

Mortise and tenon joinery

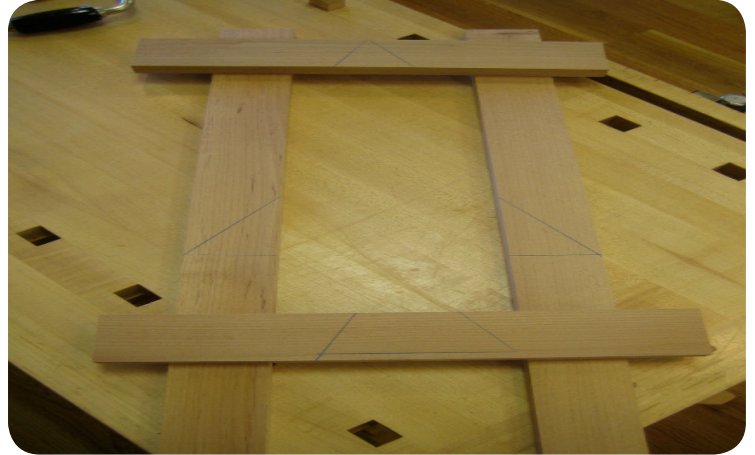
is a hallmark of fine furniture.

Known for its strength and versatility, the joints are also rewarding to make. Every woodworker should be proficient in mortise and tenon joinery because of the joints broad application in drawers, cabinet doors, tables, beds and cabinets. While there are many machine processes that can be used to build a mortise and tenon joint, using hand tools will increase your understanding of the way wood is worked and manipulated and will give you experience and confidence with a variety of hand tools. Even better, you will have a great time while doing it.

Layout

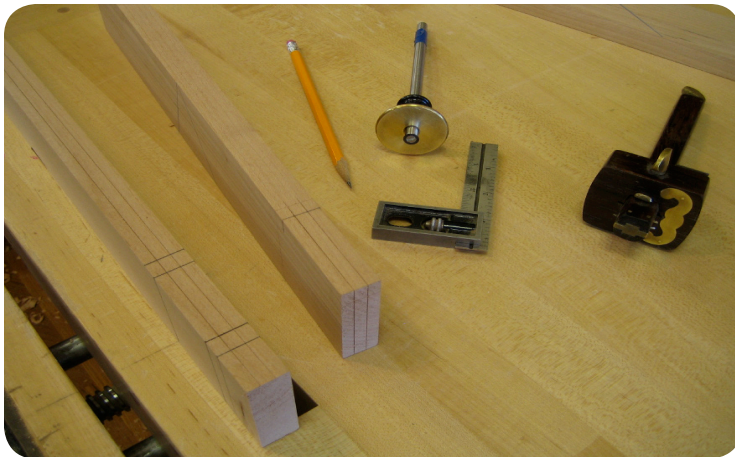


The tools required for the mortise and tenon joinery shown in this hand-out are a mortise gauge, marking gauge, 1/4-inch mortise chisel, 1/4-inch paring chisel, square, pencil, marking knife, brace and 1/4-inch bit, joiners mallet, router plane, shoulder plane and plow plane.



Use cabinetmaker's triangles to layout the frame.

Cutting the mortises



Set mortise gauge pins 1/4-inch apart. This will be the width of the groove and mortise. These marks should fall roughly in the center of the stock. Always reference off the face of the stock. Scribe the inside edge of the stiles and rails, then around the tenon. This will define the groove and the tenon cheeks. Use a marking gauge with the pins set 3/8-inch from the fence and scribe top and bottom cheeks to the haunch and shoulder.



Plow the grooves for the panel in the rails.

Cutting the mortises

Bore a 1/4-inch hole halfway through the stock. This should be near the mortise end that is closest to you.



Chop the mortise with a 1/4-inch mortise chisel. Start near the hole, with the chisel bevel facing away from you.



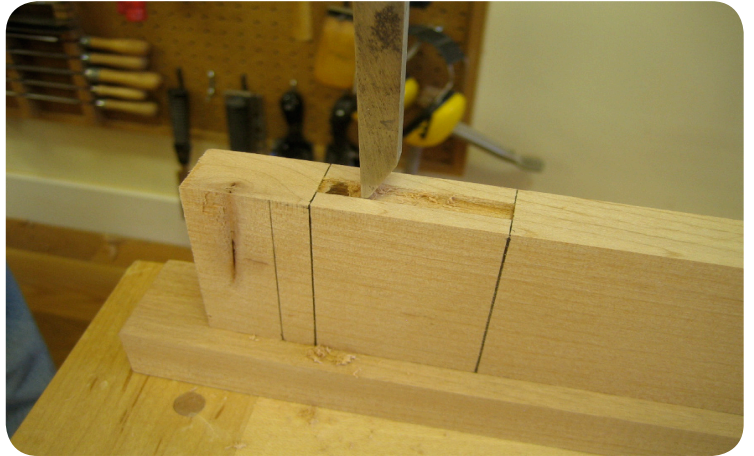
Clear the waste, then move the chisel an 1/8-inch further away from you. Chop and clear again. The key to effective mortising is to let the long bevel of the chisel make shearing cuts.



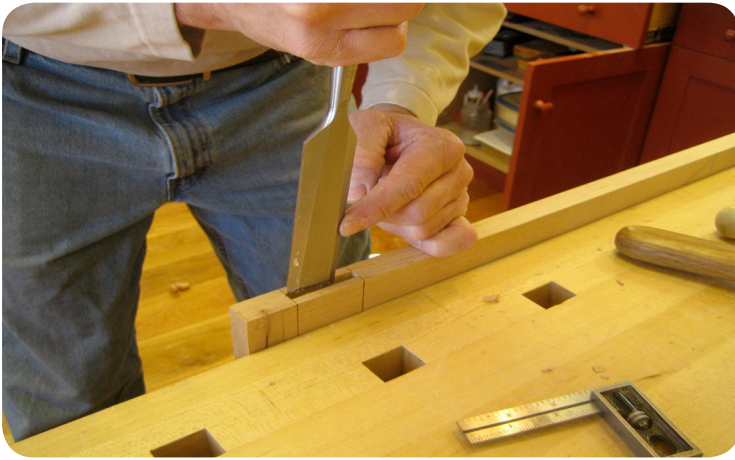
Flip the rail to its outside edge. Use a paring chisel to create a shallow groove within the border of the mortise layout lines.



Repeat the process on the outside of the rail. Here I am boring the 1/4-inch starter hole.



Chop and clear the mortise halfway through the rail. Repeat the process on the outside of the rail.

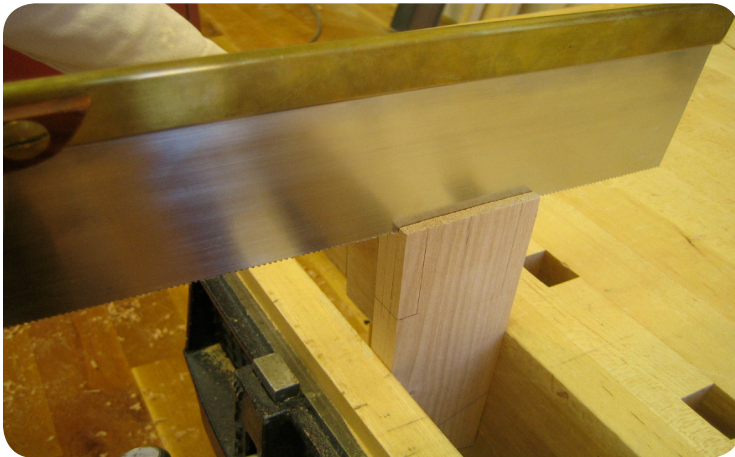


Once the mortise is connected from both sides, use a paring chisel to clean up the mortise sides.

Use the chisel to verify that the mortise is clean, with no obstructions from the top line to the bottom line.



Cutting the tenons



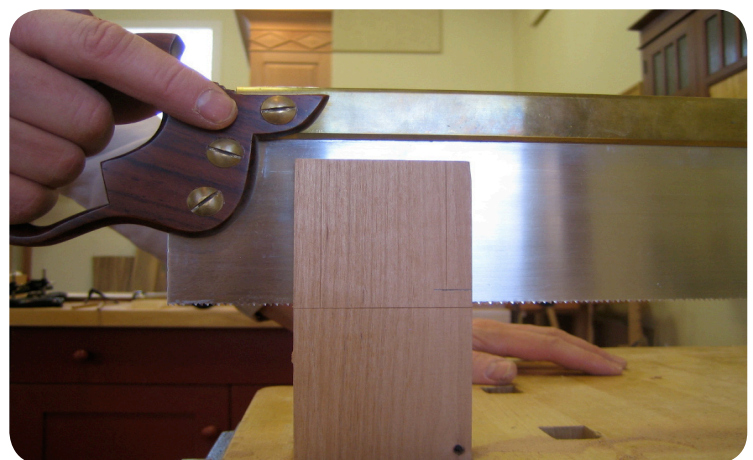
Use a tenon saw to cut the tenon cheeks. Always cut to the waist side of the layout lines. Cut as close as possible, but never take the lines. The joint will be perfected later. Focus on cutting one section of the tenon at a time. Begin with the tenon end.



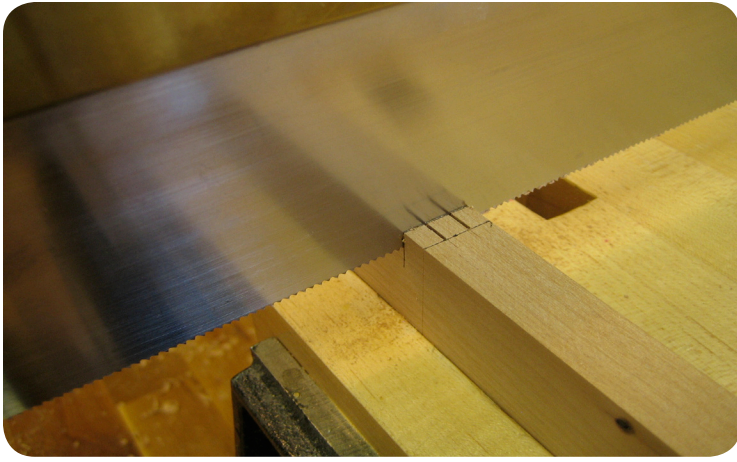
Lower the handle as you cut. Follow the mark down the board edge facing you.



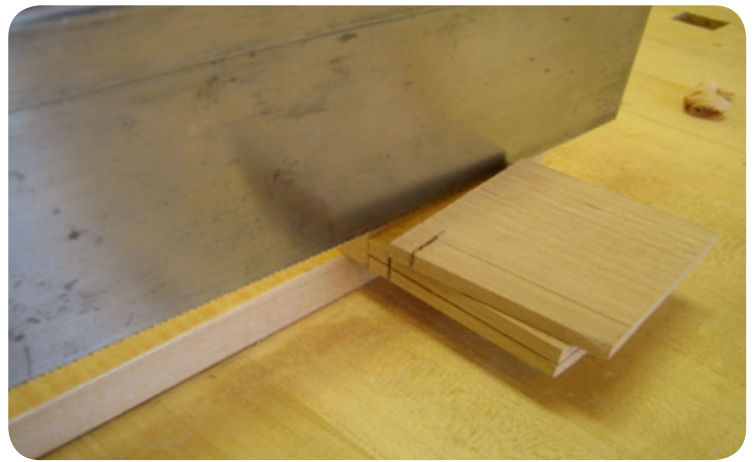
Flip the board 180 degrees and cut the tenon on this edge just like before.



Finish the cheek cuts by cutting all the way to the shoulder. The two kerfs already established on each edge will accurately guide the saw.



Cut the haunch shoulder.



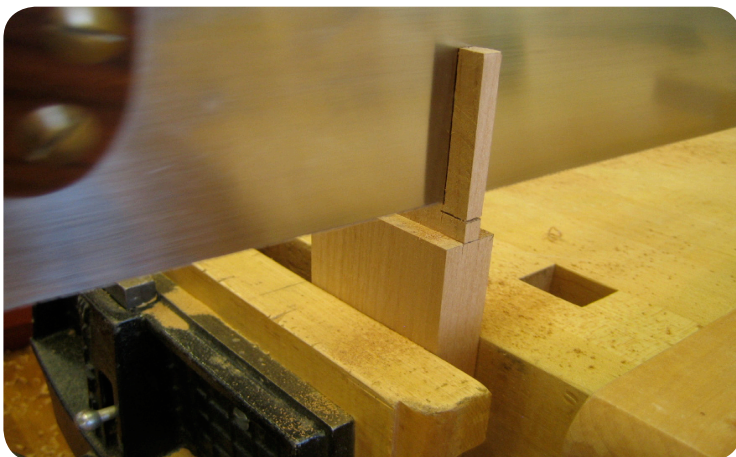
Make the face shoulder cuts. These cuts should be close to the layout lines, but will be perfected later with a shoulder plane or paring chisel.



Use a shoulder plane to trim the tenon cheeks to the layout lines.

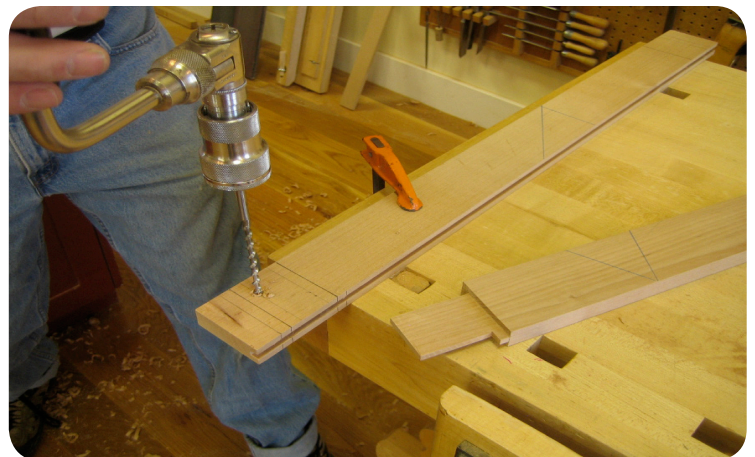


Use a shoulder plane to clean up the tenon shoulders.



Remove the edge cheeks. The tenon is now complete. Use the plow plane to plow the grooves in the rails.

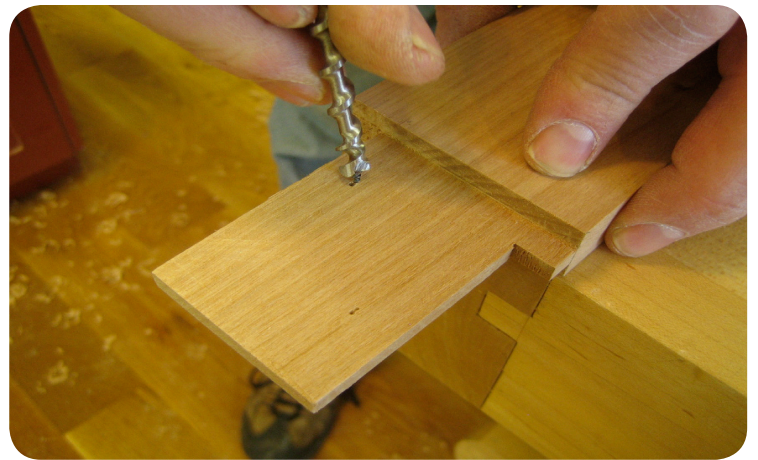
Draw boring



Layout and bore two 1/4-inch diameter holes in the stile through the mortise.



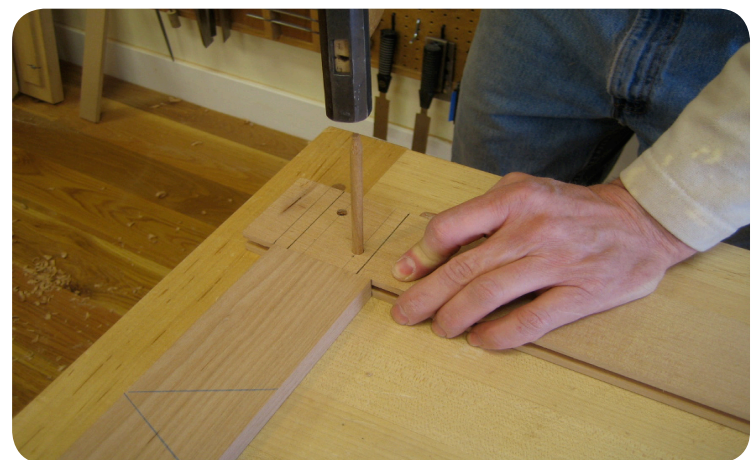
Dry assemble the joint and, using a drill bit with a center point, mark the center of each hole location on the tenon.



Remove the tenon from the mortise and, using an awl or the spur point of a drill bit, offset the marks 1/16-inch toward the tenon shoulder.



Use a brace and a 1/4-inch auger bit to drill these offset holes through the tenon.



Cut some 3-inch lengths of 1/4-inch dowel and create a point on one end of the dowel. A pencil sharpener is ideal for pointing dowels. Assemble the mortise and tenon joint, apply glue if desired and drive home the draw- born pegs.



Use a flush cut saw to trim the excess dowel off both sides of the joint.



The mortise and tenon joint is now complete and ready to have the horns on the stiles cut off flush with the rails.