Screws for Woodworkers

For best performance, choose the right screw, and install it properly

by Sandor Nagyszalanczy

***A good selection of screws** and a power driver will handle a variety of fastening tasks, but choose the right screw for the job.*

Screws will never take the place of traditional joinery, but I can't imagine woodworking without them. What other fastening device so small, simple and inexpensive is capable of such extraordinary feats of joinery? Screws help build frames and carcases, mount hardware and trim, and attach tabletops to aprons—all with speed and ease. And even though screwed-together assemblies are strong, they generally can be taken apart if the need arises.

Of the woodworkers that I've visited recently, most use standard tapered wood screws, drywall screws or hardened-steel production screws for everyday tasks. Each type of screw has different characteristics that make it better for some jobs than for others. The drawings on pp. 77-79 show the basic shape of each screw. Depending on the screw and the material that it's being driven into, you'll need to prepare a different kind of pilot hole to get the best fastening performance. I'll tell you more about that later.

Flat-head screws are by far the most common, but there are lots of head types and drive styles to choose from. Each head type is appropriate to a particular application (see the photo on p. 78). The traditional straight drive slot is still used on standard wood screws, but drywall and production screws use Phillips and square recess drives. These drive configurations are more secure, making them much easier to use with power drivers (see the drawings on the facing page).

Standard wood screws—When someone says "wood screw," most of us picture a pointed, tapered-body screw. It's commonly available with either a straight drive slot or a Phillips-drive recess and three head types: flat, round and oval. Standard wood screws have the greatest range of sizes, from a #0 (about 1⁄16 in. dia.) by 1⁄4 in. long to a #24 (about 3⁄8 in. dia.) by 5 in. long, which makes them the only choice when you need a very small or very large screw. And these screws are good for everyday fastening tasks as well as for restoration and reproduction work.

These screws require a stepped pilot hole of two diameters—one for the threaded part and the other for the thicker, unthreaded shank. Pilot holes must be carefully sized to prevent screw breakage (see the chart on p. 78). The thick, shallow threads found on these screws don't bite into wood as aggressively as deeper threads do, so standard screws don't hold as well as the newer hardened-steel production or drywall screws.

Drywall screws—Readily available from most hardware outlets, drywall screws are hardened-steel fasteners used for attaching wallboard to studs. These screws have a Phillips-drive recess in a thin, flat head. The generous radius under the head (called a bugle head) allows the screws to be set below the surface of drywall without tearing the paper. The screws are sold with black-oxide coating or zinc plating to give them a modicum of corrosion resistance. And the sharp points and straight shanks make it easy to drive them into metal studs.

All of this is great for drywallers but not necessarily for woodworkers. Drywall screws are strong. However, they are hardened to the point of being brittle, making them a poor choice for assemblies subjected to a lot of punishment. Drywall screws are

Photos: author

available with shallow, double-lead threads as well as larger single-lead threads (see the center drawing at right). Single-lead threads grip better in wood, double lead in metal.

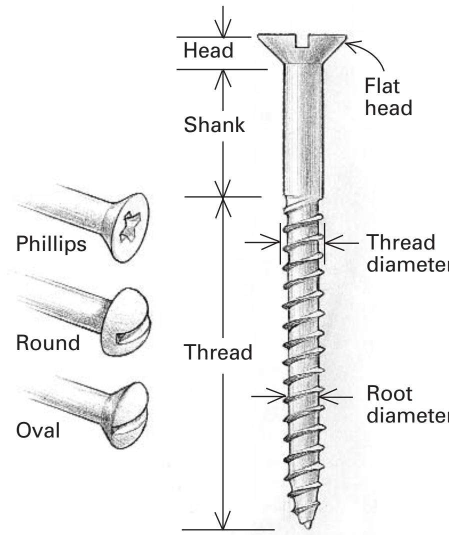
These shortcomings don't mean that drywall screws have no place in the small woodshop. Because they are inexpensive, I use them for many less-demanding jobs around the shop, such as for jig construction or for cobbling up temporary supports when assembling larger cabinets.

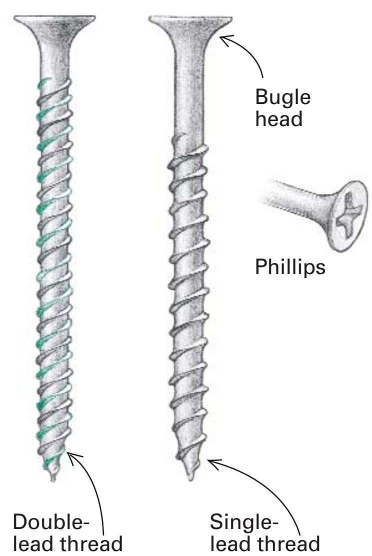
Hardened-steel production screws—Hardened-steel production screws (for example, installation screws, particleboard screws, deck screws) are strong and versatile. They're my fastener of choice for all manner of demanding furniture- and cabinet-assembly tasks. Production screws are made of high-quality steel, heat-treated for strength and greater elasticity to resist head stripping and breaking. The deep, sharp threads wrapped around a straight shank bite more firmly into wood fibers than the thick, shallow threads found on standard wood screws. And production screws are more resistant to pullout—I trust them to

Screws

Standard wood screws

These screws are available in a wide range of sizes, from ¼ in. to 6 in., and have either a slotted or Phillips drive. Common head styles are flat, round and oval. The thick, shallow threads and large-diameter shank require drilling both a shank hole and a pilot hole.



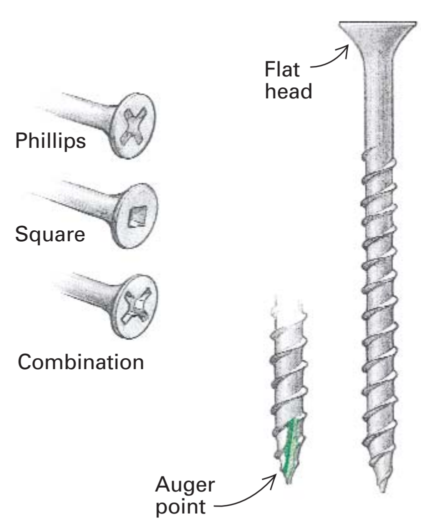


Drywall screws

Drywall screws have a Phillips drive and are made of hardened steel. A pilot hole is not necessary except in the hardest woods. The bugle head is self-seating in soft woods. The double-lead thread pattern (left) provides a tight grip in thin, metal studs. The sharp, single-lead thread (right) works best in wood.

Production screws

Strength and sharp threads make this fastener an excellent choice for wood. A pilot hole is generally not necessary in softwood. The auger-point version drills its own hole in hardwoods. A broad range of sizes in Phillips, square and Phillips-square combination drives are available.



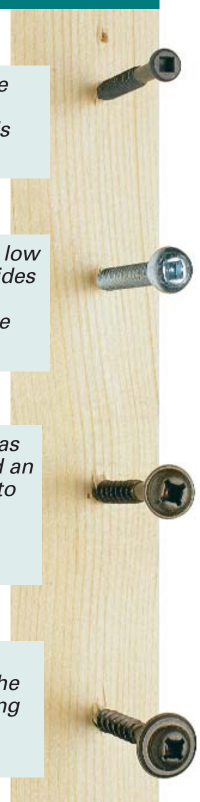
hold, even when they're driven into the end grain of solid hardwoods and the edge of plywood and particleboard panels. These screws are available in a range of sizes from #4 by 3/8 in. long to #12 by 4 in. long, and they are available with a Phillips-drive, a square-drive or a combination Phillips/square-drive recess.

Steel screws: a good choice for most jobs

Steel is the most common material used for screws—it's strong and inexpensive. The strength of the high-quality, heat-treated steel of production screws is superior to the mild-steel used in standard wood screws.

Steel screws are plated with different metals to enhance corrosion resistance and to match other hardware. Screws with decorative platings work best indoors. The rust-resistant plating, usually a thin layer of zinc, chips off around the drive slot, so the screw will rust when used outdoors. Although this may not affect the strength of the fastener, it usually results in rust streaks, which discolor the surrounding area.

Screw heads for special applications



Trim head *is like a finish nail. The small, flat head is easy to hide.*

Pan head *has a low profile and provides a flat bearing surface under the head.*

Washer head *has a low profile and an integral washer to provide a large bearing surface under the head.*

Super washer head *provides the maximum bearing area under the head.*

Screws made of weather-resistant materials, like brass, bronze and stainless steel, can be both decorative and corrosion resistant. In general, these materials are weaker than steel. To prevent the screws from breaking, size the pilot hole correctly: too small and the head may twist off (see the chart below).

Pilot holes: to drill or not to drill

A standard wood screw isn't very good at making its own hole, so you need to drill a stepped pilot hole, correctly sized to the screw. You can use two drills and a countersink, but that method is slow when you have to prepare a lot of holes. Most woodworking suppliers sell special bits that create a pilot hole, shank hole and countersink in one operation. I've used a high-quality taper bit and countersink for years. These bits have adjustable collars to control the depth of the countersink. You can counterbore a hole in the same step by setting this collar farther up on the shank for a deeper cut.

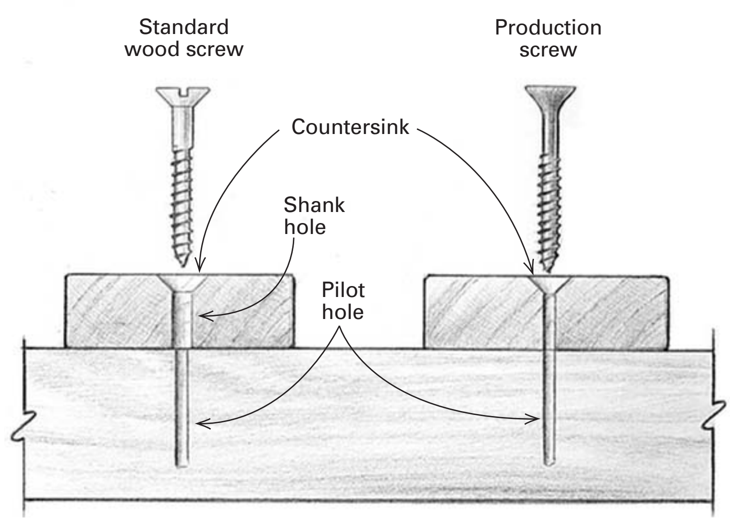
With their thin shanks and sharp threads, drywall and production screws can be driven into softwoods, plywood and some hardwoods without making pilot holes. Some production screws are available with a special self-tapping point that drills its own hole in hardwoods (see the bottom drawing on p. 77). However, in really hard woods, it's best to drill a pilot hole and countersink for a flat-head screw to avoid splitting the wood or snapping the screw.

A shank hole lets the screw turn freely—When using drywall screws and production screws, it's tempting to skip drilling a hole for the shank. When fastening two pieces of stock together, however, a shank hole allows the screw to turn freely in the first piece, so the screw can pull it tightly against the second piece. A shank hole is necessary for screws that are threaded all the way up to their heads. If the threads are engaged in both pieces, the parts can't be pulled tightly together.

Drilling a separate shank hole isn't always necessary. The shank diameter of a production screw is about the same as the root diameter of the threaded part of the screw (see the drawing below right). If the unthreaded portion of the shank is long enough to extend through the first workpiece, that portion of the screw will turn freely in a shank-diameter pilot hole while the threaded portion bites into the second workpiece.

Another way to avoid drilling a separate shank hole is by clamping parts tightly together before driving a screw. This works well if you're using fully threaded drywall screws. This method also prevents chips and sawdust created by the driven screw from getting between workpieces, which keeps them from pulling tightly together.

Pilot- and shank-hole clearance



To determine the correct pilot-hole diameter for any given screw, I check a chart of standard wood-screw sizes and corresponding shank-hole and pilot-hole diameters for hardwoods and softwoods (see the chart below).

If I'm not sure of the screw size, I measure its root diameter with a dial caliper. The reading I get determines the size of the bit I use for the pilot hole. If I am driving screws into very hard

Recommended drill diameters

Here are the best drill diameters to the nearest 1/64 in.

Screw gauge	Pilot hole (hardwood)	Pilot hole (softwood)	Shank hole
#4	5/64	1/16	1/8
#6	7/64	3/32	9/64
#8	1/8	7/64	11/64
#10	9/64	1/8	3/16
#12	5/32	9/64	7/32

woods, I add an extra 1/64 in. I increase the size of the pilot hole slightly when using screws made of soft metals, such as bronze. When using soft solid-brass screws, I tap the holes by drilling a slightly undersized pilot hole and driving in a steel screw of the same size and length. I back out the steel screw and drive home the brass screw.

Fit the driver to the screw

A regular straight-slot screwdriver should have a square-edged tip that matches both the width and length of the screw slot. Don't be shy about regrinding the tip; a screwdriver with a twisted or chisel-like point isn't much good. In choosing a Phillips driver, check to see that the tip of the driver goes deeply into the recess without bottoming out.

My all-around favorite is the square driver (see the photo below) because it doesn't slip readily. And the driver holds the screw firmly so it can be set in place with one hand. As far as square drivers go, it's difficult to choose the wrong one—there are only three sizes for the most common-sized wood screws.

Using a powered drill/driver saves a lot of time and wrist fatigue when you have to drive a ton of screws. A drill with an adjustable clutch will improve your screw-setting performance by limiting the amount of driving torque. The clutch prevents broken screws and sets all the heads to the same depth. If you don't own a drill with a clutch, you can fit your old electric drill with a clutch accessory called Optigrip (which is available from several mail-order catalogs).

Good-quality screws are available from woodworking supply companies. McFeely's specializes in screws (P.O. Box 3, Lynchburg, VA 24505-0003; 800-443-7937) and carries an extensive line of hardened-steel production screws. Many brands of hardened-steel screws are coated with a dry lubricant that makes them easier to drive and less susceptible to breakage. If you drive screws by hand, lubricating the screw will save you lots of effort. If you use a cordless drill/driver, you'll set more screws on a single battery charge if you use a lubricant. There are a number of proprietary screw lubes on the market, but I find that rubbing screws with an old candle works just fine. □

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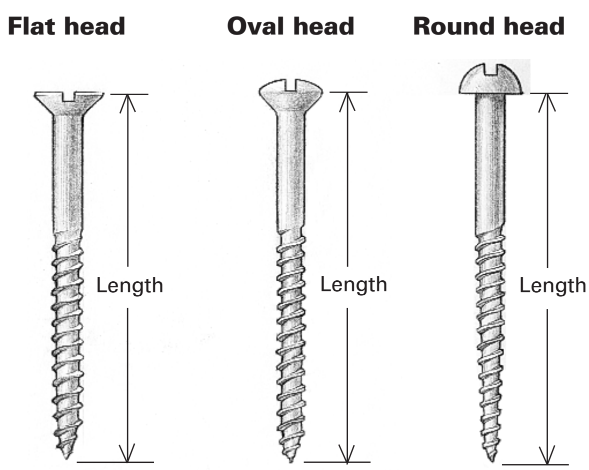
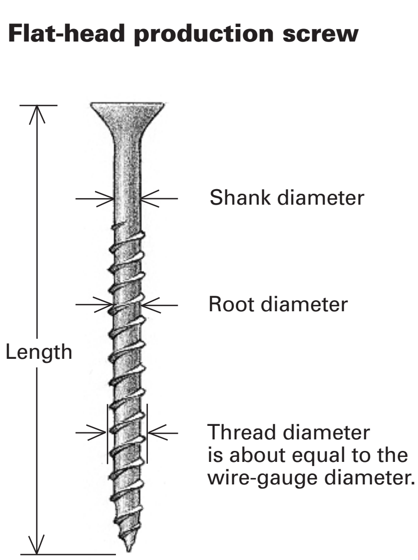
***The box label gives** the wire-gauge size, length, head type, drive type and material or plating.*

Measuring screws

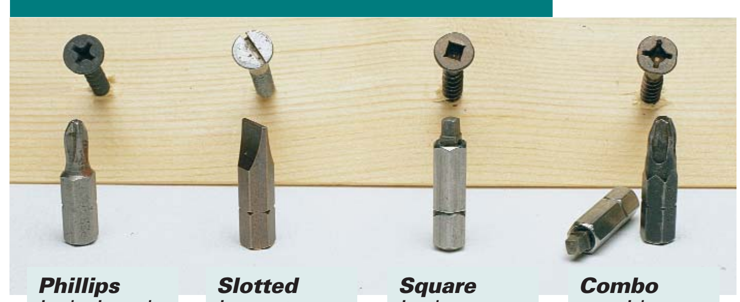


Length is measured from the tip of the thread to the edge of the bearing surface under the head.



Screws are made from wire, the larger the wire gauge the larger the finished screw. Threads on a production screw, unlike those on a standard wood screw, are rolled. This makes the shank diameter and the root diameter about the same.

Four most common screw drives



***Phillips** is designed for power driving. Tapered bit can prematurely disengage under high-driving torque.*

***Slotted** is most common drive. Driver tends to slip and is difficult to power drive.*

***Square** is also designed for power driving. Driver doesn't slip under driving torque.*

***Combo** provides the qualities of the square drive as well as the wide availability of Phillips drive tools.*