

Do It Yourself

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Open Bookcase: Dovetail Joinery and Case Assembly

From "[Wood Works](#)"

episode WWK-603 -- [More Projects](#) »

In this segment, the dovetail joinery is created for the case portion of the open-design bookshelves, and the case itself is assembled.

Materials:

Cherry and maple stock

Stock for spacing-jig

Table saw

Plunge router

Random-orbit sander

Drill press (or cordless drill)

Straight-edge

Shelf pins

Dead-blow hammer

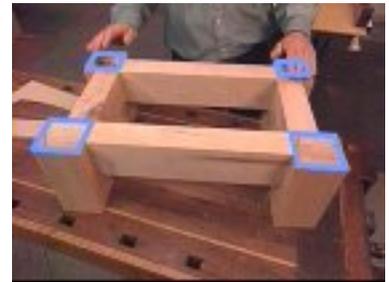
Carpenter's pencil

Carpenter's square

Slow-setting resin glue

Clamps

Safety glasses or goggles



The curved pedestal base begins as eight square pieces of stock including the four legs, two short aprons and two long aprons.

Safety Alert: *Always* wear safety goggles or safety glasses, and follow proper safety precautions, when working with wood, power-tools, saws, drills, routers, etc.

Dovetail Joinery

- Once the glue has dried on the base, smooth the surfaces and blend the transitions between the aprons and legs using a random-orbit sander (**figure A**). Ideally, the base should appear as if it were sculpted from one piece of wood.



Figure A

- With the base complete, work can now begin on the main portion of the bookshelves -- the case. We used 3/4" cherry stock for the case, and milled it to final dimensions. The long sides of the case are 56" in length (**figure B**) and 11-3/4" wide (**figure C**).
- The top and bottom are 20" in length and also 11-3/4" wide.



Figure B



Figure C

- We used dovetail joinery, one of the strongest joints in woodworking, to assemble this case. For this project, the joinery is made using a dovetail jig (**figure D**).
- A set of matched router bits are included with most dovetail jigs. The 7/16" guides position the bit to cut the pins (**figure E**).



Figure D



Figure E

- The jig holds the stock in place as you use a handheld router to cut the pins and pin-sockets in a pattern that you have set up. The jig is adjustable, and you can create a wide variety of patterns by simply rearranging the order of the guide fingers. As seen on our test-cut prototype, we incorporated half-pins on both ends of the top piece, and a pin in the exact center. The two outer pairs of full pins are spaced equidistant from the center for balance (**figure F**).



Figure F

Tip: Tape a sacrificial piece of 1/4" MDF onto the stock before you begin cutting. The MDF helps support the stock and reduces the risk of tear-out.

- Begin by cutting the pins into the top and bottom stock. Once the stock has been positioned into

the cutting jig, slide a 3/4" MDF backup board into the horizontal clamp so that it's snug against the back of the cherry stock. This piece also reduces the risk of tear-out.

- Install a 7/16" guide-bushing and straight cutting bit into the plunge router and begin carefully routing between spacers of the jig (**figure G**), cutting through both the cherry and MDF backup boards.
- It's a good idea to cut the pins (**figure H**) so that they will stand about 1/32" proud when the case is assembled.



Figure G



Figure H

- With the pins cut, you can now begin work cutting out the corresponding dovetails. Replace the straight cutting-bit in the plunge router with a 3/4" dovetail cutter. Clean away the sawdust from the jig, and exchange the pin-guides (i.e., "fingers") in the jig for dovetail guides.
- Place the tail-stock, along with the MDF guide taped in place (**figure I**), into the jig. Then slide the waste backing-board into the horizontal clamp as before.
- Because of the length of the tall side-pieces, we placed our jig on top of a box to lift it to the correct height (**figure J**).



Figure I



Figure J

- Using the 3/4" dovetail cutter (**figure K**), meticulously cut away the sockets leaving 7-degree-angle tails. Use caution not to rout out between the tail guides. As seen in the photo showing the tear-out that can occur when cutting dovetails (**figure L**), the advantage of using the sacrificial

MDF backing board can be clearly seen. Continue the procedure until you have cut out all of the dovetails.

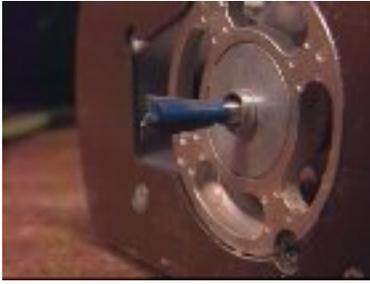


Figure K



Figure L

- With the dovetails cut, you can conduct a dry-fit and check to see if any adjustments will be needed to achieve a good, tight fit. Tap the pieces together using a dead-blow hammer (**figures M and N**), but avoid forcing the fit.



Figure M



Figure N

- Before gluing up the case, drill the holes that will be needed for supporting the shelves using brass shelf-pins (**figure O**). These shelf pins are available at home centers.
- The challenge is to drill holes on both sides in identical locations so that the shelves will sit level. To accomplish this, we created another jig. With a long board and short board joined in perpendicular fashion at one end, and with carefully measured and uniformly spaced holes in the long section, the jig can be used to ensure the precise placement of the holes.
- By referencing off the end of the side pieces (**figure P**), the jig ensures corresponding placement of the holes and perfect alignment. You can use a hand-held drill, with a stop-block on the bit, to drill the holes, or you can use the drill press as we did.
- At the drill press, double-stick tape the jig to the side-stock, referencing off the edge. Using a 5mm-bit, drill out the first row of



Figure O



Figure Q

shelf holes to a depth of 3/8" (**figure Q**). Our jig sets the spacing of the holes 3 inches apart and 7 inches from the top and bottom.

- Once you've finished one side, readjust the jig to the other side and drill the next row.
- Repeat the procedure for the other piece of side stock.
- Check the holes with the brass shelf pins.
- With the holes all drilled, you can begin glue-up. Brush slow-setting resin glue between the tails and pins (**figure R**).
- Place the sides and end pieces in position, and gently tap them in place using a dead-blow.
- Clamp the assembly securely using long clamps (**figure S**) and allow the glue to set overnight. We used custom-made cauls, recessed to accommodate the proud pins, so that the clamps can pull the joints tightly together.
- Though dovetails are typically "self-squaring," it's still a good idea to check the case to ensure that it's square. The slow-setting glue will allow you time to make adjustments during assembly.



Figure P



Figure R



Figure S

In the segment that follows, the shelves are added to the case, and the case is bridged to the base.

RESOURCES:

Woodworking Techniques: Best Methods for Building Furniture from Fine Woodworking

Model: 1561583456

Author: Fine Woodworking Magazine

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David Marks Website

David Marks, DIY's *Wood Works* host, is a master woodworker. For more information on cut sizes and project details, please contact him via his Website at www.djmarks.com

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