Doors are what we see when we look at a cabinet. Thanks to their relatively large surface area, they’re the most visible component in many projects, and they will make a lasting impression if you design them carefully and thoughtfully.

In addition to looking good, doors must function properly. A well-made door opens with little resistance, closes without clatter or fuss, and has a comfortable pull that fits the hand.

Begin by choosing the style of door you want: overlay, rabbeted, or flush. After that, it’s a design exercise in proportioning components carefully, choosing the appropriate joinery, and understanding wood movement.

The illustrations on the following pages will help you work out the best door design for whatever project you’re planning. This guide covers frame-and-panel doors, the most popular type, used in many furniture styles and periods. Some of the design considerations, however, also apply to slab-style plank doors and veneered doors.

Andy Rae is a woodworker and author of Building Doors and Drawers (The Taunton Press, 2007).
Because doors are the focal point of many pieces, it’s important to proportion them so they will work in harmony with each other and with other case components. People frequently make doors and their case openings too wide or, less commonly, too tall. Whenever possible, divide the case opening into reasonable sections and build the doors to suit.

**Flush doors**
These require the most attention during fitting because the doors hang inside the face of the case. They call for reveals of \(\frac{1}{16}\) in. or less. Extra-tall doors are awkward to open and close.

**Rabbeted doors**
These sit partially proud of the case, and a rabbet on the back allows them to rest slightly inside the case opening. Because the door gap is concealed, this type is generally the easiest to fit.

**Full overlay doors**
These cover the entire face of the cabinets. Avoid unattractive partial-overlay doors, which are used in factory-made cabinets because they require no fitting.

Hinges look best if aligned with inner edges of rails (top). For wide rails, space them one hinge-width from the edge (bottom).

**Mounting Options**
For fine furniture and cabinets, there are three main options. Flush and rabbeted doors are seen in contemporary as well as period furniture. Overlay doors are used most often in kitchen and bathroom cabinets. Each style has some pluses and minuses when it comes to fitting and mounting.
F I N E  W O O D W O R K I N G

BASIC DOOR ANATOMY

In frame-and-panel door construction, a narrow outer framework surrounds and captures a wide panel. The vertical frame pieces are called stiles; the horizontal pieces, rails. The panel can be made of solid wood, plywood, or medium-density fiberboard (MDF). Typically, stiles run full-length and are mortised for tenons on the rails. But you can reverse that for aesthetic reasons: On paired doors, for example, full-width rails add a visually unifying element. Full-width rails also provide better screw purchase for knife hinges.

FRAME EDGE PROFILES

Edges offer a chance for you to be creative by cutting different profiles or applying a molding. This is usually done to the inside edge of the frame, though rabbeted doors typically have a thumbnail or roundover profile on their outside edge.

FRAME Profiles

Flat panels offer simplicity and are a hallmark of Shaker work. Raised panels are more traditional. Rabbets or bevels can be positioned on the back to keep the front plain. As a rule, keep the panel flush with or below the surface of the frame.

Panel Profiles

THIN, FLAT PANEL
Essentially the same thickness as the groove in the frame. Made from plywood or MDF, or glued up from narrower solid stock.

RAISED PANEL
Profiled on front or back and designed to be flush with the frame. Or, it can be the same thickness as the frame and rabbeted equally front and back.

THUMBNAI
Quarter-round, quarter-round with fillet (shown), ogee, or other profiles. Shape on a router table or shaper, or by hand.

Bead With Quirk
Make bead \( \frac{1}{8} \) in. to \( \frac{1}{4} \) in. wide with a \( \frac{1}{16} \)-in. quirk. Cut it on the router table or shaper. Requires a mitered frame so the bead is continuous.

SQUARE EDGE
Simple in design, simple to make. Smooth the surface with a plane before assembling the frame.

APPLIED BEAD
Shape a \( \frac{1}{8} \)-in. to \( \frac{1}{4} \)-in. bead. For all applied beads and moldings, miter the ends, then attach with glue and/or brads.

APPLIED MOLDING
Use stock \( \frac{1}{4} \) in. to \( \frac{1}{2} \) in. thick, profiled on a router table or shaper. Glue to frame and panel if panel is sheet goods; otherwise, glue only to frame.

BOLETION MOLDING
Complex profile with a rabbet that rests over the frame. Glue to frame only, unless panel is made from plywood or MDF.

TOP RAIL CAN BE SAME WIDTH AS STILES.

STILES ARE TYPICALLY 2⅛ IN. TO 3 IN. WIDE.

ORIENT GRAIN FROM TOP TO BOTTOM.

PANEL CAN BE \( \frac{1}{4} \) IN. TO \( \frac{1}{2} \) IN. THICK.

BOTTOM RAIL IS OFTEN AN INCH OR SO WIDER THAN STILES, ADDING VISUAL WEIGHT.

Panel rests in groove cut in stiles and rails.

Tenon on rail fits into mortise in stile.

MILL FRAME STOCK \( \frac{3}{4} \) IN. TO 1 IN. THICK. USE STABLE, STRAIGHT-GRAINED STOCK.

LEAVE GAP IN BOTH STILES SO SOLID-WOOD PANEL IS FREE TO EXPAND. PLYWOOD OR MDF PANEL NEEDS NO GAP AND CAN BE GLUED IN.
Options for Corner Joints

Doors with solid-wood panels get their strength mainly from the corner joints in the frame; a glued-in plywood or MDF panel adds considerable rigidity. The time-honored mortise-and-tenon joint is quite common, but the type of joint you use will depend on the look you want and the strength you need, as well as the ease of construction. Here are nine good options.

1. **Mortise and Tenon**
   - The basic joint: Rails are grooved their full length for the panel; stiles require a stopped groove. Mortises should be as deep as possible for maximum strength; Rae tries to make his at least 1 1/4 in. deep.

2. **Haunched Tenon**
   - A variation on the basic mortise-and-tenon joint that’s easier to make. Both stiles and rails are grooved their full length for the panel. The tenon is cut with a step, or haunch, on one side that fills the groove in the stiles.

3. **Mitered Mortise and Tenon**
   - Another variation on the basic joint. The inside edges of the stiles and rails are mitered after the mortise and tenon are cut. The miter makes it easy to mold a continuous profile along the inside edge.

4. **Bridle Joint**
   - A strong and easily made joint. You can cut the open mortise and the tenon on the tablesaw, using a tenoning jig.

5. **Floating Tenon**
   - Mortise both stiles and rails, then join the parts with a separate tenon sized to fit. Making this joint means you can size the rails without having to take into account the extra length of the tenons.

6. **Biscuit Joint**
   - Biscuits don’t yield an especially strong joint. Make the rails at least 3 in. wide to accept #20 biscuits, and use two biscuits for maximum strength. Best with a glued-in plywood panel for added strength.

7. **Cope and Stick**
   - Matched router bits cut mating profiles in the inside edges of the stiles and rails. Easy to make but not especially strong, it may need reinforcement with a floating tenon or a plywood panel glued into the grooves.

8. **Stub Tenon**
   - A variation on the basic mortise-and-tenon joint that’s very easy to make. Stiles and rails are grooved their full length, and the tenons are cut to a length equal to the depth of the grooves. A plywood panel glued into the grooves gives the door additional strength.

9. **Reinforced Miter**
   - A miter reinforced with a wood key makes a very strong joint. It’s also fairly easy to make, since you can use the tablesaw for all the cuts. You’ll need a cradle-type jig to hold the frame at 45° when cutting the key slots.

www.finewoodworking.com

Copyright 2009 by The Taunton Press, Inc. Copying and distribution of this article is not permitted.
When doors meet

Paired doors are common, offering easier access inside a case. For the tidiest look and one that seals out dust, design the doors with some sort of overlapping element. It's customary to have the right-hand door open first. Also, cut a slight bevel in the side of one door, to keep it from binding.

Opposing rabbets
Close the gap by cutting matching rabbets in the edges of the stiles. Make each rabbet half the thickness of the doors, so they sit flush with each other when closed. When planning the cabinet, you may need to widen the stile of the door rabbeted on its front (top drawing), so that the stiles appear the same width when closed.

Add an astragal
This is a strip of wood glued either to the face of one door or attached to the back of the captured door. Be sure to cut the astragal a hair short so it won't interfere with the case top or bottom.

Hinge options

Well-made hinges installed with care will yield a door that swings smoothly and closes easily. Be sure to select the correct type of hinge for the style of door you're hanging. Buy quality hardware: Look for solid castings or extrusions, thick leaves, and knuckles that pivot smoothly without play.

Butt hinge
Used for overlay and flush doors. Requires mortising one or both leaves into the case and door.

Surface hinge
The easiest type to install. Used for flush and rabbeted (right) doors.

Surface hinge for rabbeted doors
One leaf is bent to accommodate the offset. Installation is a snap.

Straight knife hinge
Used for overlay doors where the case top and bottom extend over the sides. Requires careful mortising of case and door.

Offset knife hinge
Used for flush doors. Requires careful mortising of both case and door.

Cup hinge
Available for all types of doors. Easy to mount in hole drilled in back of door. Lots of adjustability after door is mounted.
GOOD OPTIONS FOR GLASS DOORS
Glass doors dress up a cabinet and add a practical touch, because you can see what's inside. Use translucent or textured glass if you want to light up the inside without revealing precisely what's there. There are several options when it comes to rabbeting the door to accept the glass.

RABBET THE FRAME AFTER ASSEMBLY
Glue up the door, then use a bearing-guided router bit to cut the rabbet for the glass in the back of the frame.

1. Cut a \( \frac{1}{2} \)-in.-wide by \( \frac{3}{8} \)-in.-deep rabbet around all four sides.

2. Use a chisel to square up the rounded corners the router bit produces.

INSTALL THE GLASS
Fasten the strips with a pin nailer or decorative brass nails.

Mitered strips hold the glass in the rabbet.

Cut the glass about \( \frac{1}{8} \) in. smaller in height and width than the opening.

TWO FRAMES THAT CAN BE RABBETED BEFORE ASSEMBLY
It's easier to cut the rabbet before assembly by grooving or rabbeting parts on the tablesaw, but not all frames allow this.

KEYED MITER
Cut the rabbet in the frame stock, then cut the miters, assemble the frame, and add the keys.

Glue in and trim keys after assembly.

Use a standard blade or a dado set to cut the rabbet.

MITERED MORTISE AND TENON
When making a batch of doors this way, you can use the same machine setups to create a rabbet for a glass door.

Cut the frame joints and groove the stiles and rails.

Rip away the back of the groove wall, exposing a rabbet for the glass.