes $3/8$ " to the outside of the ends of each template as shown in photo #3. Accurate placement of the cleats is critical. Align the bottom cleat and using clamps (photo #4) clamp the cleat on the underside of the template and screw the cleat to the bottom of the template. Repeat the process with both templates. Use #6 screws that are $1/2$ " long. The small cleats that define the ends of each template are secured in the same manner. Make sure that these end cleats are set 90 degrees to the bottom cleat. Templates with attached cleats are shown in photo #5.

Laying Out the Component Parts on the Wood



Step #8:

I used quarter sawn cherry for the sides and ends but any hardwood can be used. Since there is very little exposed wood for the sides and ends, grain orientation is key to ensure that the finished product has visual appeal.

In order to select the best segment of the wood, I used a piece of clear acetate and transferred the shape of the side and end pieces from the templates using a white grease pencil.(photo #1).

I then laid the acetate on the wood in order to select the best segment of the board for that part. I marked the corners and then transferred the shape onto the wood using the corresponding MDF template. Photos #2-4.

This provides the very best wood grain for each of the 2 sides and 2 end pieces. Unfortunately there is some wood waste but the finished product is more appealing.



Stock Preparation



Step #9:

In this step you will rough cut the stock to size, mill the wood flat and square and dimension it to $\frac{1}{2}$ " thick.

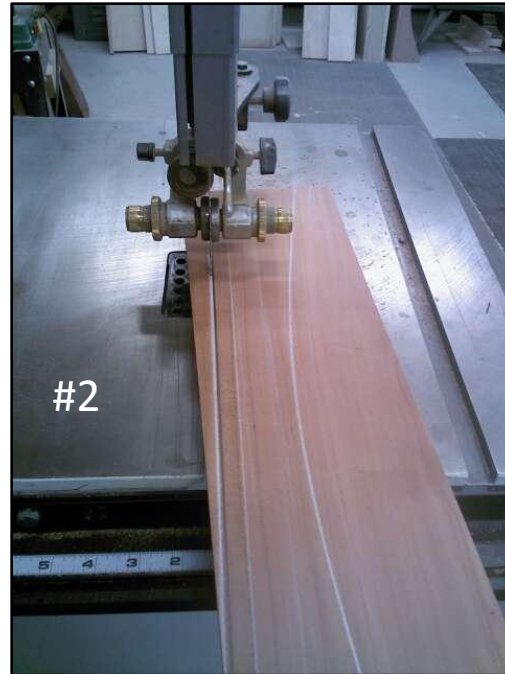
First cut the individual parts as shown in photo #1. Then using a jointer make one face flat (photo #2). With the flat face against the jointer fence, joint one edge square to the flat face (photo #3). On the table saw, make the other edge parallel by ripping the boards (cut end boards to no less than $3\frac{1}{2}$ " wide and cut the side boards to no more than $2\frac{1}{2}$ " wide) as shown in photo #4.

Since I started with wood that was 1" thick, I resawed the wood to a little less than $\frac{5}{8}$ " thick on the bandsaw (photo #5). This process provided a thin slice of wood that could later be used for veneer (*wood is a precious commodity and woodworkers try to optimize the use of wood whenever possible*).

Use a wide belt sander with a 150 grit sanding belt to make the other face flat and parallel to the first face (photo #6). Continue using the sander to reduce the thickness to $\frac{1}{2}$ ". Continuously flip the board over so you don't remove wood from only one side. You can also dimension the wood to $\frac{1}{2}$ " thick with a planner. However, the wide belt sander not only will dimension the wood but will also provide a smoother surface.

NOTE: In milling the wood, the template tracing will be sanded off. You will have to trace the template outline again on each piece of wood after you complete the milling process.

Laying Out the Component Parts on the Wood



Step #10:

In positioning the template to optimize the wood grain, the edge of the template shape may not be parallel with the edge of the wood as indicated in photo #1.

To correct this situation, draw a line parallel to the edge of the template shape about $\frac{1}{2}$ " below.

Use the bandsaw a cut along this new line as indicated in photo #2. Cut as accurately as you can along the line.

Use the jointer to ensure that this freshly cut edge is straight. Photo #3.

Use the table saw to make the opposite edge parallel. Photo #4.

At this stage all the boards are a little oversized but the edges are parallel to the template image.

Stock Preparation

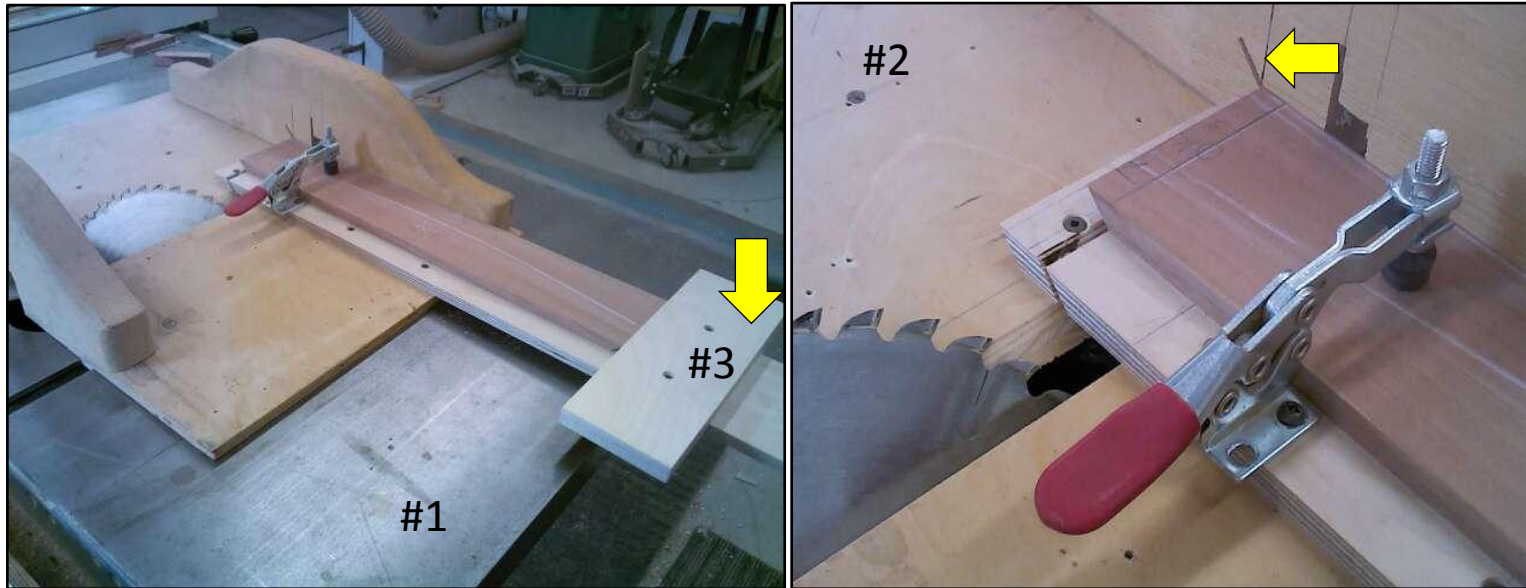


Step #11:

In this step you will cut one end of each of the sides and end pieces square. The purpose of this cut is to establish a reference end that will be set against a stop block when you cut the 45 degree angle. You are **NOT** trying to cut these pieces to their final size in this step. The objective is to create one end that is at 90 degrees.

Use a cross cut sled on the table saw to make these cuts.

Cutting the Miters



Step #12:

In this step you will cut the 45 degree miters on the side and end pieces. **These pieces need to be precisely cut.**

Set the saw blade at a 45 degree angle. Use a triangle or other measuring tools to ensure that it is set at exactly 45 degrees to the saw table.

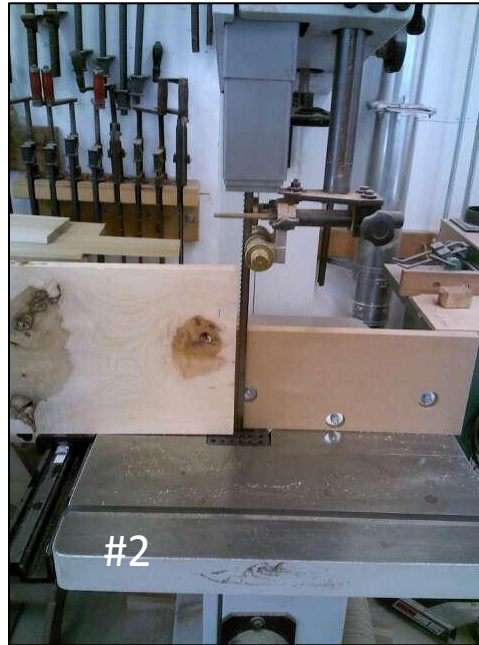
***NOTE:** I suggest you make several trial cuts on two pieces of any extra milled wood and put them together to ensure that they meet at 90 degrees. You don't want to practice with your prepared milled side and end pieces.*

The best way to ensure that all the pieces are cut to the correct lengths is to use a cross cut sled and a auxiliary base and stop block (photo #1). Cut a piece of ½" thick plywood 5" wide and 24" long for the stop block base. Place this piece against the fence of the crosscut sled and overlap the blade by 1 ½". Screw it to your cross cut sled. Make a 45 degree cut. I also attached a toggle hold down to secure the work piece.

***NOTE:** After setting the blade and cutting a trial piece the fence has a 45 degree cut. Use one of the milled boards to establish the actual height of the cut. Draw a line (yellow arrow) from the intersection of the 45 degree cut and the height of the milled board. This will aid you in identifying the end of the cut.*

Screw a stop block (#3) at 19 ¼" from the end of the 45 degree cut for the side pieces. Place the reference edge from step #11 against the stop block. Cut the 45 degree cuts on both ends of both side pieces. Reposition the stop block at 14" for the end pieces. Repeat the 45 degree cuts on the end pieces.

Cutting Veneers for the Bottom Panel



Step #13:

In this step you will cut the veneers for the bottom panel. The veneers will be glued to a $\frac{1}{4}$ " thick piece of medium density fiberboard (MDF) as a substrate. **NOTE:** *The wood used in these photos is not the actual piece of wood I used for this serving tray, but the process is the same.*

The width of the serving tray is $14 \frac{1}{4}$ ". You should start with a piece of wood that is at least 8" wide. You will need 4 slices of veneer, two 8" wide pieces per side. Veneers always need to be applied on each side of the substrate to ensure equilibrium, otherwise the panel will warp.

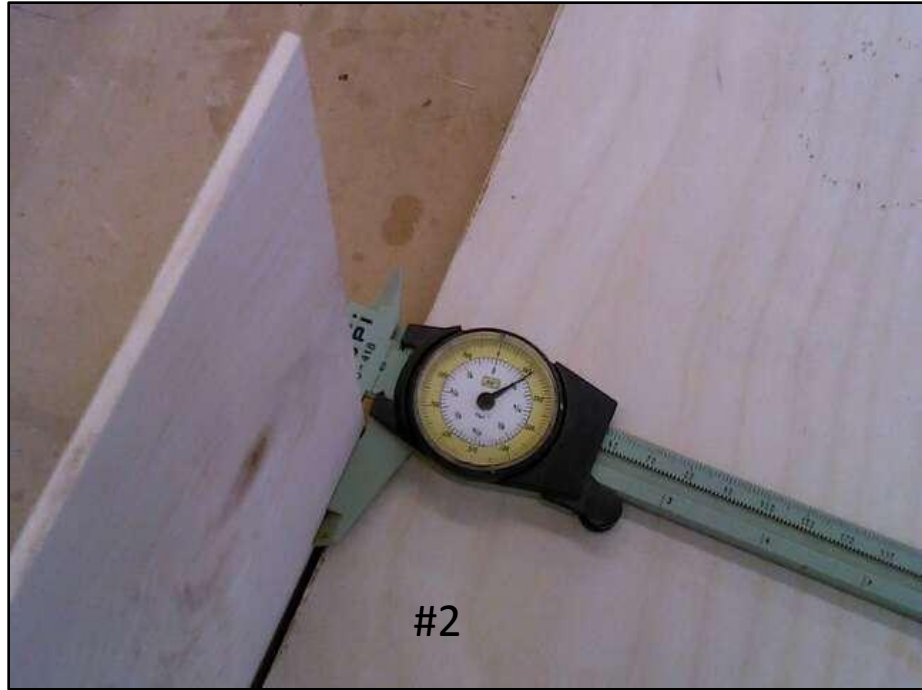
You need start with a piece of figured wood that is milled (flat on one side with the other face parallel. Both edges square to face). Use a combination of a jointer, planner and sander to accomplish the milling process. Mark this side as your reference side. You will be making multiple cuts from this same side.

You will use a bandsaw to cut the veneers. Set the bandsaw fence at between $\frac{1}{8}$ " to $\frac{3}{16}$ " away from the saw blade. The fence and blade need to be perpendicular to the band saw table. Set the guide bearings $\frac{1}{4}$ " above the edge of the wood.

Using a moderate feed rate and applying pressure against the fence, guide the wood through the blade.

Now you have to resurface the cut side to ensure it is flat. Once your reference slide is flat, repeat the resawing process until you have 4 veneer pieces (2 for the front and 2 for the back of the serving tray's bottom panel).

Sizing Veneers for the Bottom Panel



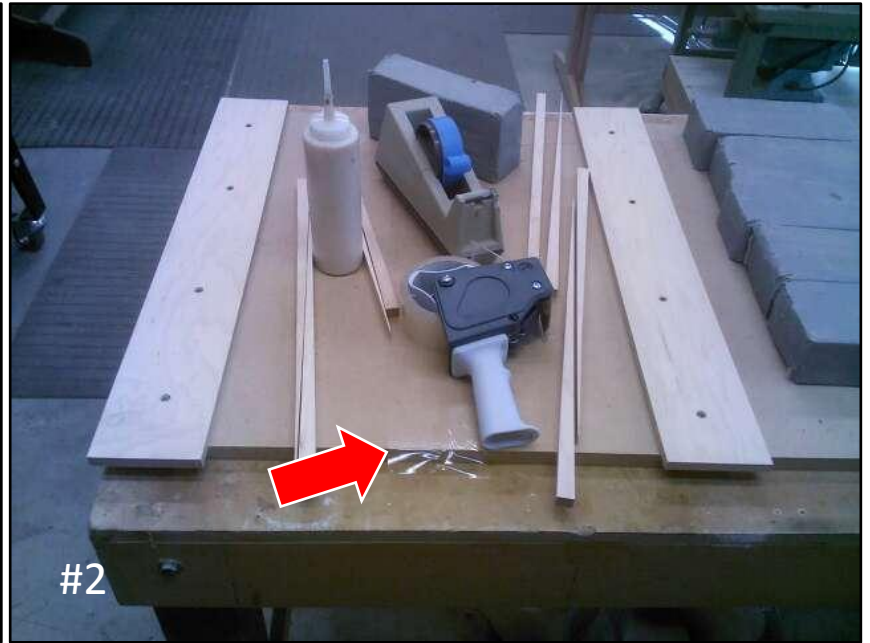
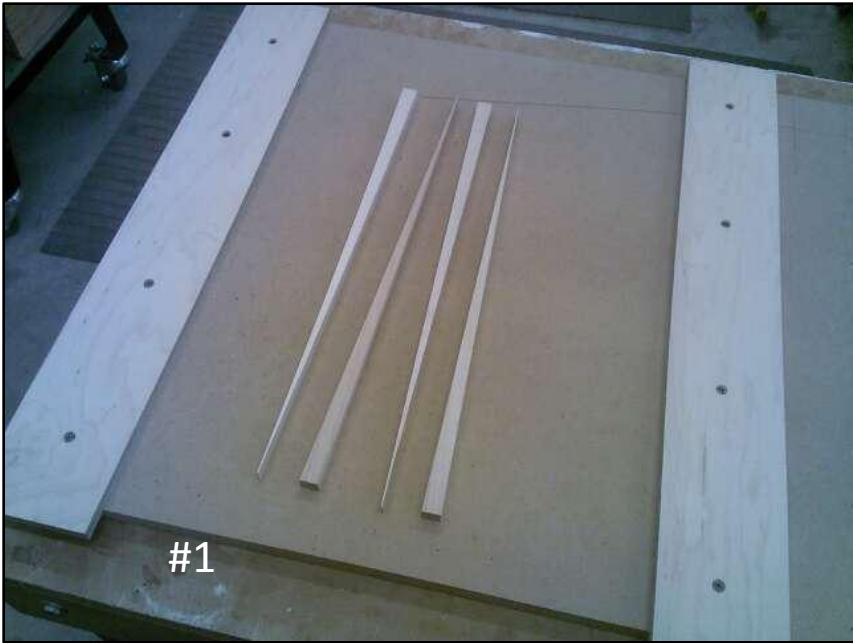
Step #14:

In this step you will sand the veneers smooth and thickness sand them to 1/8" thick. Use a caliper to accurately measure the veneer thickness (photo #2).

The side that was sawn will have some saw blade marks. Since one side of the veneer was already flat and smooth (your reference side), you need to flatten and smooth the opposite side. Place the flat side face down and use a pencil to make "witness" marks (photo #1) across the width of the veneers.

Taking no more than 1/64th off on each pass through the sander, sand this side until all the witness marks have disappeared. Turn the veneer over and sand this side. The purpose is to ensure that both sides are sanded smooth and are flat. The final thickness of the sanded veneers should be around 1/8".

Jig for the Gluing Veneers



Step #15:

In this step you will make a jig to edge glue the two pieces of veneer together in order to have a veneer panel that is at least 15" wide.

The gluing jig is comprised of a $\frac{3}{4}$ " sheet of MDF, 2' x 2'; two $\frac{1}{2}$ " thick by 2" wide cleats, 24" long; and four pair of wedges $\frac{1}{2}$ " thick (photo #1).

Screw the cleats to the base ensuring that they are parallel to each other. Space them $\frac{3}{4}$ " further apart than the measurement of the 2 veneers that will be glued together.

In order to avoid accidentally gluing the veneers to the MDF base, place a 2" strip of packing tape down the middle of the jig as highlighted in photo #2. Photo #2 also shows the supplies required to glue the veneers together: wedges, painter's masking tape, and bricks covered in duct tape. Not shown is a $\frac{3}{4}$ " MDF board a little narrower than the width of the veneers and 24" in length. This board is placed over the veneer panel and then weighted down with the bricks.

Gluing Veneers



Step #16:

Since you will be gluing 2 pieces of veneer together, it is important that both pieces have straight edges and are approximately 7 ½" wide and 22" long. You want the extra room as a fudge factor.

The first step in gluing the veneers together is to ensure that the mating edges meet without any spaces. In order to accomplish this, the mating edges should be planed flat.

The best method to do this is to put the veneers together and align the edges flush to each other. Since the veneers are very thin a backer board is used to stabilize the veneers. Use a spring clamp to hold the veneers flat against the backer board (photo #1).

The process of ensuring that the panels fit together without any space can be time consuming. Patience, a delicate touch and close scrutiny is the key to success. It is important to remember that the panel is the key focal point of the serving tray. Any gaps will distract from the overall appearance of this project.

Gluing Veneers



Step #17:

Once you establish that the mating edges of the veneers meet seamlessly you are ready to glue the two panels together. #1, apply glue to each of the mating edges.

Use blue masking tape and adhere tape across the edges while squeezing the panels together with moderate inward hand pressure #2.

Use the wedges to apply equal pressure on both edges of the panel #3. Check the seam to make sure that there are no gaps.

Use a piece of $\frac{3}{4}$ MDF (#4) and place it over the glue joint (tip: apply clear packing tape to the center of the MDF's underside to ensure that it doesn't get glued to the veneer panel).

Weight the board down with bricks or other heavy objects to ensure that the panel dries flat #5.

Leave the panel undisturbed for at least 2 hours. Overnight is better.

Repeat veneering process as described in steps #13-17 to the other side for the serving trays bottom panel (NOTE: Veneer needs to be applied to both sides of the substrate, otherwise the panel will warp).

Sanding the Veneer Panel

Step #18:

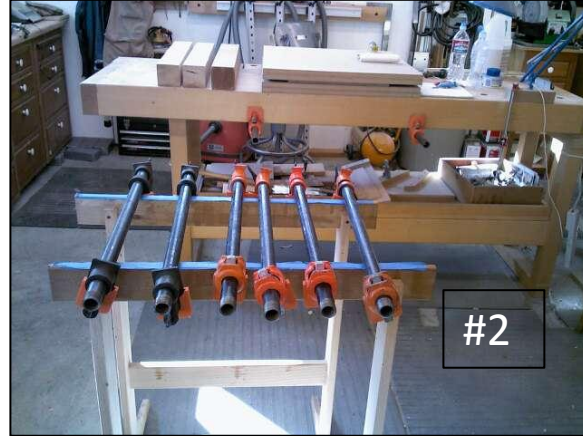
Once the veneered panels have been glued, use a wide belt sander to ensure that both sides are flat.

This should only take 1 or 2 passes through the sander. Try not to remove much material. The objective is to ensure that the panel is flat.

The finished panel should be 1/16" to 3/32" thick.



Gluing the Bottom Veneered Panel



Step #19:

You are now ready to glue the 2 veneers onto a $\frac{1}{4}$ " MDF substrate. Cut a piece of $\frac{1}{4}$ " MDF to the same size as the panels. You should have two pieces of veneer and one MDF substrate. Photo #1.

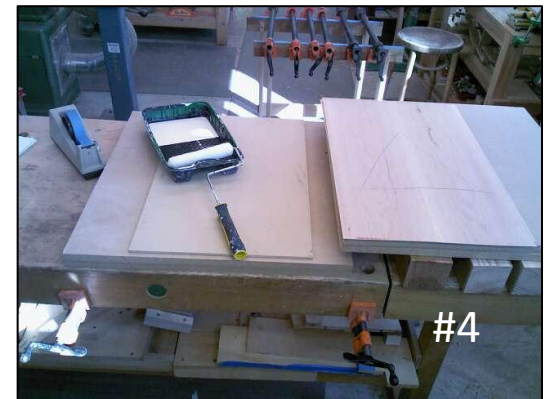
The objective is to apply equal downward pressure along the entire length and width of the veneered panel. This requires a very flat surface and clamping cauls. I use my workbench as a veneer press.

I use 4 pieces of $\frac{3}{4}$ " MDF about 25" square. 2 of the pieces are placed on my workbench (#1). The other 2 will be placed on top of the veneered panel. This process helps ensure that there are flat surfaces on both sides of the panel.

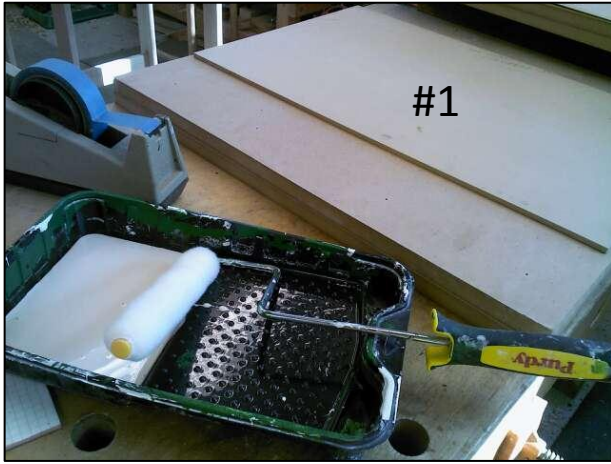
You will also need 6 @24" pipe clamps and 3 @ 4" x 4" x 25" cauls. The cauls have been planned so that the center of each 4 x 4 is $\frac{1}{8}$ " higher than the ends. This allows for more pressure to be applied to the center of the panel from the ends. Photos #2 & #3.

You will need to apply glue evenly across the substrate. Since the glue will start setting up within 15 minutes, you will need to work relatively fast. A paint roller and tray will help you spreading the glue evenly and fast. Photo #4.

I use yellow woodworking glue.



Gluing the Bottom Veneered Panel



Step #20:

You will need to have everything ready for the glue up (photos #1 & #2).

First spread an even layer of yellow woodworkers glue on the $\frac{1}{4}$ " MDF substrate (**NOTE: Do not apply glue to the veneers, only the substrate**). Photo #3.

Carefully lay one of the veneers on the glued substrate.

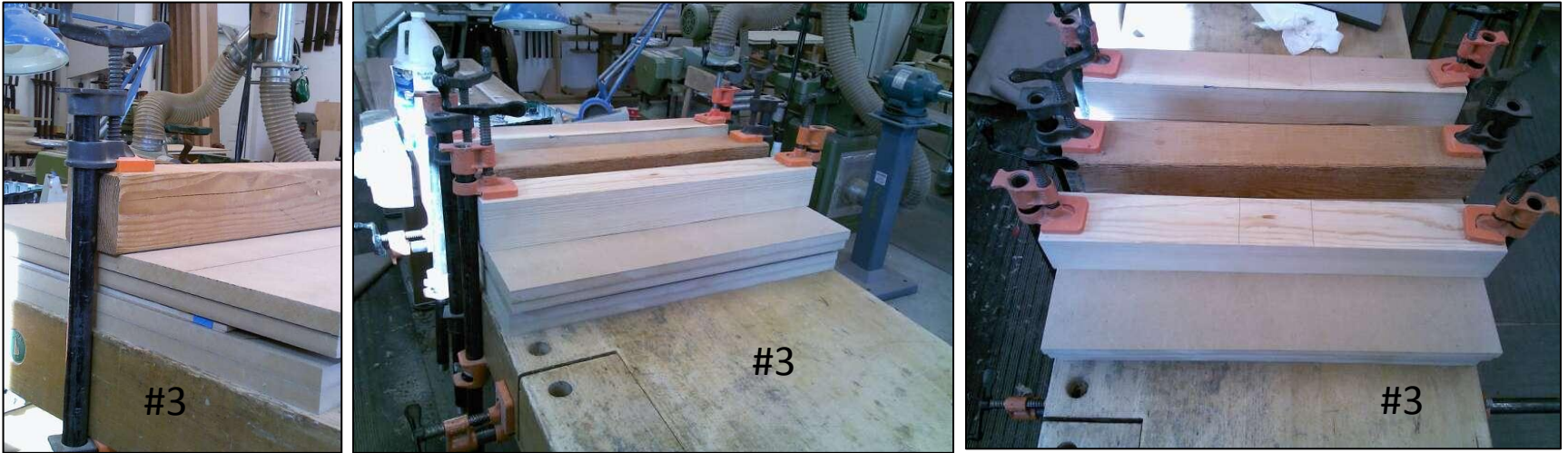
Turn the substrate over and apply glue to this second side. Carefully lay the second veneer down.

Use blue masking tape and apply tape around each of the corners in both direction. Photo #4. The purpose of the tape is to hold the veneers in position. The glue will cause the veneers to shift a little when the $\frac{3}{4}$ " MDF sheets and the cauls are laid on top and the clamps are tightened.

Notice that a sheet of craft paper is laid under the panel. This is there in case glue squeezes out the sides. Better to have the panel glued to the craft paper than to the MDF platform.



Gluing the Bottom Veneered Panel



Step #21:

In photos #1 & #2, you can see the 2 @ $\frac{3}{4}$ " MDF pieces above and below the sandwiched veneered panel. The 4" x 4" cauls are positioned on top and clamped to the workbench.

In order to ensure even pressure across the surface of the veneered panel, space the cauls evenly. The panel is only 15" wide, so with the 2 outside cauls placed on the outside edge of the veneered panel you should have approximately 2" between the cauls.

Start with clamping the middle caulk in place first. Alternately tighten the clamps so that pressure is applied evenly on both ends of the veneer panel.

Once the middle caulk is clamped, place a caulk on one of the edges and repeat the clamping process.

Repeat with the 3rd caulk and clamps. Leave the panel clamped at least 8 hours.

Bottom Veneered Panel Prep

Step #22:

This is the completed veneered panel for the bottom.

Use a jointer and squared an edge. This will be necessary since there is a good chance that the veneers shifted during the glue up.

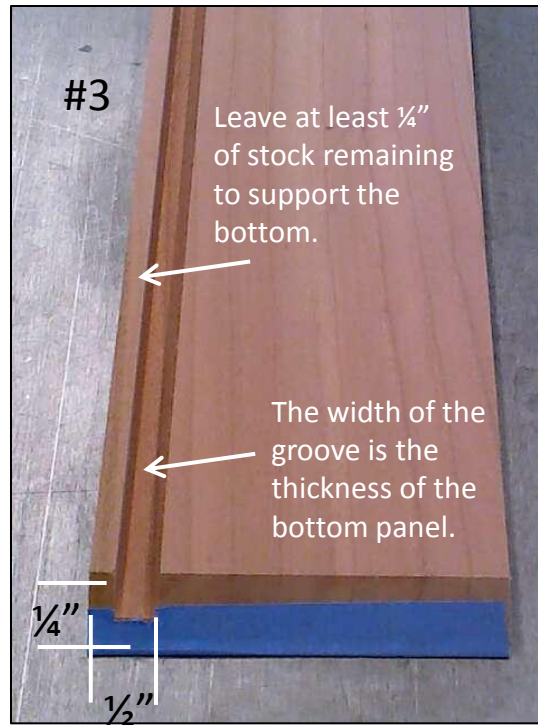
Once one edge is squared, cut the other edge parallel on the table saw. NOTE: You cannot trim the panel to its final size until the groove in the sides have been milled.

Sand with 150 to remove any tape residue.

Once sanded, measure the thickness of the panel. This dimension will establish the width of the groove in the side and end pieces of the serving tray.



Cutting the Groove for the Bottom Panel



NOTE: The blue masking tape applied to the ends of the boards is to protect the edges. The 45 degree cut makes the edges very fragile and the tape adds a little protection.

Step #23:

Before cutting the groove for the bottom panel, you need to cut the bottom edge on both the sides and end pieces to the template marks photo #1 (only side piece displayed).

This cut establishes the bottom edge of the serving tray (not pictured).

Measure the distance from the outside edge of these pieces to the template marks. Set your table saw fence accordingly. **NOTE: Measure each piece separately since the positioning of the template marks may vary slightly from piece to piece.**

Use a hand plane to smooth these cut edges. It is important that these bottom edges are straight and smooth since they will be your reference edges in the templates you made in Step #7.

Set the height of your table saw blade at $\frac{1}{4}$ " and the fence at $\frac{1}{2}$ " (remember to reset the saw blade to 90 degrees). Photo #2.

Photo #3 shows the dimensions and the positioning of the cuts.

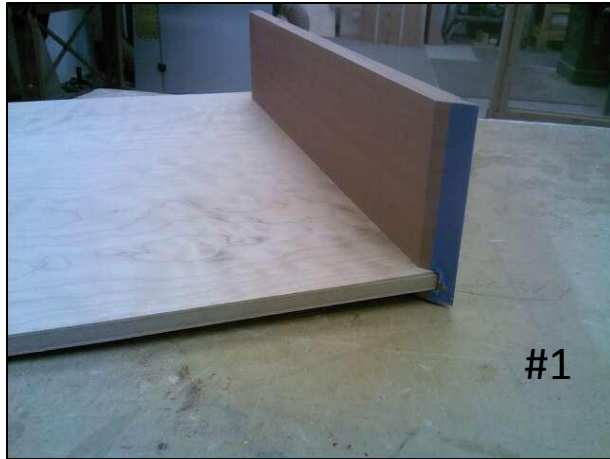
Make a test cut on a scrap of wood and check both the depth of the cut and the position.

This will create the inner most edge of the groove.

Reset the fence to $\frac{3}{8}$ " and run each board through again, this will widen the groove.

Repeat the process until the width of the groove equals the thickness of the bottom panel.

Cutting the Bottom Panel



Step #24:

Now that the grooves have been cut in the all the pieces, you are ready to cut the bottom panel to size.

Since the bottom panel is a veneered panel, you do not have to factor in seasonal wood movement.

Assemble the box and measure the distance from the inside of the grooves from side to side and end to end to determine the panel size. Make it a little oversized and then make adjustments to ensure a good fit. *(I suggest the you reduce the panel size slightly, **no more than 1/16"** in both width and length to eliminate the chances of binding. Be careful, you do not want to make it too loose).*

Since the panel is made up of two pieces of veneer on each side, to achieve the best aesthetic, measure the final width using the center of the panel as your guide. This will ensure that the panel is centered in the tray. *(Example: If the panel is 14 1/2" wide measure from the seam 7 1/4" in each direction).*

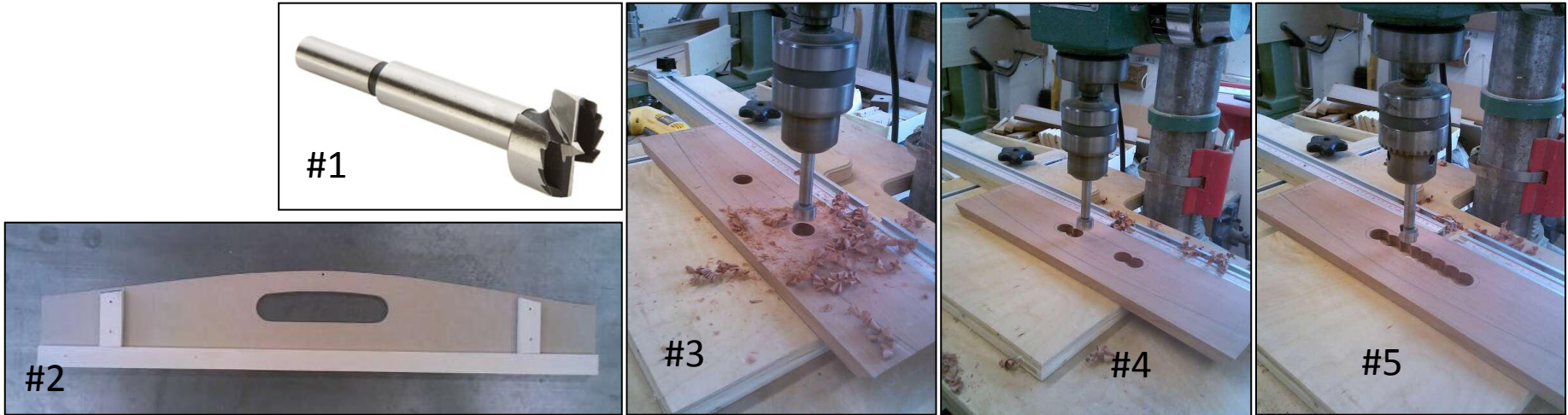
Rip the width of the panel on the table saw to width. Photo #2.

Then use a cross cut sled on your table saw to ensure a clean and accurate cut. Photo #3.

Do a trial fit to make sure that the mitered ends close completely.. Photo #4.

Use a block plane or a sanding block and ease the edges of the bottom on both the top and bottom. It is a good idea to sand each corner of the bottom panel so it does not come to a 90 degree angle.

Creating the Hand Holes in the End Pieces



Step #25:

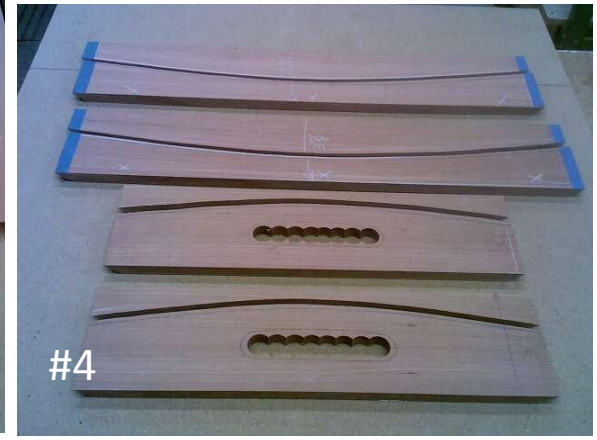
Use the template for the end pieces and trace the hand hold onto the wood. Photo #2.

Use a 5/8" Foster (Photo #1) or spade bit and remove the waste for the hand hold in the end piece. *(Place a scrap piece of wood underneath the end piece to ensure a clean cut on the underside).*

(NOTE: The hand hold is 1" wide so careful positioning of the drill bit is critical. You want to stay within the lines.)

Move the wood and continue drilling to remove as much waste as possible photos #3-5.

Rough Cut the Sides and End Pieces

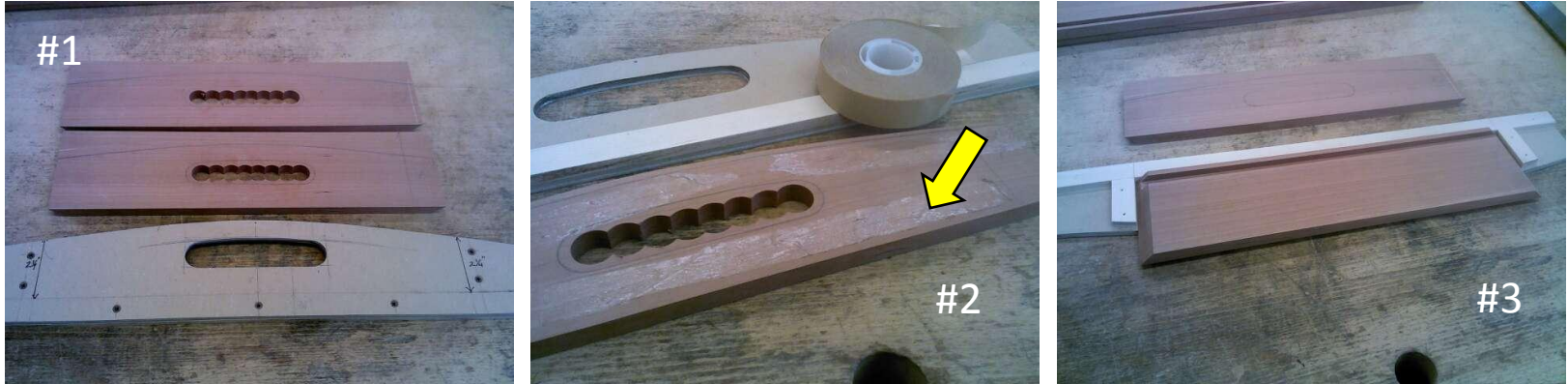


Step #26:

Trace the outline of both the end and side pieces on the corresponding pieces of wood as shown in photo #1.

Use a band saw or a hand held jig saw and remove the waste. Cut 1/8" outside the line. Photos 2-4.

Trim the Sides and End Pieces



Step #27:

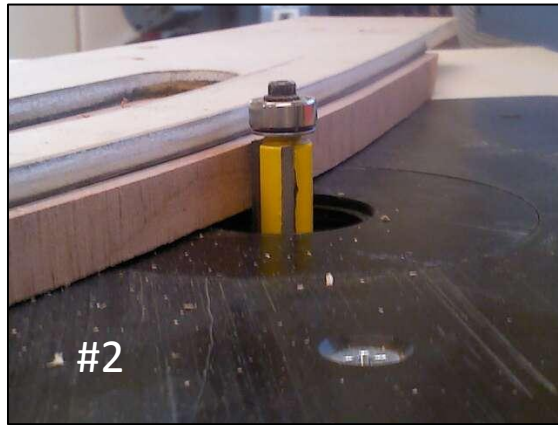
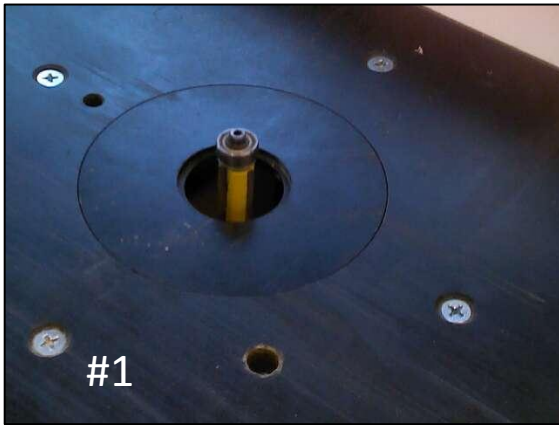
Photos #1 & #3 are shown only to display the template and its intended use.

Now that all the pieces are cut to length and the miter joints have been cut. It is time to cut the final shapes. The templates that you created back in step #7 will now be used to route the outside edges of the four pieces.

Photo #2 shows the use of double-sided tape to secure the wood to the template. Place strips of the double-sided tape along the outside of the wood. *(The tape I use is not paperbacked so it looks transparent).*

Place the end pieces with the outside face into the template and firmly seat the wood with you fist to ensure the wood has made contact with the tape. Make sure the bottom of each piece is flush with the bottom cleat.

Router Table Setup



Step #28:

I use a 1/2" flush trim router bit with a roller guide-bearing at the end as shown in photo #1 in a router table.

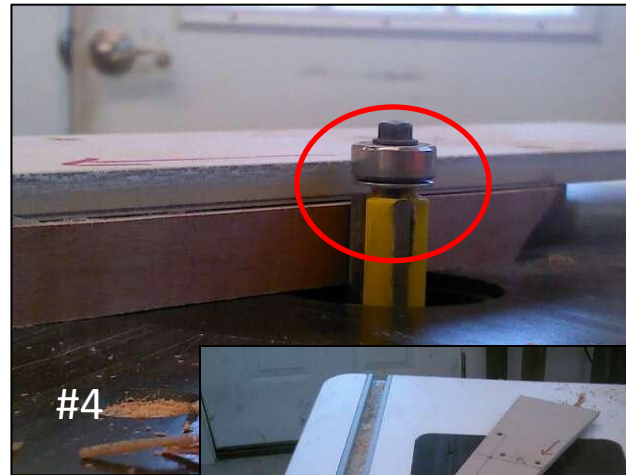
Position the router bit so the guide-bearing will make good contact with the 1/4" MDF template as shown in photo #2.

NOTE: Make sure that the cutting edge of the bit is positioned above the wood. This may cut the template a little, but that is ok. Photo #4).

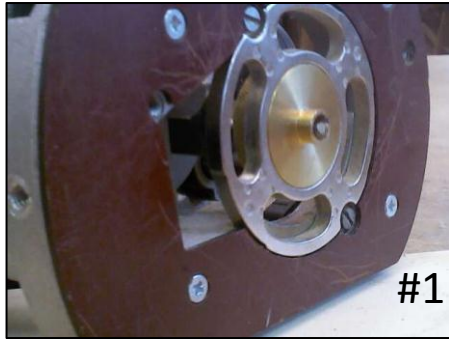
When cutting a curve, you will need to cut in two directions in order to avoid tear-outs. The rotation of the bit determines the feed direction of the wood through the router bit. Notice in photo #3 the red arrows that are marked on the template. Those arrows indicate the feed direction which changes direction in the center of the wood.

Photo #5 shows the amount of material that is being removed.

Photo #6 shows a side piece being routed. The wood is pulled and pushed as the arrows indicate.



Routing the Hand Holes in the End Pieces



Step #29:

NOTE: Since step #27 is done on a router table and this step is done with a plunge router you could save time by routing the hand-hold and outside edge in succession. Doesn't matter which is done first.

It is time to clean up the hand-hold in the end pieces.

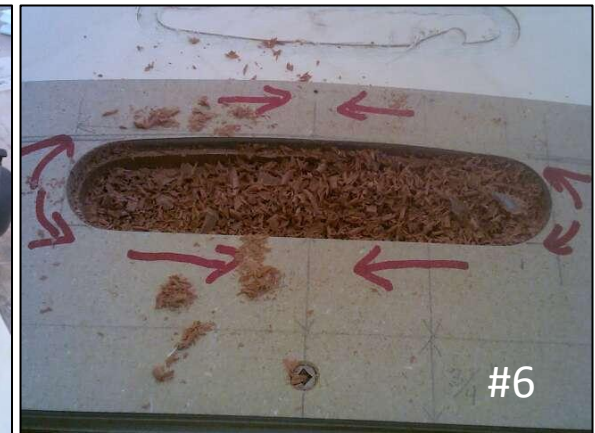
I use a plunge router fitted with a guide bushing and a 1/4" straight bit. The guide bushing's outside diameter is 3/8". Photo #1.

Secure the end piece in the template as in step #27. Photos #2 & 3.

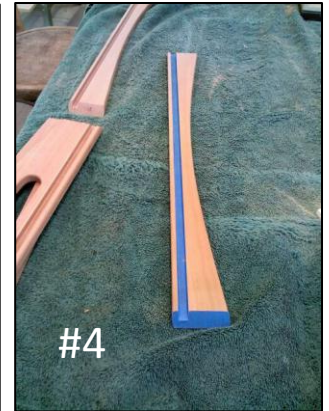
Clamp the template and end piece to a work surface as shown in photo #4 with a piece of scrap wood underneath the template. (*This is necessary since you will be going all the way through the piece and whatever is below the end piece will be routed as well*).

Notice in photo #6 the arrows show the direction of the router. Once again, this is done in order to reduce tear-out.

It is best to take small bites and lower the router in 1/8" increments. This will take longer but you will end up with a smoother cut. Repeat until you go through the wood.



Finishing the Inside of the Serving Tray



Step #30:

Applying a finish to the inside surfaces of the tray pieces is easier and more effective when the project is still in pieces. The outside of the tray will be finished after the project is assembled.

The first thing to do is sand all the parts. It is not necessary to sand the outside of the sides and ends, but do sand the bottom of the panel. Start with 150 grit sandpaper and progress to 180 and finish with 220. Use a random orbit sander and sanding blocks. Photos #1 & 2.

Ease the edges of the grooves in the side and end pieces. The best way to do this is with the corner of a sanding block.

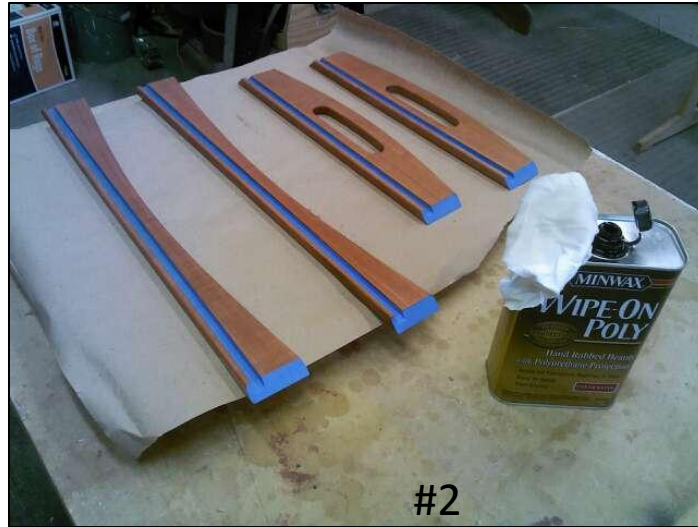
When you have completed sanding the pieces, mask the grooves, the mitered ends and the edges of the panel with painters blue masking tape. The tape will protect the areas that will be glued.

Make sure that the masking tape does not overlap areas that will be exposed. Photos #3 & #4.

Finishing the Inside of the Serving Tray



#1



#2



#3

Step #31:

Before you apply the finish to the inside surfaces of the tray pieces, wipe all the parts with paint thinner (mineral spirits). Photo #1. This will remove any dust and prepare the surface for the finish.

IMPORTANT SAFETY NOTE: Oil base finishes on rags will **catch on fire** if not handled correctly. Either hang wet rags in a well ventilated area until completely dry or soak oily rags in water and place in sealed metal can. Dispose responsibly.

Wipe on polyurethane is easy to use and provides a protective finish. Minwax Wipe-On Poly is the brand I have used with good success, however, there are other brands available. Photo #2. **Apply finish in a well ventilated area. Follow the directions on the can.**

Use a clean cotton cloth and wipe on a liberal amount of finish. The first coat will absorb into the wood. Use 0000 steel wool between successive coats, photo #3. Use a tack cloth to remove steel wool fibers, photo #4. A tack cloth is a treated cloth that picks up dust and other materials in preparation for finishing and is available at your local hardware store in the paint section.

It is best to wait at least 8 hours between coats (read instructions on can). Continue to apply additional coats using a moderate amount of finish. Make sure that the coats are applied evenly.

I recommend at least 3 coats of finish. The more coats the better protection. I would not put more than 5 coats.



#4

Gluing the Serving Tray



Step #32:

Remove masking tape and make sure there is no finish on the miter joints or in the grooves. Use a single edge razor or a small chisel if necessary to clean the joints. Photo #1. Layout all the parts as shown in photo #2.

Before you glue up the tray, do a dry fit to ensure that all the parts are fitting correctly. Photo #3. Once you have established that all the parts are coming together without gaps you are ready to glue to tray. **See note below right.**

It is best to assemble and glue on a flat surface as shown in photo #4.

Miter joints are inherently weak because you are gluing end grain to end grain. Gluing the bottom panel into the frame provides additional glue surfaces that will hold the tray together. Keys will be added in the next step.

In addition, applying clamping pressure to miter joints requires special clamps. I found that a band clamp works well. Photos #4, 5 & 6.

Apply a moderate amount of yellow glue in the groove on one side. Place the panel in the groove and align the panel to the edge of the groove on the end.

Apply glue to the corresponding end piece and seat it to the panel and the side piece. Take blue masking tape and tape the corner, ensuring that the miters line up and are closed.

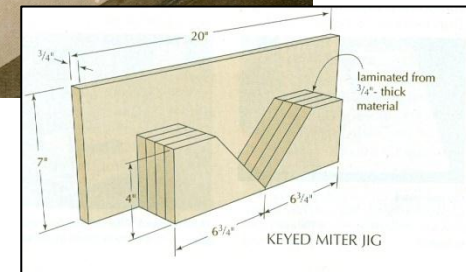
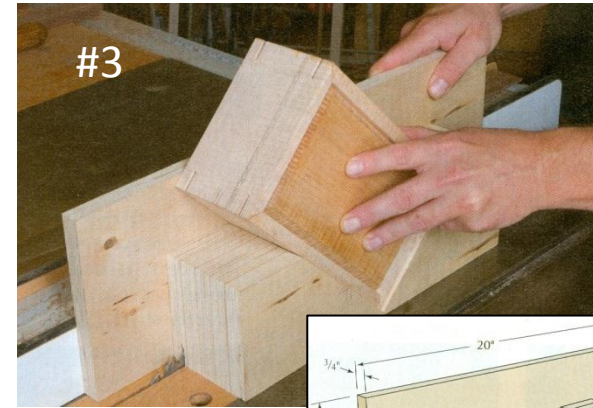
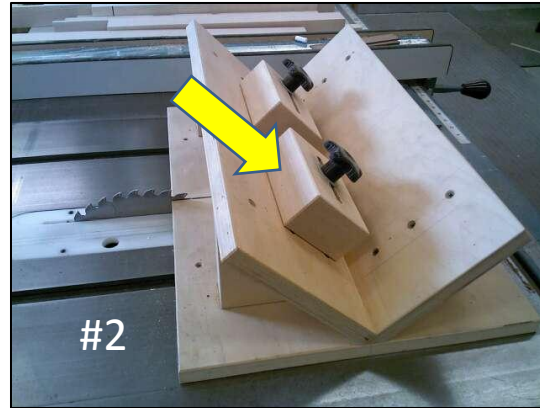
Apply glue to the other end piece and slide that into position. Do the same with the other side piece. Apply blue masking tape to each corner as you proceed. Make sure that all the miter joints are tight.

Arrange the band clamp and tighten. Check the alignment of each joint. Let the project dry for at least 8 hours.



NOTE: The top corners of the tray will not fit perfectly. You will correct this in step #38. Photo #6.

Making Key Miter Joints



Step #33:

A keyed miter joint is both decorative and structural, emphasis on the structural.

A table saw jig is required to make the slots through the mitered corners of the tray. The thickness of the saw blade determines the thickness of the keys.

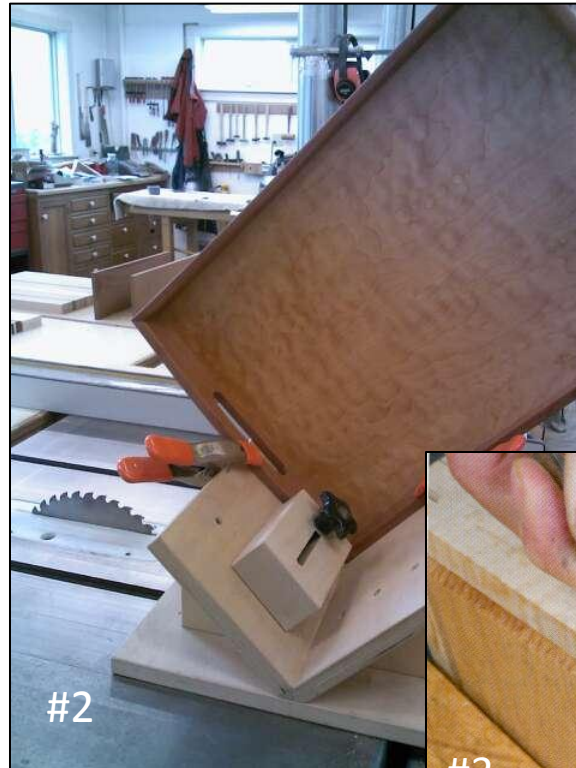
Photos #2 & 3 are two examples of key miter jigs. Photo #3 is from the August 2012 issue of *Popular Woodworking* and uses the table saw fence to set the positions of the keys. The jig in photo #2 rides in the miter slots in the table saw top and the position of the keys are set by adjusting the guide blocks (highlighted).

The procedures are the same regardless of the jig you use. The jig holds the work piece at a 45 degree angle as it is guided through the saw blade.

The saw blade's height determines the depth of cut. Keyed miter joints **DO NOT** go through to the inside of the frame, so setting the blade depth is critical and requires test cuts.



Making Key Miter Joints



Step #34:

I used the jig that rides in the miter slots on the table saw.

NOTE: Regular saw blades do not make a flat bottom cut. You will have to square the end of the cut with a small chisel as shown in photo #3.

In photo #1, the guide blocks have been set $\frac{1}{2}$ " in from the bottom of the tray. This is the first cut.

Secure the tray in the jig. I used squeeze clamps to secure the tray. Photo #2.

Guide the jig through the saw blade. Make sure that you go all the way through the blade. You want the cuts to be the same for each key. Going partially through the blade will result in uneven slots.

Making Key Miter Joints



Step #35:

I used ebony for the keys. Mill the stock to the same thickness as the key slot. Make them a little wider than the depth of the slots, approximately 1". Cut 8 keys about 2" long. Photo #1.

Test fit the keys to make sure they fit snugly and bottom out to the ends of the slots.

Apply white glue to the slots and seat the keys into the slots. Photos #2 & 3. Make sure that the keys bottom out in the slots.

Let the glue dry for at least 2 hours.

Making Key Miter Joints



Step #36:

You now need to cut the keys. Photos #1 & 2.

In order to protect the tray from saw marks, I use blue masking tape to protect the areas around the keys. Photo #3.

Use a cross cut saw and cut off the excess material. Cut close but make sure you do not scratch the outside surfaces. Photos #3 & 4.



Making Key Miter Joints



Step #37:

The next step is to make the keys flush to the tray. The best way to do this is to use a low angle block plane.

In order to secure the tray during this process, I used a couple of pieces of plywood cut to fit inside the ends of the tray and long enough so I could clamp them to my workbench. Photo #1.

Since the inside of the tray is finish, I used a towel and piece of felt to protect them. I secured the tray with bar clamps as shown in photo #2.

Using the block plane, gently plane the keys flush to the faces of the tray. Work from the outside to the middle to avoid tearing out the corner of the keys. Photos #3 & 4.

Sand the outside of the tray to 220 grit.



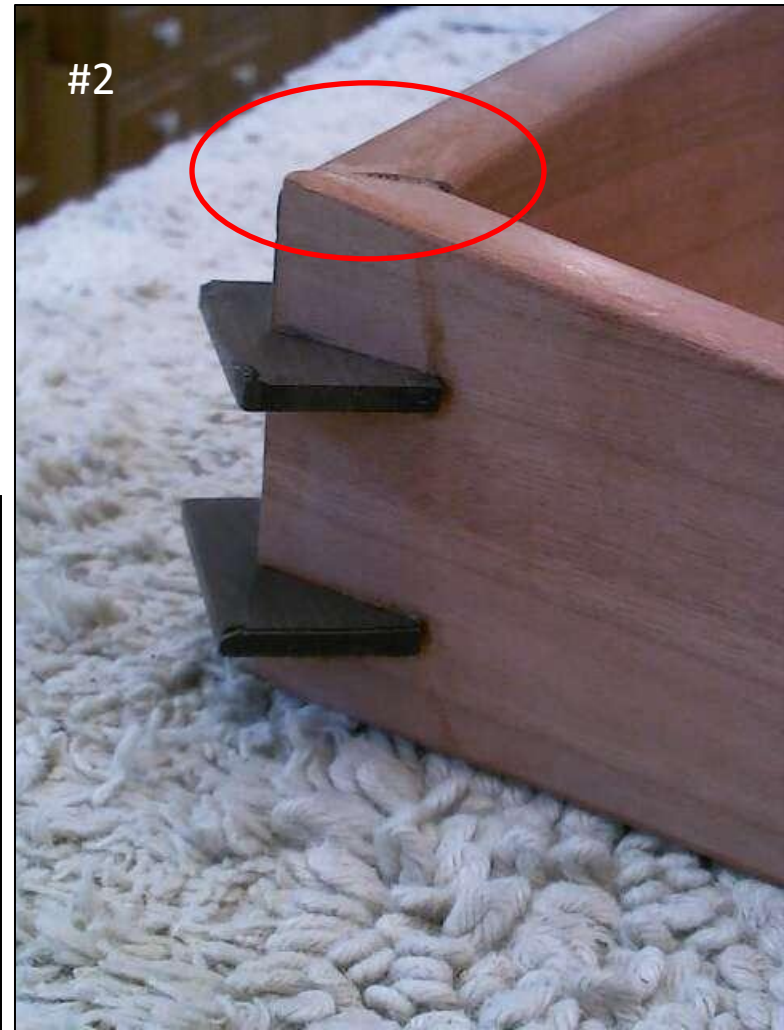
Cleaning Up the Corners

Step #38:

When you assembled the tray in step #32, it was noted that the top corners of the tray did not come together cleanly. This is because of the compound angles of the miters and the curves of both the end and side pieces.

You will need to be modify them with a sharp chisel and sandpaper.

Carefully shape the top corners so they merge together as shown in photo #2.



Finish the Outside of the Tray

Step #39:

You are almost done.

The inside surfaces of the tray have been finished.

You will need to overlap the finish along the top edges of the tray but you do not want to splash finish on the bottom.

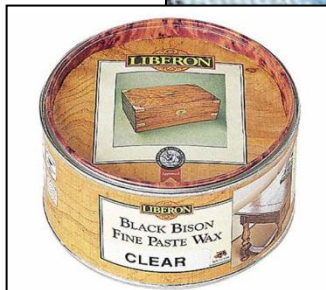
In order to protect the bottom, I use blue masking tape and craft paper.

As outlined in step #31, apply 3-5 coats of wipe-on polyurethane to the outside surface. Because this finish is very forgiving, you can overlap the top and inside faces of the tray. Make sure that there are no drips or runs.

Use 0000 steel wool between coats.



Apply Paste Wax to the Tray



Step #40:

Apply a couple coats of high quality paste wax to the tray.