

# Instructables

## Butcher Block Top



## **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.

This project details the steps involved in making an end grain butcher block counter top. The finished size of the counter top is 26 1/2" wide and 37 1/2" long. It is intended as a counter top for a kitchen island.

Producing flat and square board surfaces with parallel edges is the key to a successful project. The production process is time consuming and involves the repetition of many steps including:

- glue-ups (glue provides the bond between all the joints. There are no mechanical fasteners).
- flattening the boards
- creating parallel surfaces.

The wood used in this project is hard maple, its grain is tight enough to limit the absorption of fluid, but not so tight that it will affect the stability of the product itself and cause cracks. Use hard maple that is knot free.

The hard maple end grain butcher block is much gentler on the knife's cutting edge because, instead of grinding against the wood fibers, the blade will actually "squeeze" between them, thus wearing out much slower. For the same reason, the top itself wears out at a slower rate than a conventional edge-grain cutting board and does not show cut marks like an edge-grain cutting board.

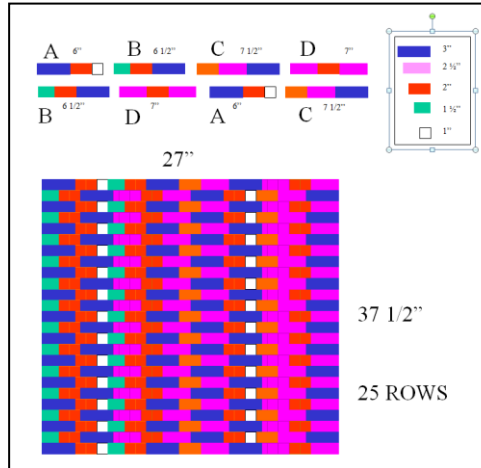
After an initial seasoning with mineral oil, adding occasional applications will ensure a long life for the top.

## **Materials Needed:**

- Approximately 30 linear feet of hard maple. 2" thick and 6" to 8" wide.
- Titebond 3 glue
- 150 grit sandpaper
- Mineral oil

## **Tools & Equipment Needed:**

- 8" jointer
- Hand plane (preferably a low angle jointer plane).
- 16" flat bed drum sander (3" or 4" belt sander is an alternative).
- Table saw with a cross cut sled and a very sharp blade.
- Bar clamps of various lengths.
- Gluing jigs.



## Construction Methodology:

The butcher block top is composed of alternating "A" and "B" rows of 4 laminated blocks.

Blocks A, B, C & D are comprised on three individual strips of wood ( 1", 1 1/2", 2", 2 1/2" & 3") glued together in four different configurations.

The random grain orientation of each laminated board creates a very stable structure.

25 rows of blocks, 1 1/2" wide and 27" long, will create a 37 1/2" long, 26 1/2" wide and 1 1/2" thick counter top. More rows can be added depending on the desired length.

The intent is for the blocks to overlap each other and avoid common vertical glue seams. This configuration provides a 1/2" vertical overlap of the individual blocks.

You will need a minimum of 30 linear feet of 6" to 8" wide, 2" thick, knot free, hard maple boards.

The key is to produce boards with flat faces and square edges. Gaps/spaces are NOT good!

Each row contains the following block widths: 4 @ 2", 3 @ 3", 3 @ 2 1/2", 1 @ 1 1/2" and 1 @ 1".



### **Step #1: Flatten one face of each board.**

It is easier and more effective to work with boards of a moderate length. Utilizing your lumber efficiently, cut your boards between 3' and 4' long.

A jointer is used to flatten one face of a board.

In order to ensure that a surface of a piece of lumber is flat, draw a series of pencil lines every 2" across the surface being flattened.

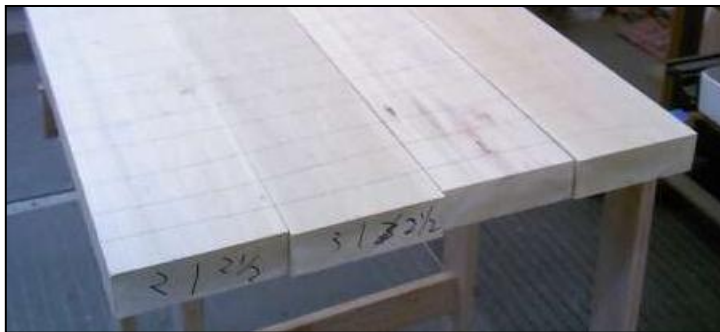
These are called "witness" lines. *You will be using this technique throughout the production process.*

Applying downward pressure and pushing the board forward with a push stick, flatten one face.

When the surface of the board is flat, all the "witness" lines will have been planed off.

Flatten one face of each piece of lumber.

Mark the flat side with a pencil mark so you will know what side you flattened.





### **Step #2: Create parallel surfaces and reduce thickness to 1 5/8".**

Once one surface of each board is flat, the next step is to make the opposite side flat and parallel by running it through a planer.

Reduce the thickness of the boards so they are all at least 1 5/8" thick. The thickness of the board determines the width of each row. The flattening and sanding process reduces the thickness from 1 5/8" to 1 1/2". (**Note: All the boards should be dimensioned at the same setting to ensure consistency.**)

You now have a series of boards that are 1 5/8" thick and vary in width from 6" to 8". For ease of handling, 4' in length is recommended.



### **Step #3: Sand each board to create a smooth surface**

This step depends on the quality of the board's surface.

If each board is flat and smooth (without tear-out or knife tracks) then you can skip this step.

However, in most cases, planer and jointer knives leave a slightly rippled surface and it is recommended that you run each board through a flat bed drum sander to create smooth surface on each board face.

***Important: All the boards need to be sanded the exact same number of times to ensure that all the boards have a consistent thickness.***



**Step #4: Square one edge to the board's surface.**  
Use a jointer to make the edge square to the face of the board. Use a square to ensure that the edge is 90 degrees to the face.



**Step #5: Use a table saw to create parallel edges.**  
Now that one edge is square to the board's face, position the squared edge to the table saw fence and make the board's edges parallel.



### Step #6: Cut boards to 4 different widths

In this step you will rip the milled boards to different widths ( 1", 1 ½", 2" 2 ½" & 3") in order to create the laminated A, B, C & D boards.

You will need to cut more 2", 2 ½" and 3" strips than 1" or 1 ½" strips as stated below:

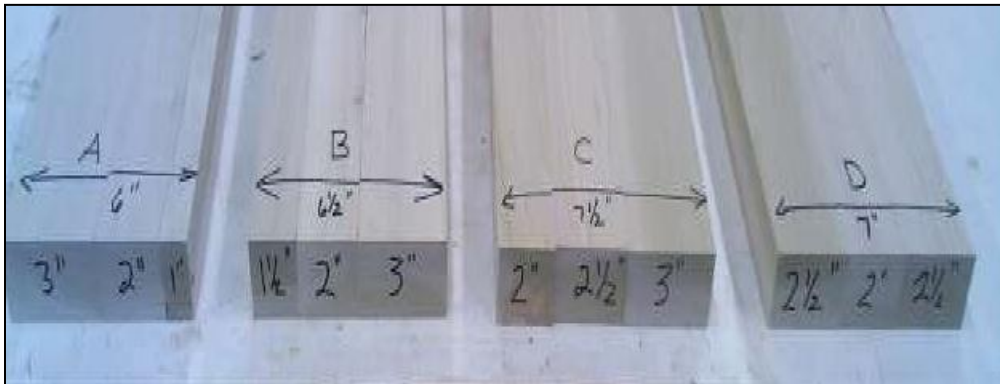
- 4 @ 2"
- 3 @ 3"
- 3 @ 2 ½"
- 1 @ 1"
- 1 @ 1 ½"

You will need at least 30 linear feet of 1 5/8" thick milled lumber, 6" to 8" wide. More if the counter top is longer than 37".

When combined, the strips of wood create the laminated A, B, C & D boards that will be cut into blocks.

The edges of each board need to be square to the board's face. Avoid any gaps or spaces.

**IMPORTANT:** Assemble the A, B, C & D boards so the end grain is random.





**Step #7: Glue the wood strips to create A, B, C & D boards.**  
Apply a consistent film of glue on both mating edges of the boards.

Use bar clamps to glue the strips together. Ensure that the layout of each board is consistent with the configuration of the A, B, C & D boards.

Align the surfaces of the boards to mate flush.







**Step #8: Flatten the A, B, C & D boards.**

Use the jointer and flatten one face of each laminated board.

Utilize “witness” lines to ensure flatness.





**Step #9: Flatten the opposite face of the A, B, C & D boards.**  
Use the drum sander to make the opposite face parallel. A 120 grit sanding belt is adequate.

Sand all of the A, B, C & D boards to the same thickness.

**NOTE:** *You could also use a planner but be careful to avoid tear outs.*

Once the opposite face is sanded, turn the board over and sand the jointed face to remove any jointer ripples. Use "witness lines to gauge progress.





**Step #10: Cross cut the A, B, C & D boards.**

Use a crosscut sled on the table saw to cut each board to 1 5/8" wide blocks (you will end up with a 1 1/2" thick top; the sanding processes to create a flat top will remove about 1/8"). Use a stop to ensure that all the pieces are cut uniformly.

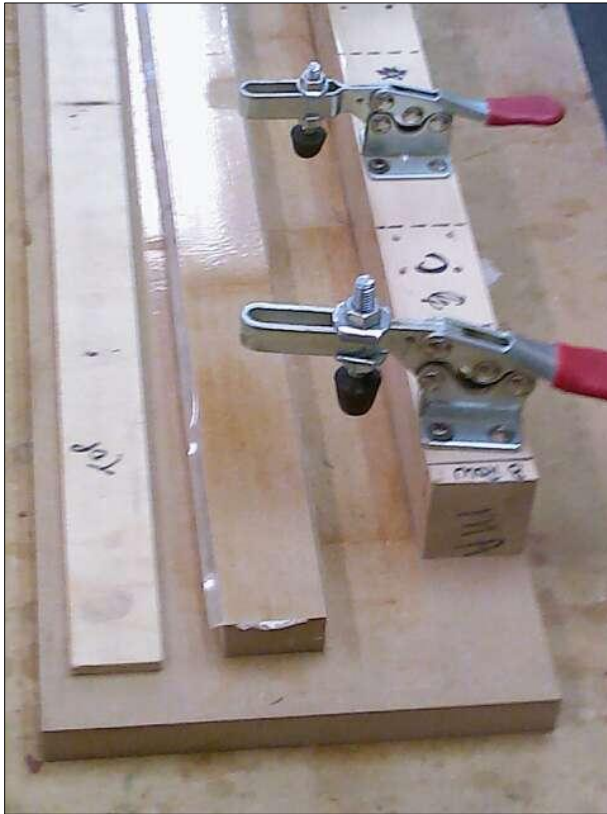
**SAFETY NOTE:** Hard maple is very dense and the depth of the cut is 1 5/8" inches, meaning that there is a lot of exposed blade and blade tension. Be careful of kickback and only remove cutoff when the blade is out of the way.

**IMPORTANT:** All the boards need to be cut at the exact same width. Use a stop block to ensure consistency.

The width of these cuts determines the thickness of the butcher block top. If you want a thicker top, change the size of the cut.

You will end up with 100 individual blocks (25 each of A, B, C & D) for a 37 1/2" long top.





### Step #11: Make two gluing jigs for the blocks.

Use the following procedure to make two clamping jigs to aid in the gluing of the laminated strips for each of the A and B rows.

- Cut two pieces of  $\frac{3}{4}$ " MDF 34" long and 8" wide for the jig base.
- Cut two pieces of hardwood  $1\frac{1}{2}$ " square and 29" long for the fence.
  - Cover the face of the  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " hardwood fence with clear packing tape (avoids gluing the blocks to the fence).
- Cut two  $26\frac{1}{2}$ " long,  $1\frac{3}{8}$ " wide pieces of  $\frac{3}{4}$ " MDF as front clamping cauls. Cover the cauls with a strip of clear packing tape to prevent it from gluing to the blocks.
- Cut two  $26\frac{1}{2}$ " long,  $1\frac{3}{8}$ " wide pieces of  $\frac{1}{4}$ " plywood or MDF as top clamping cauls. Cover the cauls with a strip of clear packing tape to prevent it from gluing to the blocks.
- Attach the  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " hardwood fence to the  $\frac{3}{4}$ " MDF board through the bottom with screws. Align the edges so they are flush.
- Place A, B, C and D segments along the  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " hardwood fence and mark and label each segment to ensure the proper gluing sequences.
- Place toggle clamps to correspond to the glue joints of the blocks. The toggle clamps are used to apply downward pressure on the lamination. This keeps the sections from moving during glue up. The  $\frac{1}{4}$ " caul is placed on top of the blocks to equalize downward pressure.
  - Adjust toggle clamps with top caul in place to ensure adequate downward pressure.

### Step #12: Glue A, B, C & D blocks into A & B strips.

The multiple clamping positions will ensure tight glue joints and will maintain flat surfaces making successive steps easier.

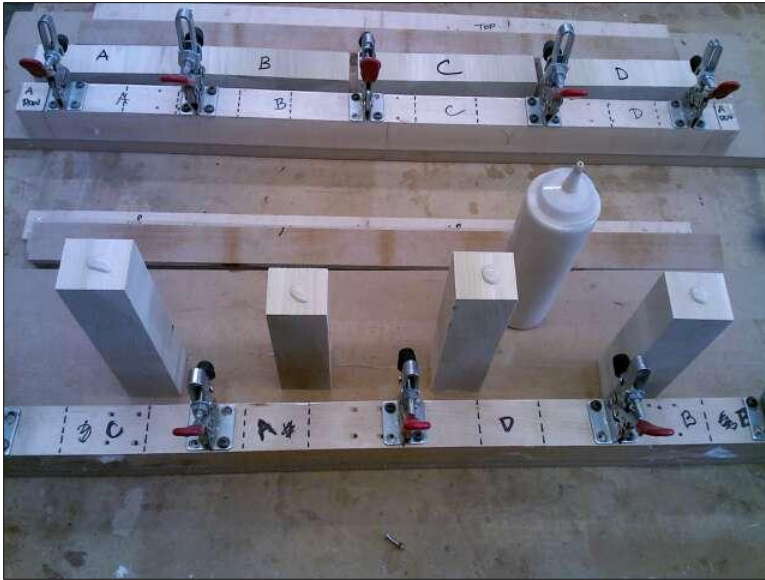
#### Clamps:

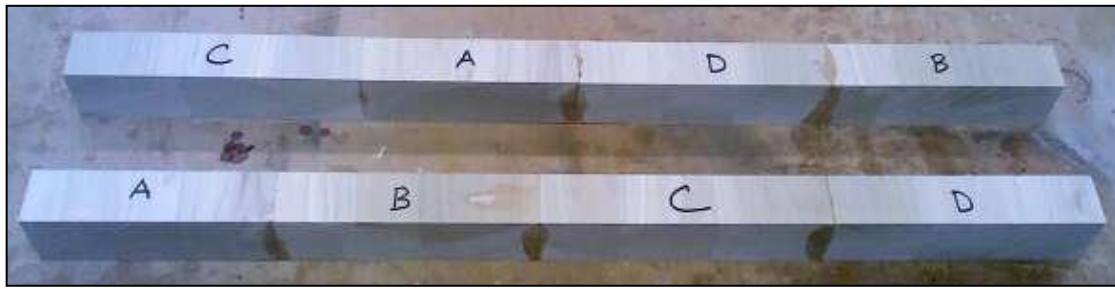
- The long bar clamp exerts clamping pressure along the length of the 4 blocks end to end.
- The toggle clamps hold the blocks flat to the base.
- The small bar clamps keep the blocks tight and flat to the fence.

#### Gluing procedure:

- Position the A, B, C, and D segments in the proper order and put a dime size glob of *Titebond 3* glue on the end of the blocks. Use a brush to spread the glue evenly over the entire end of the blocks. **NOTE: The second and third blocks will need glue on both ends.**
- Lay the 4 blocks in order on the gluing jig and press them together with your hand.
- Position the front MDF caul on the opposite side of the blocks. *The caul is a little shorter than the four blocks so it doesn't interfere with the long bar clamp.*
- Place a small bar clamp across the middle of the first block and tighten the MDF caul and block against the fence. This will secure the first block against the fence.
- Place another small clamp in the middle of the last block and tighten the clamp with **LIGHT** pressure so the block can slide but is still tight to the fence. *This clamp will be tightened once the long bar clamp is applied.*
- Position the long bar clamp on the ends of the blocks and apply adequate pressure to clamp the 4 blocks together end to-end.
- Tighten the last small bar clamp and put two more small bar clamps in the middle of each block.
- Place the thin caul on the top of the blocks and clamp it down using the toggle clamps.

**Repeat until all the 'A' and "B" rows have been glued up.**





### Step #13: Flatten the A and B strips

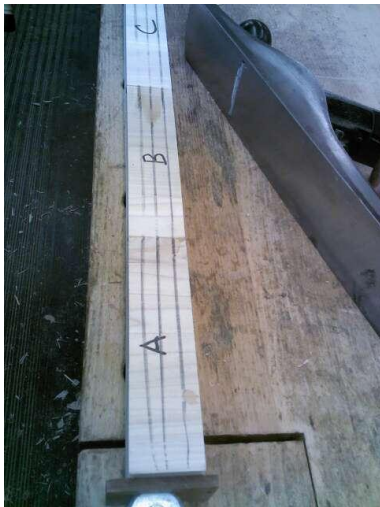
In order to ensure that the joints between rows are tight (no spaces or gaps), both sides need to be flat and parallel.

There will most likely be a minimal amount of dried glue on the sides and top of the strips at each of the three glue joints.



Take a pencil and draw a series of “witness” lines from end to end. These “witness” lines will telegraph the high and low spots along the length of the board.

Take a hand plane and flatten one side of the laminated strip. The “witness” lines should disappear when you have achieved a flat surface.



Mark this side with a pencil mark. This will “reference” the flat side.



#### **Step #14: Make A and B strip sides parallel**

Using a flat bed drum sander, position the flat “reference” side down on the bed of the sander and lightly sand the top side of each A & B strip. You will be sanding across the grain.

**NOTE:** *Sanding across the grain is NOT a standard practice. Since the sides of each board are glued to each other, the sanding marks will not be visible. The objective is to ensure that each side of the strips are flat.*

All the strips have to be sanded the exact number of times to ensure that they are all the same thickness.

Take a pencil and draw a series of lines from end to end. These “witness” lines will telegraph the high and low spots along the length of the strip.

Sand each strip until the “witness” lines disappear. This will signify that the side is flat.

Turn the strips over and lightly sand the “reference” side. This provides a similar surface on both sides of the A and B strips.





### Step #15: Glue A and B strips

It is easier and more efficient to glue six A and B strips into sub-assemblies and then glue the sub assemblies to achieve finish length of the counter top.

- Mark the end of each strip with the corresponding “A” or “B” row designation.
- Layout 6 alternating A and B strips.
- Draw a “triangle” across the 6 strips. This will assist you in ensuring that the strips are in the correct order.

Use *Titebond 3* waterproof glue.

- Use a squeeze bottle and place a bead of glue along the length of the strip.
- Use a small foam brush and evenly spread the glue along the entire side of the strip.
- Apply glue to each mating surface.
- Stack the 6 rows together, one strip at a time. Ensure that the strips are aligned and the faces are flush.







### Step #16: Clamp A and B strips

Use bar clamps to secure the 6 A and B strips together.

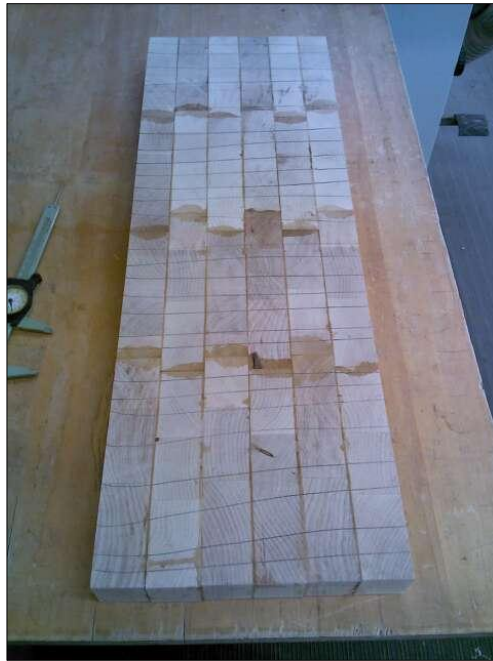
Ensure that the top surface of each row is flush with the strips on either side.

Ensure that the ends of the strips are evenly aligned.

**NOTE:** *The ends will eventually be trimmed by ¼" so exact alignment is not critical.*

The photo shows a vertical glue press that applies downward clamping pressure as well as pressure on the face of the board. This helps to ensure that each row is flush with the other rows.





**Step #17: Flatten the face of the sub assembly**

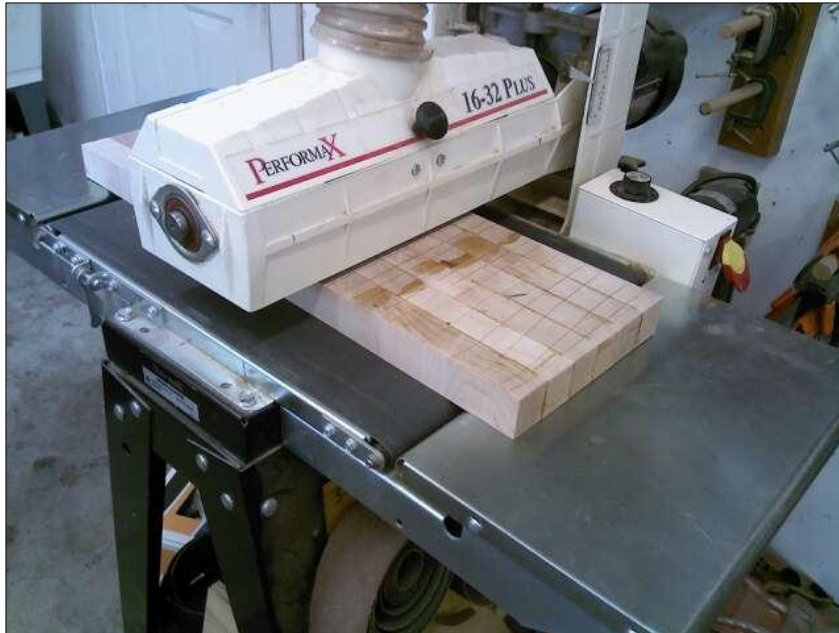
Now you have 6 rows glued together. As careful as you have been, the surface is not absolutely flat so you have to flatten one side.

Use a scarpener or a chisel to remove any excess glue from the face of the board.

Use a hand plane to remove any high spots. Use “witness” marks as a guide.

Repeat this process for the remaining sub assemblies.





### **Step #18: Flatten the opposite face of the sub assembly**

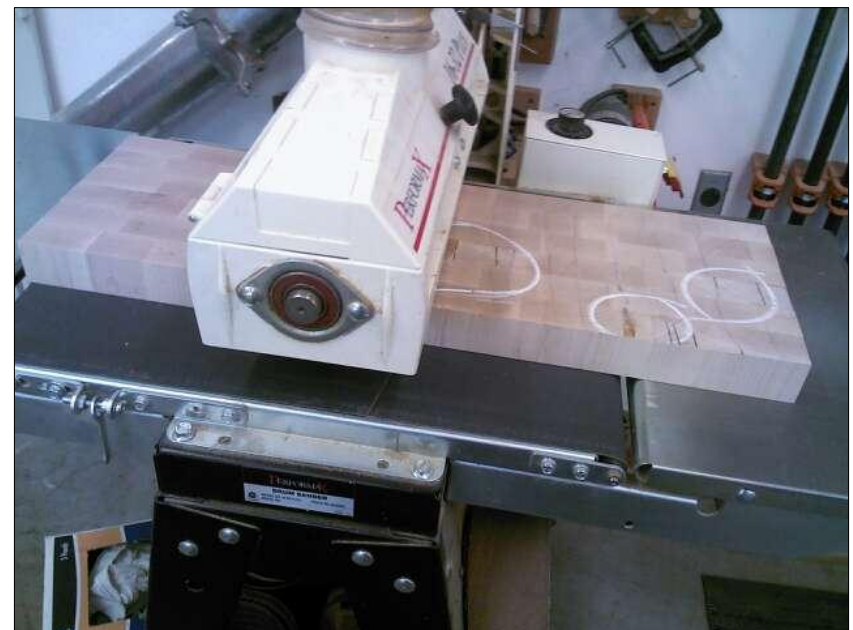
Now that one face of the sub assembly is flat you need to flatten the other side.

Once again draw “witness” lines across the face of the sub assembly and lightly sand the surface through the drum sander (you could also use a belt sander but be careful not to dish out the surface).

The photos (chalk circles) indicate where the surface still is not flat.

Turn the sub assembly over and sand the other face using the same technique.

***IMPORTANT: The faces of all the sub assemblies need to be sanded to the same thickness.***





**Step #19: Square the edges of each sub assembly**

The sub assemblies are almost ready to be glued together but first you need to ensure that the mating edges are flat and square to the face of the sub assembly.

Clamp the sub assembly in a vice and use a hand plane to refine the edge so it is square to the face and flat. Use an adjustable square to check for square.

Repeat this process on all the mating edges on the other sub assemblies.



### Step #20: Glue the sub assemblies

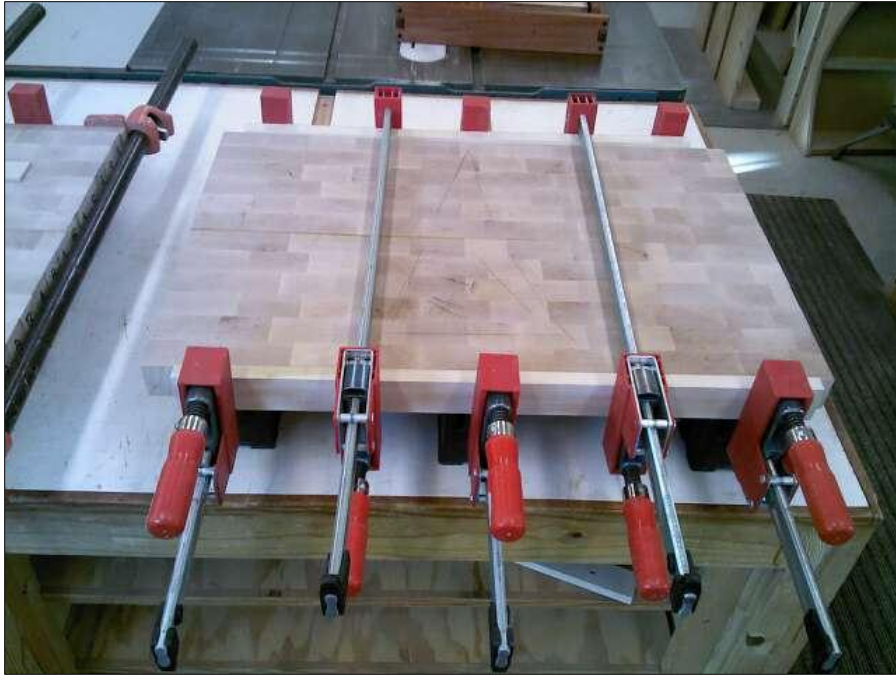
There are now four sub assemblies, three with six rows and one with seven rows.

Choose the best face of each sub assembly and layout the completed counter top **ENSURING** that you have alternating “A” and “B” rows. Mark the sub assemblies with a triangle pencil mark to indicate the gluing order.

Apply glue to both mating edges and apply bar clamps. Let the glued sub assemblies dry for 24 hours.

**IMPORTANT:** *Align the two edges flush.*





### **Step #21: Glue the 2 halves**

There are now four sub assemblies, three with six rows and one with seven rows.

Choose the best face of each sub assembly and layout the completed counter top **ENSURING** that you have alternating “A” and “B” rows. Mark the sub assemblies with a triangle pencil mark to indicate the gluing order.

Apply glue to both mating edges and apply bar clamps. Let the glued sub assemblies dry for 24 hours.

***IMPORTANT: Align the two edges flush.***



**Step #22: Flatten the counter top**

The counter top is now glued up into one piece.

You can use a belt sander to sand the top flat or you can use a wide belt drum sander. Professional cabinet shops often rent time on their wide belt sanders at a minimal cost.

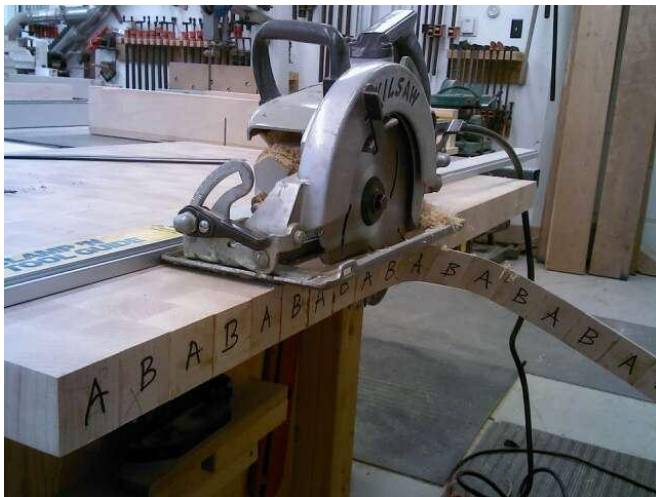


### Step #23: Trim the long side of the counter top

The counter top is ready to be cut to the final width of 26 1/2".

The objective is to trim one side of the counter top straight by about 1/4".

- Use a contractors "Skillsaw" or other power hand saw that can cut to a depth of 1 3/4".
- Measure the distance from the wide edge of the saw base to the inside edge of the blade. In this case 3 5/8".
- Use a "T" square and mark a line 3 3/4" of an inch from the edge of the counter top. This will cut about a 1/4" of the width of the top.
- Secure a straight edge along the line. This serves as an edge guide for the power hand saw. **NOTE:** Make sure the straight end cannot move.
- Set the blade to 1 3/4" deep.
- Use both hands to hold and guide the saw along the straight edge and cut the waste.







**Step #24: Flatten the counter top edge**

One edge of the counter top is now trimmed. The power hand saw most likely left a rough edge.

Use a hand plane and plane the edge flat . You will going against the wood grain but it will not matter since you will be sanding the edge smooth in a following step.



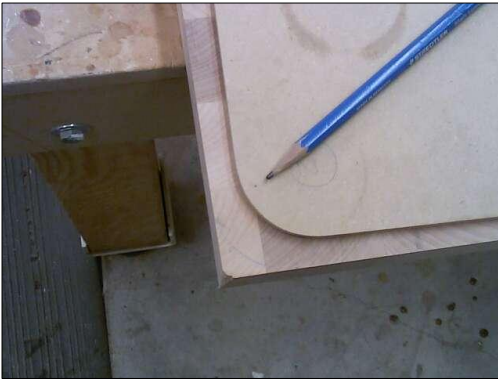


**Step #25: Trim the opposite edge of the counter top**  
Use the table saw to trim the opposite edge parallel.

Set the table saw fence at 26 ½" and cut the top.

Repeat step #22 and plane this edge flat.





### Step #26: Round the corners

- Make a corner template using  $\frac{1}{4}$ " MDF and mark the four corners of the counter top.
- Use a jig saw to cut the majority of the waste. Leave  $\frac{1}{8}$ " margin.
- Fit a router with a 2" straight cutting bit and a guide bushing.
- With the corner template clamped to the top, use the router to trim the corner.



**Step #27: Round the corners**

Use a 3/8" quarter round router bit with a guide bearing to round over the edges on both sides of the top.





**Step #28: Sand the edges and the top**

Use 150 grit sandpaper and hand sand the edges and the corners to make them smooth.

Use a random orbit sander to sand the top. Because the top is end grain, 150 grit sandpaper is all that is required.





Now that the top is sanded you can see the pattern of the individual blocks and how the blocks overlap each other to form a strong bond.



### Step #29: Finish top with mineral oil

Use mineral oil, purchased from your local pharmacy, and apply it liberally on the top. Use a soft cotton rag and cover the top and all the sides with a heavy coat.

***NOTE: There are oils made especially for wood cutting boards, but mineral oils is just as good. Do NOT use vegetable oils (olive, canola etc.) they will turn rancid.***

Leave on. The mineral oil will be absorbed into the end grain within a few hours. Repeat until the mineral oil will not absorb any more.

Repeat on the other side.

Apply mineral oil every few months or when the top appears to be dry.

I recommend that you only cut vegetables or bread etc. directly on the top. Do not cut raw meat, poultry or fish directly on the wood.



This is what the finished top will look like after a few coats of mineral oil.

