Woodworkers United For America

Flag Display Case Instructions

(Revised 11-07-2001)

November 1, 2001 - The following guidelines are provided in order to produce multiple flag cases of the same size. This is important so you can utilize cut glass, plywood backs, and lumber of a uniform and consistent size. The completed boxes have to fit a common size shipping container being provided by Inland Container.

QUAN	DESCRIPTION
1	3/4" x 3 3/4" x 70" hardwood lumber
1	1/4" veneered plywood back cut to fit
1	1/8" double strength glass

QUAN	DESCRIPTION
6	~1/8" spline stock, hardwood lumber (kerf width)
1	Bottle white or yellow glue

Nominal Folded flag size - ~ 16" x 16" x 22" x 3"

It is suggested you use hardwoods that are native to your area and a near matching plywood faced back.

When milling lumber, it is strongly recommended you use two feather boards to hold stock down onto cutting tool and into fence to get a consistent cut the length of the board. This is important if all milled surfaces are to match in the final miter joints.

This box is going to be assembled with the glass in place. Therefore, it is suggested you follow these steps to make your job easier and produce a top quality finish.

1. Mill lumber to a final size of 3/4" x 3 3/4" x 70 long. Determine inside and outside face and mark lumber same.
2. Mill a groove 1/4" wide and 3/8" deep down the inside face leaving a 3/8" reveal to the edge of the board ("A" in Figure 1). After cutting, measure. Groove must be exact dimensions to accept pre-cut glass and rubber beading. The depth of cut can be + 1/32", - 0", but the width must be exact.
3. On the opposite edge of the inside face, cut a rabbet that is 1/4" in from the edge and 3/8" deep in the face ("B" in Figure 1). After cutting, measure. Rabbet cannot be under the dimensions stated.

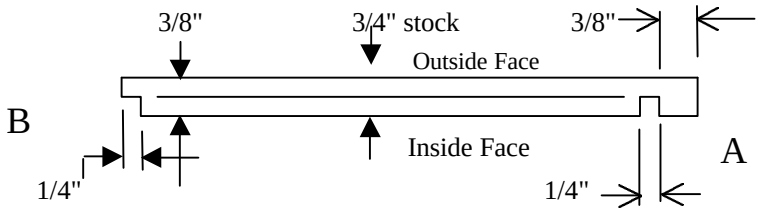


Figure 1

4. If you are going to cut any shapes into the front edge and outside face, those should be routed in next while the lumber is still full length. Use router or shaper. Be sure to take small cuts and use feather boards. Move cutter depth in small increments and continue making cuts until you reach the desired depth.
5. Finish sand the inside face and routed front edge (if any). Wet with mineral spirits and check under good incandescent light for any surface blemishes. If blemishes found, continue sanding.

6. Apply a sanding sealer to the inside face and front edge, including both the groove and rabbet. Let dry, then "lightly" sand with 220 or 320 grit sandpaper just enough to remove raised grain.

   Or…….apply paste wood filler to bare wood. Let stand until hazed over, then rub off excess with clean rag or burlap. If necessary, apply second coat (within 24 hours), and remove same as first coat. Let dry (cure) at least 48 hours in a warm, dry location before applying finish top coat. Paste wood filler will also serve as the sanding sealer.

7. Apply 3-5 coats of top coat finish. Lightly sand between coats to remove dust and small blemishes. Apply each coat within 12-24 hours of previous coat until all coats have been applied. Allow final coat to dry at least 48 hours in a warm, dry location, then adjust sheen as desired using 0000 steel wool, or polish with waxes and buff to desired gloss.

OK, you now have a board with the inside completely finished. Now it's time to cut up our board into the three finished pieces.

8. Cut the board into three pieces, keeping in mind we'd like to keep them in assembly order within the board to maintain grain matching. See Figure 2 below.

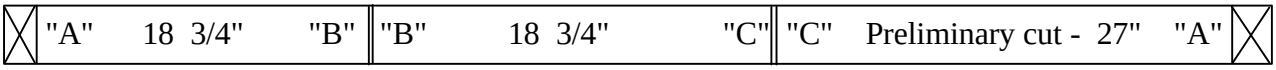


Figure 2

Crosscut the board to give you two 18 3/4" pieces as shown above. Place a piece of masking tape on the inside face marking joints A, B and C on both boards as shown above.

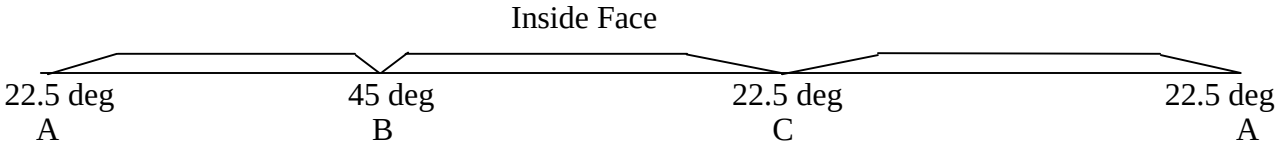


Figure 3

Figure 3 illustrates the angles that will be cut from the board. Instructions for each are as follows.

9. Set your tablesaw blade to a 45 deg angle. Use a 45 deg triangle or fixture to set the exact angle. Trial test cuts checked with a square are recommended.

   Be sure to maintain the length of the board and bevel cut just to the upper outside face of the board. Use masking tape on the outside face and a backer board to reduce chip out on the edge. Place the board with the finished, inside face down and cut both joint "B"'s. These two boards should be grain matched.

10. Take the two 18 3/4" boards with the 45 deg cuts and place them together securely. Check to be sure the assembled joint is exactly 90 deg. If not, correct until they form a perfect 90 deg angle. See Fig 4.

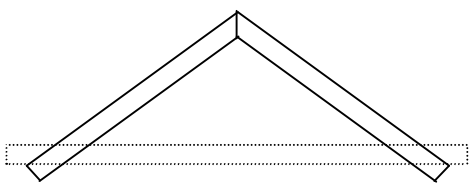


Figure 4

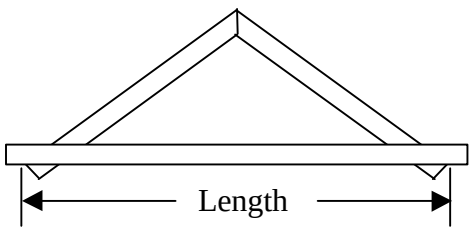


Figure 5

11. Measure from the lower outside face end across to the opposite side and determine the length. This is the length you'll need to cut the remaining board to. See Figure 5 above.

    Set your tablesaw blade to square cut the remaining long board to the length needed for the base of the case.

12. Now that you have all your pieces cut to length, it's time to cut the 22.5 deg angles for joints "A" and "C". Set your tablesaw blade to 22.5 deg off vertical. This will either read 22.5 deg or 67.5 deg on your scale. The best way is to set the angle using an angle guide as sold by WoodHaven and others. This angle must be exact or your case will never fit together properly. Trial cuts are suggested.

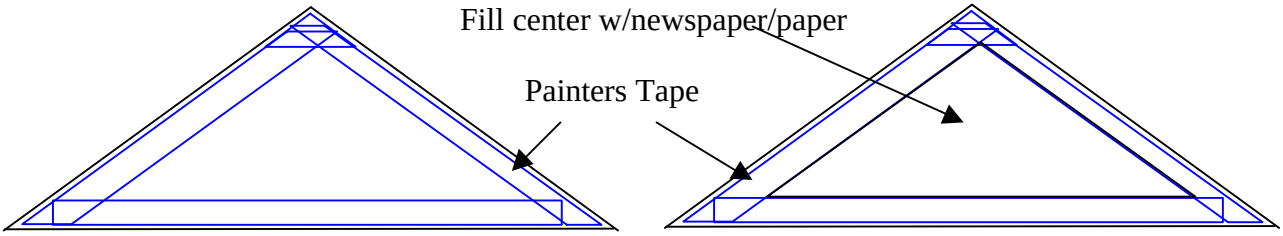
    Place the boards to be cut in a tenoning jig with the board standing vertical to the tabletop and with the bottom edge pressed down tight against the tabletop. Be sure to clamp the board in the jig the proper way and use a backer board clamped in the fixture as well. This will eliminate tearout on the back of the cut. All the material should be taken off the inside (finished) face. (Directions vary due to right and left tilt saws)

    Go ahead and make the cut, advancing the tenoning jig slowly through the cut. Cut all four ends needing a 22.5 deg angle, carefully observing how you place the board in the teoning jig. If any board is miscut, there is no way to correct or salvage the board to build a case.

13. Using a large rubber band, test fit the completed box. Check to see that all angles close tightly and form a 45 deg, 45 deg and 90 deg angle.

ASSEMBLY

14. Glass preparation requires you tape the outside face surface with low release masking tape (blue temporary painters tape works well) and newspaper on the same face. See sketch below.



15. The box is assembled with the glass installed, tape and paper side up. Apply minimal glue (white or yellow) to all six cut joints and let them sit for a minute. If the glue totally disappears, brush on an additional thin layer, install the glass and use a band or web strap to pull the case together. BE SURE to use protective material over the three corners or you will damage them for sure. If using cardboard, I'd suggest at least two layers. Having an extra set of hands helps for this operation. Be sure all joints close tightly and evenly and that all three sides are even as far as board width. That insures that the glass groove and back panel rabbets are perfectly aligned.

    After clamping, remove any excess squeeze out from around the inside groove for the glass and back panel. Don't worry about any excess glue on the outside of the case.

    After 4 hours, remove the clamp and corner protectors. The case is rather fragile since all we have are end grain glue joints. Next we want to cut the exterior splines using the spline grove cutting fixtures. I'm recommending cutting 1/8" or saw kerf spline slots.

    With a backer board in place, the 45 deg corners are dropped into the 45 deg spline cutting fixture and the tablesaw blade is set to 1/8 to 1/4 inch below the inside corner of the joint. The box is spaced out to clear the glass groove, and the spline cut is made. I'm recommending two splines per corner so using the spacers, space out an inch or so and cut the second spline. Repeat this operation with the other 45 deg corner.

    Next, place a backer board in the 90 deg spline cutting jig and place it on the saw. Readjust the blade height to 1/16" to 1/8" below the inside corner of the joint. Using the same spacer thicknesses as with the 45 deg fixture, cut the two spline slots in the 90 deg corner.

    Square all the bottoms of the spline slots with an 1/8" chisel. (You can make one from old file)

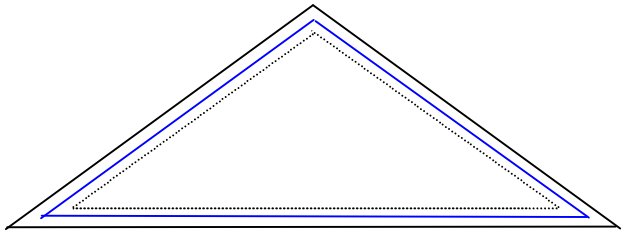
16. Resaw hardwood lumber (same species as sides) to something thicker than kerf width spline slots, sand or plane to a heavy kerf thickness. Cut the spline stock to length (+ some) and glue into kerf slots. Be sure they are bottomed out in the kerf and the bottom of the kerf slot is flat.

17. When the spline glue joints are dry, use hand flush cutting saw to trim excess waste, then sand the splines flush with the outside face of the box.

    Hand or machine sand the entire outside face of the box and prepare it for finishing. Use mineral spirits top wet down the box and inspect under good light for glue smears and areas that need more sanding. Sand to 150 or 180 grit. When done, wipe down with tack cloth.

18. 1/4" plywood backs, faced with veneer to match the hardwood used in the case, need to be cut to fit the rabbeted opening on the back of the case. Group built boxes should all use the same sized back. They should be well fitting with minimal gaps.

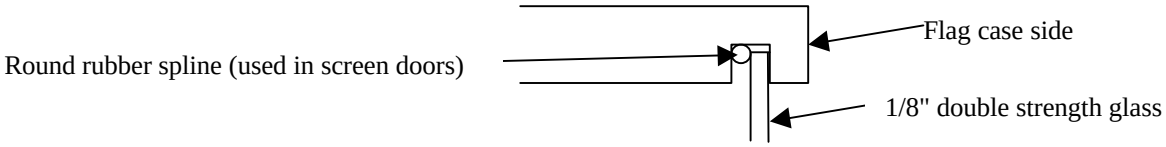
    You may want to include pre-drilled holes and a brass zig-zag hanger (with nails) along with the case. This would allow the recipient to hang it on a wall.



    Secure the back with 2-3 screws along both the sides and 3-4 screws across the bottom. Suggest using #4 x 5/8" brass screws with #4 brass dress (or cup) washers. Pre-drill screw holes and pre-thread the hole using steel screws of the same size.

19. Using the same finish as the inside, apply to the outside surfaces and back of the case.

20. When the finishing and waxing is completed, remove masking tape and paper from the glass. Install the rubber screen spline into the groove behind the glass. Be sure to push it all the way to the bottom of the groove. Use strips that are 1/2" shorter than the sides and centered in each side.



21. Clean glass by applying vinegar diluted with water, or glass cleaner, to a soft rag and wipe glass. Refrain from "spraying" cleaner on the glass as it will get to the finish and may leave blemishes. Wipe clean, and dry.

NOTE: Flag boxes of this type can and are displayed in many ways by proud owners. This can include wall hanging, standing vertical on table surface or divider where both the front and the back of the case are viewable, and laid down flat with the back down on a low table such as a coffee table.

As a result of these various ways an owner may wish to display the case, all 5 flag box surfaces (3 sides, front glass view and back panel view) **should be well finished and attractive. Some types of back fasteners may obstruct wall hanging, some methods of disassembly may show other types of fasteners.**

Perhaps if these methods are used the note enclosed with the case should indicate the case has been built for specific types of display, and not others.

(See "Spline_Jig.jpg" file for Spline Slot Cutting Fixture or Jig)