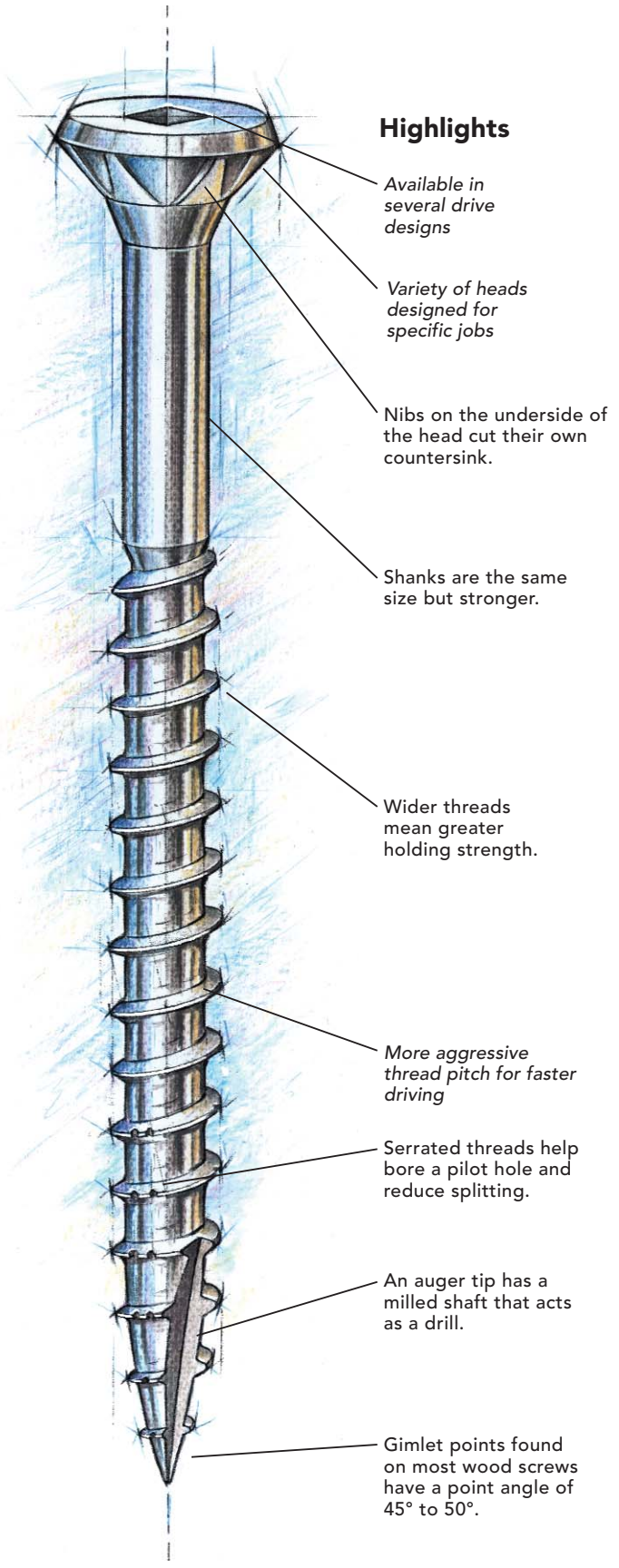
The New Wood Screw



Stronger, better-equipped screws are tailored for specific applications

BY SCOTT GIBSON

About 200 years ago, Job and William Wyatt, two enterprising brothers in England, transformed the wood screw into something carpenters and woodworkers were willing to use. Until then, Witold Rybczynski recounts in *One Good Turn* (Touchstone Books, 2001), screws were handmade by tradesmen known as girders. The Wyatt brothers automated the manufacture of screws using a lathe, producing a much better screw in a few seconds rather than minutes.

Today, most wood screws are made overseas, and few, if any, industrywide standards exist. Nonetheless, it's easier than ever to get a screw made for a specific job. Manufacturers continue to tinker with improvements, and some of them really are better than the old standbys.

Slotted and Phillips screws are old news

Early wood screws were made with slotted heads because slotting was easy to do, but they are terribly inefficient. Slotted heads do not center the driver automatically. Under load, the tip of the screwdriver easily skates out of the slot, and slotted screws are notoriously difficult to use with a power screwdriver. How many times have you gouged your work or yourself while driving a slotted-head screw?

The other familiar design that's losing ground is the Phillips head. Perfected by Henry Phillips in the 1930s, it became the standard on auto-assembly lines. Phillips drivers "cam out" of the recess when they reach a certain torque so that fasteners are not overdriven. This characteristic often forces you to fight the head design to seat the screw head, and it's likely you'll strip the drive.

Square, Quadrex and Torx are drive designs that work

Canada's Peter Robertson patented the square-head recess in 1907 (drawing facing page). It makes one-handed fastening easy because a screw fitted on the end of a square-drive tip stays put; you're not pushing down all the time to keep it engaged. Square drives have more contact area, which can work against you, too. Having a clutch on a power screwdriver will save you from overdriving this screw.

The Quadrex, also called a combo or combination drive, takes either a Phillips or square driver (drawing facing page) and is pretty forgiving when the driver can't be lined up on the screw's axis. This design lets production shops use a square driver, while consumers who need to tighten or remove the same screw later can use a standard Phillips driver.

The six-lobed Torx drive (drawing facing page), or star drive, has a better torque transfer than either a square drive or Phillips head, and the drive tip doesn't slip or wear out as easily as other designs. I used

Drawings: Don Mannes

a single Torx driver on a deck not long ago, and it was working just fine after more than 1,000 screws.

Making a faster, stronger fastener

Sharp gimlet points found on most screw tips are designed to penetrate wood quickly, but can cause it to split. To minimize the problem and generally make it easier to drive screws, manufacturers sometimes cut a groove in the end of the screw that helps the fastener to bore its own pilot hole. It's called a type-17 tip and often is added to deck screws. These self-boring tips with an aggressive thread design work better on softwoods because softwoods compress easily, and the screw can force its way in. Still, a pilot hole is an advisable precaution to relieve the compressive forces of driving when you're working near the end of a board or with dense woods.

Once you've drilled the hole, it's a pretty good idea to lubricate the screw. Use a boiled linseed oil or wax to lubricate screws, but never use soap, which draws moisture from the wood to the fastener, potentially causing corrosion.

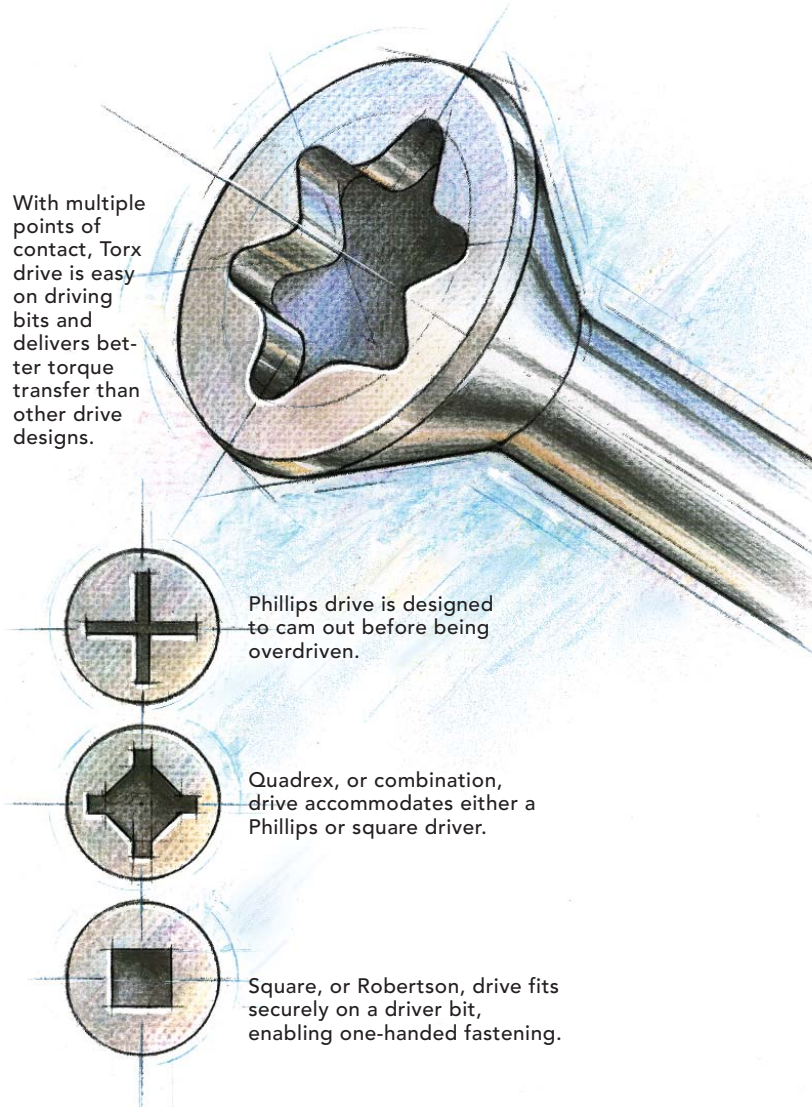
The new screws' threads are cold-rolled instead of cut on an automatic lathe. They are formed by rolling a round blank of steel in a die. Extreme pressure forces the threads to roll out from the shank; it's like squeezing a piece of clay in your hand until it oozes between your fingers. This process allows manufacturers to use stronger alloys.

These stronger threads have a slightly larger diameter than the shank, offering greater resistance to pull-out. As far as driving speed, various tips may ease you into the work, but it's the threads that feed the screw. The screw's pitch, which is 1 divided by the number of threads per inch, is how far the screw advances per rotation. The more aggressive the pitch, the faster the screw goes in, but doing so takes a bit more torque, which is another reason why the new drive designs are better suited for these screws. Not all screws should have an aggressive pitch, though. When working with hardwoods or connecting to metal, a finer thread and shallow pitch are recommended.

Along with stronger threads and better pull-out resistance, the new wood screw is designed for specific tasks. Germany's Altenloh, Brinck & Co. (www.spax.de) has developed a screw with serrated threads near the tip called a Spax that can be used on wood, masonry and light-gauge steel. According to the manufacturer, the special thread design requires 20% less driving torque and no predrilling while offering higher holding power. McFeely's (www.mcfeelys.com) ProMaster

Engaging drive designs

With deeper, faster driving threads, it sometimes takes more torque to get these screws driven, and these drive designs are just the thing to get you in. By offering more points of contact, there's less chance of the bit disengaging when the going gets tough.



With multiple points of contact, Torx drive is easy on driving bits and delivers better torque transfer than other drive designs.

Phillips drive is designed to cam out before being overdriven.

Quadrex, or combination, drive accommodates either a Phillips or square driver.

Square, or Robertson, drive fits securely on a driver bit, enabling one-handed fastening.

Job-specific head designs

Screws are used in a variety of construction applications, and their form is determined by their function.

Flat-head screws have a precise 82° taper that snugs into a countersink. They're an ideal general fastener.

Pan-head screws' flat bearing surface beneath the rounded head is useful in attaching drawer slides and hinges.

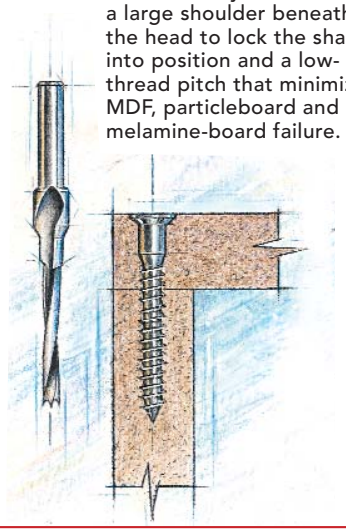
Trim-head screws are designed for most fine-carpentry applications and are countersunk like finishing nails.

Washer-head screws provide a larger bearing area for working with softer materials.

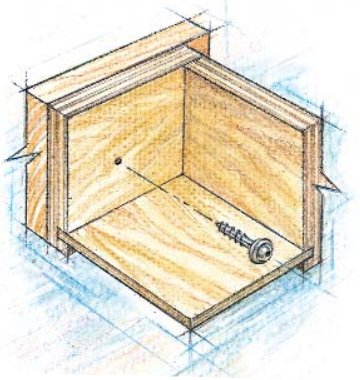
Drawer-front screws' oversize head provides for installation adjustments and minor wood movement.

Screws for cabinetry

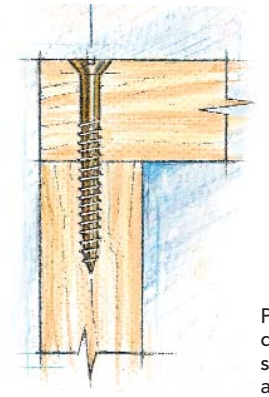
A wide variety of screws has been designed for the different materials and applications used in building cabinets.



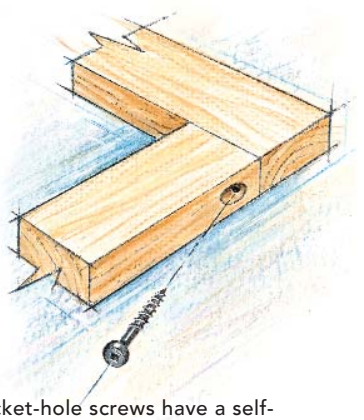
Confirmat-style screw has a large shoulder beneath the head to lock the shank into position and a low-thread pitch that minimizes MDF, particleboard and melamine-board failure.



Drawer-front screws have an oversize washer head, allowing a larger pilot hole, which provides room for adjustability.



Brass screws for traditional hardware are so soft that the pilot hole needs to be prethreaded with a steel screw.



Pocket-hole screws have a self-drilling auger point and a proper shank length to prevent bridging and speed up joinery-assembly time.

Serrated and Swan Secure Products' (www.swansecure.com) Woodpecker are similar screws.

Most wood screws are threaded only about two-thirds up from the tip. Ideally, all the threads end up in the bottom piece of wood. But if the threads span the connection, a gap can form between the pieces of wood. McFeely's ProMax addresses this problem by offering a screw with a variety of unthreaded shank lengths to match the materials being joined (drawing facing page). The Spax deck screw (drawing facing page) has a second set of threads just below the head to prevent screw heads from popping up as decking dries and shrinks.

Corrosion resistance is a must for exterior use

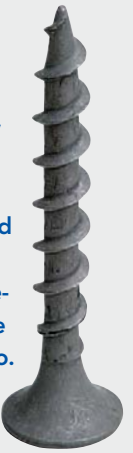
A hot-dipped galvanized coating over steel is a traditional way of preventing corrosion. But the thick protective layer clogs recesses in screw heads and makes fasteners harder to drive. Manufacturers have responded with thinner coatings, many proprietary, that do not plug drive recesses and can be tinted to approximate the color of decking.

Exterior screws may be mechanically galvanized (photo facing page), a process in which they are tumbled with metal flakes and tiny glass beads that peen a protective layer on the steel. Although bright-zinc (photo facing page) and yellow-zinc (photo facing page) coatings may be used as a surface primer for more durable coatings, they are not by themselves useful outside.

Manufacturers have all sorts of trade names for the paintlike coatings that are applied to exterior screws. Exact formulations are not published, but screws may be described as "epoxy" or "ceramic" coated (photo facing page). Manufacturers often claim that their fasteners resist a certain number of hours in a "salt-spray test" before they start to rust. This standard, which is published by the American Society for Testing and Materials (ASTM), is not as aggressive a test as the Kesternich test, which subjects the fasteners to cycles of corrosive sulfur dioxide. Cindy Meade, the marketing director for National Exposure Testing in Sylvania, Ohio, and the chairwoman of an ASTM subcommittee on corrosion, says that she would be cautious about relying on the salt-spray test numbers alone.

In redwood or cedar, or in locations near saltwater, stainless-steel fasteners are a better choice because they won't stain wood and they have better corrosion resistance than galvanized fasteners (photo facing page). Most are made from 300-series stainless, which contains roughly 18% chromium and 8% nickel. Stainless-steel alloys with slightly more nickel, series 304 and 305, show better corrosion resistance than 302 stainless. The most corrosive-resistant, series 316, contains a small amount of molybdenum. These grades of stainless are not heat-treatable, and the screws tend to be soft. Another grade of stainless, 410, can be hardened, but it corrodes more easily. Stainless-

Drywall screws are the carpenter's duct tape



Like duct tape, drywall screws frequently are misused. They are not all-purpose woodworking screws. Drywall screws come either with coarse threads for wood or fine threads for metal studs, and their No. 8 bugle head with Phillips drive is designed to bed smoothly in the paper face of gypsum drywall by camming out. A No. 6 shank is typical, and these screws usually are threaded from tip to head. The thread is designed to drive two pitch lengths per rotation, known as a double-lead thread. That's necessary in quick assembly, such as hanging drywall, but tends to bridge or split wood.

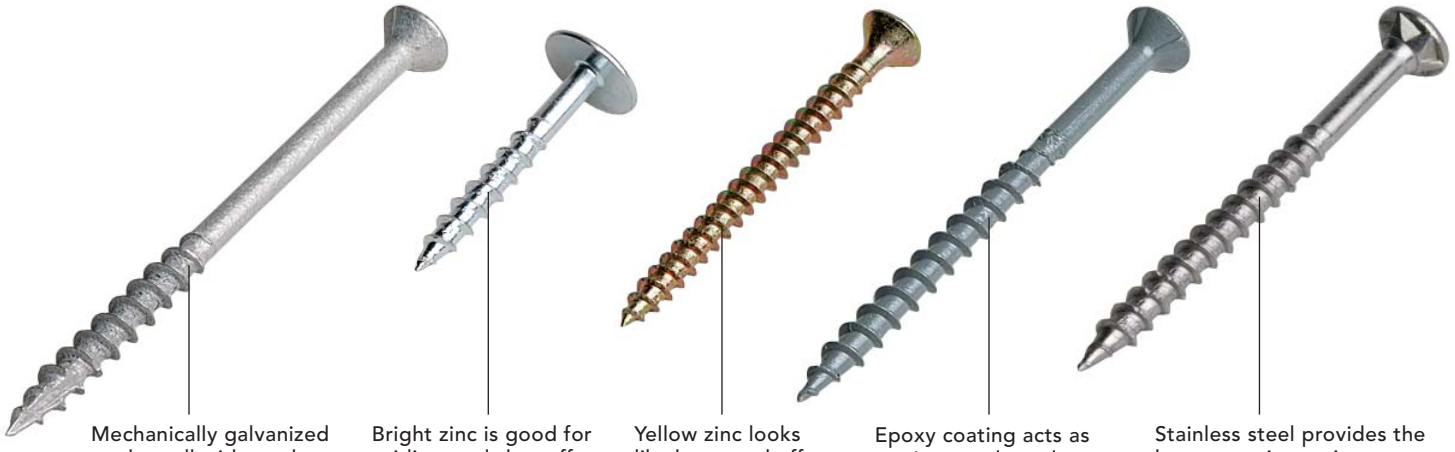
A drywall screw's No. 6 shank is meant to resist tension but not torque, and the extra torque required to drive this screw into wood may snap the thin shank. A No. 8 or No. 10 shanked wood screw is better for furnituremaking and construction.

Drywall screws are not strong enough for general construction. They are a more difficult, less reliable fastener when used in wood.

—S. G.

Corrosion beaters

Coatings work well, but are susceptible to chipping, which is why many people rely on the softer but hardier stainless-steel screws.



Mechanically galvanized works well without the hot-dipped buildup.

Bright zinc is good for acidic woods but offers minimal resistance.

Yellow zinc looks like brass and offers modest resistance.

Epoxy coating acts as a primer and needs a more durable finish coat, such as paint.

Stainless steel provides the best corrosion resistance.

steel fasteners cost twice as much, but they provide better corrosion resistance and won't stain cedar or redwood.

Interior screws for every purpose

Face-frame screws are designed for assembling cabinet face frames made with pocket-hole jigs. They have coarse threads for softwoods or fine threads for hardwoods and an auger tip that makes driving the screws easier. A panlike head acts like a washer and provides bearing so that frame parts can be cinched tight (drawing facing page).

With the advent of particleboard, a Swiss cabinetmaker invented the Confirmat screw in the 1970s. This special-purpose cabinet screw has a thick shank and deep threads for assembling particleboard or medium-density fiberboard (MDF) cabinet parts (drawing facing page). Pilot holes require a three-step drill bit—one that drills, counterbores and countersinks in one operation.

Cabinets and built-ins usually are installed by running screws through a mounting rail into a wall stud, plywood or 2x blocking. Mounting screws have large heads to distribute the load, deep threads for bite and an auger tip to bore their own pilot hole. They are available with painted heads to make them less obvious.

Drawer-front screws are made for quick, precise adjustment of drawer fronts. When combined with a large pilot hole, the oversize washer heads on these screws (drawing facing page) allow for some adjustment. If you're not happy with the drawer front's alignment, you loosen the screw, reposition the drawer front and retighten it.

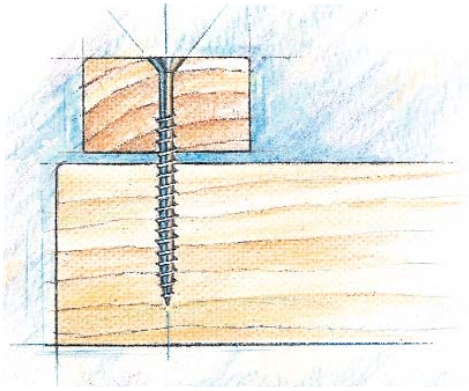
Traditional furniture hardware is brass, so it's mounted with brass flathead screws (drawing facing page). Brass is soft and damages easily. One solution: Drill a tapered pilot hole, use a similar-size steel screw to cut the threads in the wood, back it out and then use the brass fastener.

The new wood screws are generally stronger, easier to use and designed for specific jobs. While they may be more expensive than cut-thread screws, they are built to save time and give a better finished product. □

Scott Gibson is a contributing editor to *Fine Homebuilding*.
Photos by Scott Phillips.

Bridging the gap

Bridging occurs when the thread bites into both pieces being fastened, separating them. The solution is to drill a pilot hole, slightly larger than the screw thread's diameter, in the piece that accepts the shank so that the screw acts as a clamping device.



McFeely's ProMax screws come in a variety of unthreaded shank lengths to prevent bridging and overdriving screws to pull the boards together.

The differently pitched upper threads of the Spax deck screw pull boards together and lock them in place, aiding the clamping pressure of the head.