Modular Wall Bookcase

Modular Bookcase Overview:

This modular bookcase was designed and constructed by Jens Sehm of *As You Like it Fine Furniture and Custom Woodwork* in Ashland, Oregon. Jen's gave me permission to document the construction process.

This project is made from solid cherry hardwood. It is comprised of three individual units that can be slightly reconfigured.

The final thickness of the boards is 1". The depth of all the modules is 11 ½". The shelf height varies from 11 5/16" to 12 5/16" but this wall unit can be sized to fit your needs as long as the width of the individual units are the same.

This project requires basic woodworking skills and access to woodworking machines. You should be properly trained in the use of woodworking 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.

Loose tenon joinery is used to hold the cases together . A *Festool Domino* joiner was used to cut the mortises. You can use other tools to cut the mortises as well.

On a scale of 1-10, 10 being very difficult, this project is a "5". Proper stock preparation and accurate cuts are critical.

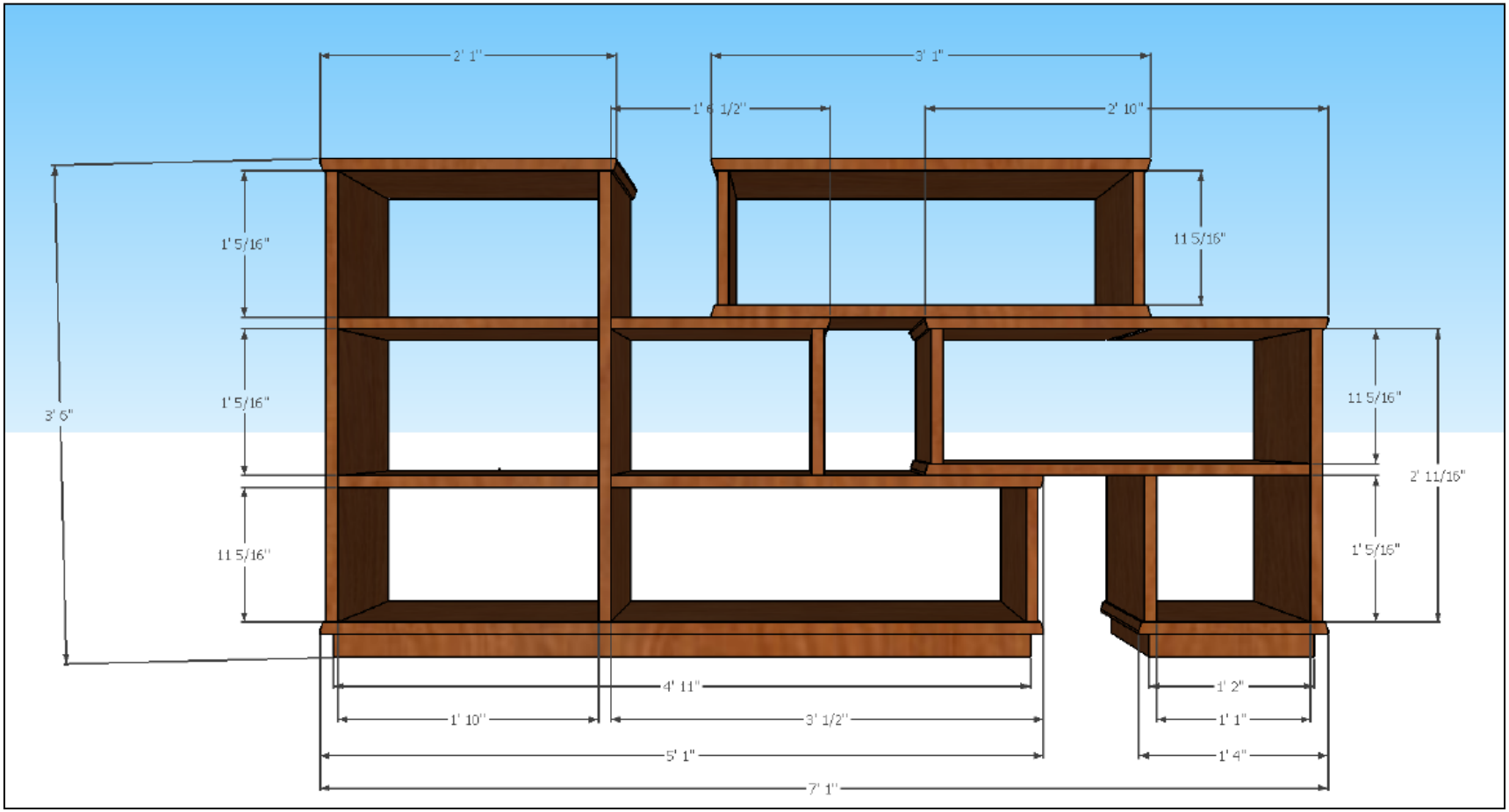
Materials Needed:

- Approximately 50 board feet of rough sawn 1 1/4" thick and 8' long cherry hardwood.
- 150, 180, 220 and 400 grit sandpaper and 0000 steel wool.
- Glue (Titebond II)
- Wipe on polyurethane varnish

Tools & Equipment Needed:

- Table saw with a cross cut sled
- 8" jointer
- Festool Domino joiner *(a hand held router or a horizontal boring machine can also be used to cut the mortises).*
- Router (hand held and router table)
- Planner or flat bed drum sander
- Block plane
- Bar or pipe clamps

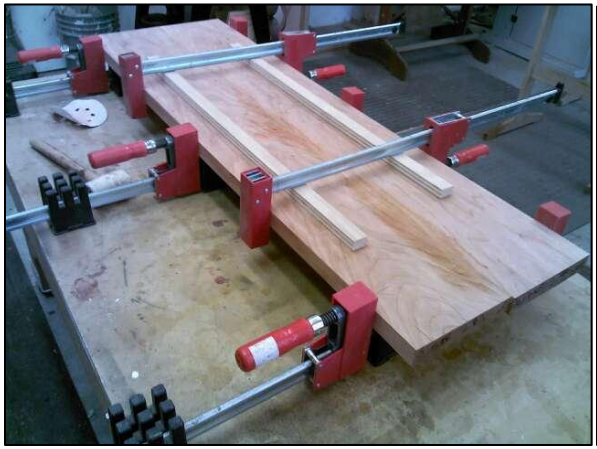
Project Plan



All the boards are 1” thick. The depth of the vertical shelves is 11”. The horizontal shelves are 11 ½” deep.

The construction method was changed so the horizontal shelves became continuous and the verticals became interrupted.

Stock Preparation



Step #1:

Start with rough sawn boards 1 ¼" thick and 6" to 8" wide. You will need two boards that are at least 6' long for the longest horizontal shelf.

Make one face flat, then run it through a thickness planner to dimension the wood to 1 1/16" thick. (*Finish sanding each face will dimension the boards to 1" thick).*

Once the boards are milled, run one edge of each board through the joiner to make it square to the face. Mark the milled edge with a pencil.

Cut the other edge of the board parallel on a table saw. Keep the boards as wide as possible, they will be cut to final width later.

The depth of the horizontal shelves are 11 ½" wide so two boards will have to be edge glued to achieve the desired width.

Select boards that are the best color and grain match. Make sure that the edges are joined and square. Dry fit the pieces together and clamp in order to ensure that the mating edges have not gaps. Use yellow glue and clamp. Check to make sure the boards are flat during glue-up.

Cut boards that are 1 1/16" thick and 2" wide for the bases. The longest board for the base is less than 6' long.

After the boards are laminated together, sand them to remove any dried glue. If you have access to a wide belt sander, use it.

Cutting Parts

Step #2:

Cut the milled boards to length and width. The vertical boards are cut to 11” width. The horizontal shelves are 11 ½” wide.

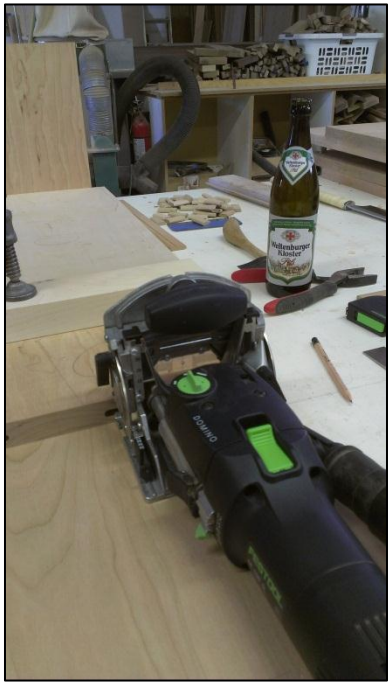
The length of the vertical boards determine the shelf height. This unit has openings around 12”. You can size them to meet your specific needs.

Ensure that the mating boards are cut to the exact same length and that the cross cuts are square.

Use a cross cut sled and stop blocks to ensure accuracy.

Mark each divider and shelf, indicating the displayed face and orientation. This will ensure that the mortises are placed correctly.

Joinery

Step #3:
The placement of the mortises on both the vertical and horizontal parts must be accurate or the unit will not be square.

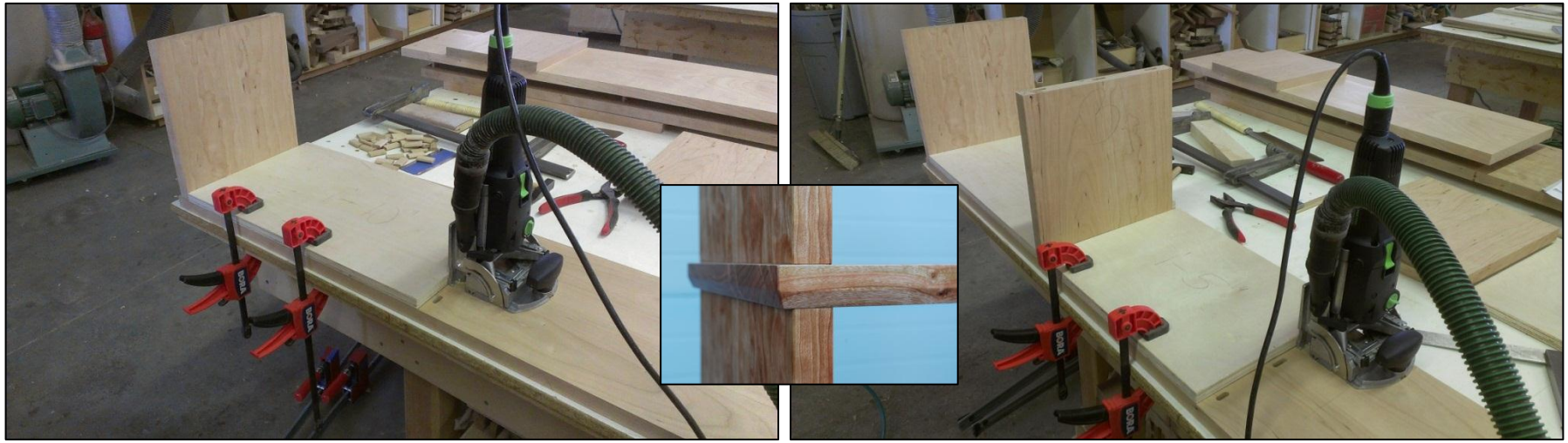
There are three mortises used to connect the vertical dividers to the horizontal shelves. Use the same spacing for each part. The mortises for the vertical dividers is made on the end of each divider.

A Festool Domino Joiner was used to cut the mortises. However, you can use a hand held router or a biscuit joiner. The advantage of using the Domino is the size of the loose tenons. The larger the loose tenon, the stronger the joint. Domino sizes are in millimeters as shown in the photo on the right.

Mark the placement of the mortises on each piece. Center the mortises in the thickness of the boards.

Along the width of the boards, the mortises should be 3” from the ends with the middle mortise centered.

Joinery



Step #4:
Accurate placement of the mortises on the horizontal shelves is best achieved with a series of spacers. These spacers are made from plywood cut to the width of the individual shelf openings. ***NOTE:*** *Make sure the spacers are cut square. If they are not square, the unit will not fit together properly.*

Since this wall unit is composed of three modular units, the spacing of the vertical dividers will be different. Individual spacers will have to be made for each different vertical divider position.

The spacers are marked with the exact positioning of the mortises in the vertical dividers. The Festool Domino joiner is used in a vertical position to cut the mortises. These mortises are made on the face of the horizontal shelves. ***NOTE:*** *The depth of these mortises should be at least ½" deep and no more than ¾" deep.*

The end vertical dividers are inset ½" from the ends as shown in the inset photo. ***NOTE:*** *The mortises for the end vertical dividers of each module are inset an additional ½".*

Attach the end vertical board as the reference point on the horizontal shelf.

The first spacer is clamped to the horizontal shelf and the mortises are then cut. Make sure the spacer is butted tight to the vertical divider.

After the first set of mortises is cut, the next vertical divider is positioned as is the next spacer in order to cut the next set of mortises. Continue this process until all the mortises are cut into the horizontal shelves.

Dry Assembly

Step #5:
Assemble and clamp the modules to ensure that they fit tightly. Make adjustments as necessary.

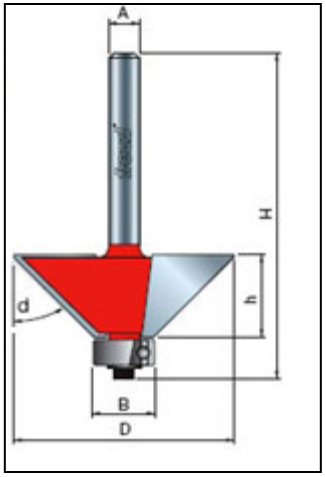
Edge Profile

Step #6:
The horizontal shelves have a chamfered edge.

Mark the edges of the boards that will be chamfered to ensure that you profile the correct edge.

The bottom of each module has the top edge chamfered, where as the middle and top horizontal shelves have the chamfer on the bottom edge.

The chamfer is best cut on a router table or shaper with a chamfering bit. The angle of the chamfer is 33 degrees and is cut 1/8” deep.



Make the Bases

Step #7:
There are two bases for this wall unit.

One base supports the three level section. The other supports the two level section.

The bases are made from 2 ½" wide, 1" thick cherry hardwood.

Both bases are 1" shorter and narrower than the horizontal shelves. This provides a ½" inset on all sides.

The corner construction consists of mitered joints reinforced with splines. There is also a cross brace in the middle of the long base. The cross base is connected in the same manner as the base frame to the bottom of the long self.

The base is screwed to the bottom of the two modules. Drill vertical countersunk holes through the base and use long wood screws to secure the bases to the bottom shelves.

Finishing

Step #8:
There are several finishes that can be applied to this project. A wipe-on polyurethane provides the best protection and is easy to apply. It is best to apply 2-4 coats. Sand between coats.

Start with 220 grit sandpaper and progress to 400 grit sand paper.

0000 steel wool can be used after the final coat to ensure a smooth finish.