



fundamentals

Essentials of the screw joint

TIPS AND TECHNIQUES FOR USING THIS VITAL FASTENER

BY MARIO RODRIGUEZ

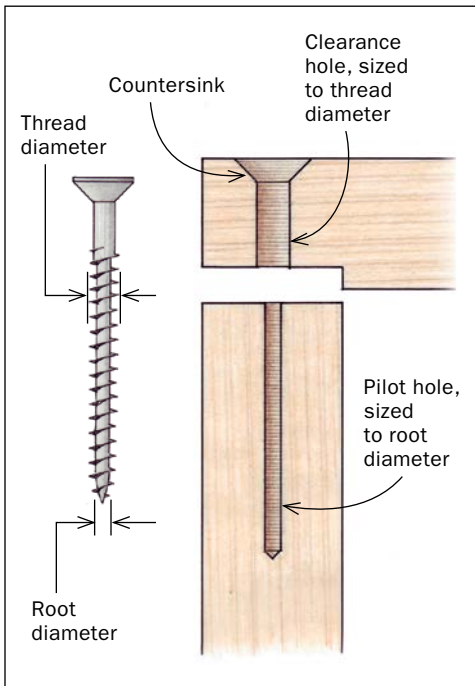
Our craft offers dozens of clever and often complex ways to join two pieces of wood. Some joints take months or years to master, and each has its advantages—strength, beauty, longevity. But none supplants the humble screw. Screws eliminate the need for time-consuming joinery, create a solid mechanical connection, and make it easy to quickly assemble and disassemble your projects.

I use screws often, even in formal pieces of furniture that include hand-cut joinery. When building a large cabinet, I'll break it down into modules and join them with screws. I also use screws to attach cabinet backs, tabletops, shelf cleats, and drawer guides. If they will be in a visible area, screws can be hidden to create a seamless look. Screws are of course also great for projects with a time or budget crunch, or where appearance isn't critical, as with jigs in the shop. If there's a chance I might have to remove, relocate, adjust, or replace a part, I attach it with screws.

Longtime contributor Mario Rodriguez teaches at the Philadelphia Furniture Workshop.

Always drill before you drive

THREE-STEP DRILLING PROCESS...



Driving a screw may not require an advanced degree, but it does require advance preparation. For a screw to function properly when joining pieces of wood, it needs two predrilled holes: a pilot hole and a clearance hole. Together, these two holes will ensure a perfectly located screw and a tight joint, and will prevent the screw from cracking the wood.

The pilot hole, which is drilled first, goes through the upper board and into the lower one. It is drilled with a bit that is smaller than the screw's threads—it should roughly match the root diameter of the screw. This will prevent splitting and make driving the screw far easier, but still give the threads plenty of wood to grab. If the screw is going into hardwood, select a bit that's slightly larger than the screw's root; for softwoods, choose one that's slightly smaller than the root.

The clearance hole, drilled second, enlarges the pilot hole and goes through the top board only. Its function is to allow the screw to pass through the top board without the threads engaging at all. Without a clearance hole, the threads grab in the top board and keep the screw from pulling the boards tight regardless of how hard the screw is driven. The bit for the clearance hole should be slightly larger than the diameter of the threads—you should be able to push the screw easily into the hole—so the screw engages only the bottom board, pulling the joint tight as it's driven home.

To set screws flush or below the surface of the top board, drill a conical countersink (for flathead screws) or a flat-bottomed counterbore (for other screws).



Pilot hole first. With the workpieces aligned and clamped, drill through the top board and into the bottom one with a bit sized to the root diameter of the screw.



Clearance hole next. Drill into the pilot hole, using a bit just larger than the screw's thread diameter. A depth stop or gauge (in this case, tape) prevents drilling into the bottom board.



Countersink last. For flathead screws, use a countersink bit to cut a conical recess for the screw head.



Then drive the screw. Accurate, tight, split-free screw joints result from proper predrilling.



...OR USE A COMBO BIT

All in one step, tapered bits with countersink collars can cut clearance and pilot holes as well as a countersink.

Beyond the basics

PLUGS MAKE SCREWS PRESENTABLE

To hide your screws, start by cutting a counterbore—a flat-bottomed hole—to recess the screw head. Use a brad-point bit (near right) in the drill press to cut a clean hole to accurate depth. To fill the counterbores, produce precise cylindrical plugs using a plug cutter (center) at the drill press. Cut a number of plugs and then saw them free on the bandsaw. After driving the screws, glue in the plugs and cut them flush with a chisel (far right), then smooth them with a plane or sandpaper.



SCREWS THAT ALLOW WOOD MOVEMENT

When you need to accommodate substantial wood movement, you can create an elongated clearance hole and counterbore. Then the screw can travel in the slot without loosening its grip. First rout the clearance slot, controlling the cut with a fence clamped to the plunge router. Then, with the fence at the same setting, change to a larger, flat-bottomed router bit to cut the wider slot for the screw head.



ADD BITE FOR END-GRAIN SCREWING



Screws don't grip well when you are screwing into the end grain of a piece of wood, or into the edge of a piece of MDF or plywood. To solve the problem, insert a dowel in the lower board and drive the screws through it.

Driving lessons



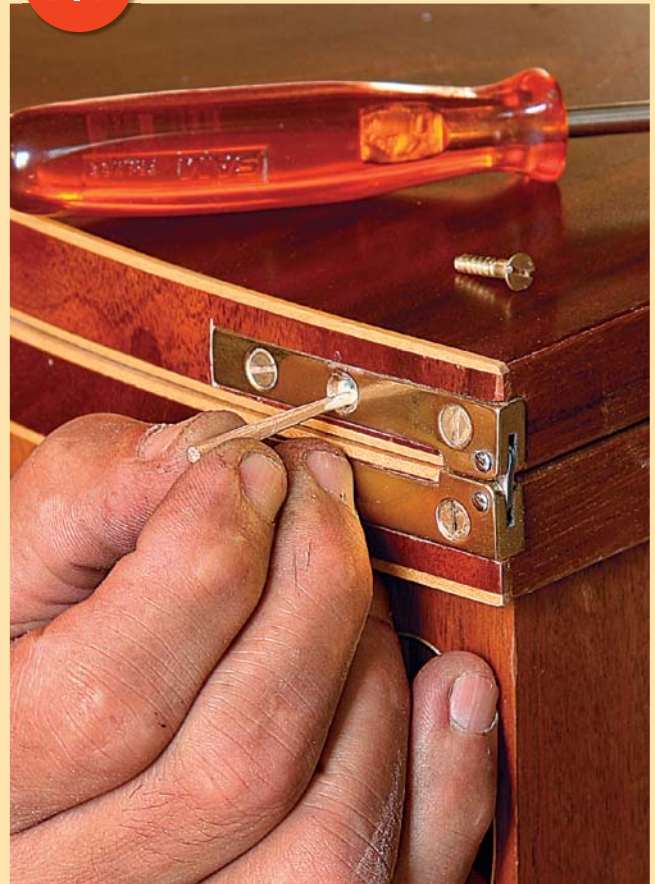
Wax works. Rub a little paste wax or paraffin on the threads to coax a screw into place more easily.

Steel for strength, brass for beauty.

Brass screws are prone to breaking, especially in hardwoods, and it's easy to strip their heads. So when mounting brass hardware, use steel hardware first, then replace them with a set of brass screws of the same size.



TIP A fix for stripped holes



If you have a hole that's stripped, or too large for your screw, fill some of the space with glue-coated slivers of wood. Cut off the excess, wait for the glue to set, and then reinsert the screw.

WHAT ABOUT A BROKEN SCREW?



Oops. To remove a screw that's broken off at or below the surface of the workpiece, Rodriguez uses a relatively new screw-extractor kit called *Unscrew-Ums* (from T & L Tools; titools.com, 860-464-9485).



Simple extraction. With one of the extractor sleeves in the chuck and his drill in reverse, Rodriguez carefully drills down over the screw (left). The extractor cuts down, tightening around the screw and eventually backing it out of the hole (above).