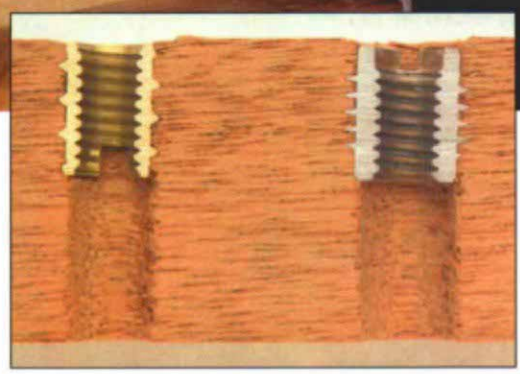
Threaded Inserts

A versatile fastener for making strong connections

by William Tandy Young



***Stronger than screws**—Boston furnituremaker Bill Howard uses threaded inserts to attach decorative end pieces to a credenza (above). A ¼-in. insert (right) has about 50% more surface area in the wood than a #14 screw.*

My friend Andy called one day to ask if I wanted to take part in a bulk order of threaded inserts. I'd seen threaded inserts in catalogs but had no experience with them. I asked Andy how he used them, and after a moment of stunned silence he replied, "Where do you want me to start?" He told me he used them on everything from tools and jigs to high-end furniture. Threaded inserts are so valuable around his shop that craftsmen working there guard their private stocks. Andy's never steered me wrong, so I joined the bulk order and got some of my own.

Once I started working with threaded inserts, I quickly saw how handy they are. They look like round nuts with machine-screw threads on the inside and wood-screw threads on the outside (see the inset photo at left). Threaded into a hole, inserts make it possible to use machine screws to fasten wooden parts. Inserts have a large outside diameter and coarse threads, and their surface area is more than 50% greater than comparable wood screws. The surrounding wood fails long before inserts pull out. Inserts hold so well they can be difficult to remove. Some designs are impossible to remove, short of splitting them out.

Since that first order, I've used threaded inserts to replace wood screws where strength was important and on knockdown furniture. I've fixed wobbly chairs by replacing stripped wood screws with threaded inserts, and I've made all

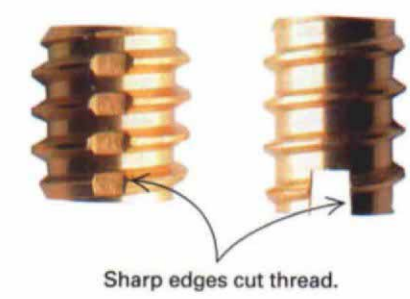
Top photo: Aimé Fraser

kinds of jigs and fixtures with inserts. I might toss the jig when the job is done, but not before I've salvaged the inserts.

Three types of inserts for woodworking

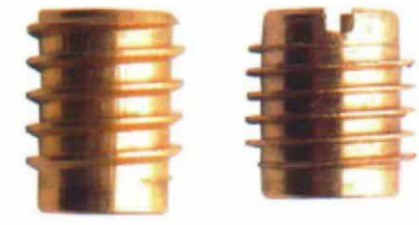
There are dozens of types of inserts made for use in almost every material. Only three are suitable for wood: inserts that cut threads in the wood, inserts that form threads and barbed inserts, which have no threads. Whatever type you choose, they're generally available in brass, zinc alloy and steel. Zinc-alloy inserts are the least expensive but also the softest. The internal threads will strip after repeated use. Brass is harder, and steel inserts are the toughest of all.

Thread-cutting inserts



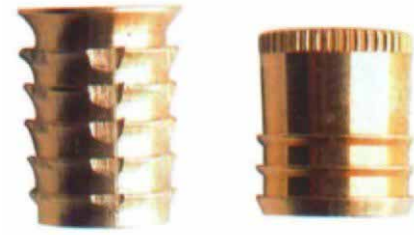
The external thread on a thread-cutting insert isn't continuous (see the photo above). The threads are broad and flat-topped with a notch, slot or groove that breaks the threads in one or more places. As the insert is driven, the sharp edges of the break cut threads into the wood. Thread-cutting inserts are easier to drive. I use them when I'm installing large inserts and when I'm working in hardwoods.

Thread-forming inserts



Thread-forming inserts have continuous thin, sharp threads (see the photo above). These inserts work like wood screws, displacing the wood around the threads rather than removing it Thread-forming inserts install easily in everything but the hardest woods. I don't use them in thin stock or in the edges of boards because they can bulge the wood around the insert or cause a split.

Barbed inserts



Barbed inserts don't have threads; they have angled fins that let the insert go in but not come out (see the photo above). These inserts are installed with a hammer.

Though barbed inserts are sold for use in solid wood, they aren't as secure as externally threaded inserts. Barbed inserts are designed for engineered wood like medium-density fiberboard where threading an insert is likely to crumble the material.

Choosing the right driver

Driving inserts with a screwdriver is a torturous, experience. You're far better off using a driver made for the job. Stud-type drivers, which screw into an insert's internal threads, are one option. These devices range from the simple nut-and-bolt driver shown in the photo below to more elaborate production drivers, like the ones shown in the photos at right. Although these drivers are able to break a jam between driver and insert, they can't back an insert out of its pilot hole once it's been installed.

Specialty drivers engage inserts either with a hex-shaped stud or with a pair of tabs that fit into the top of the insert. These drivers also are capable of removing an insert.

Nut-and-bolt driver

This non-power driver is simple, but it's slow and fussy to use. You can make one from a nut and a bolt; you will need two wrenches to use it. Here's how it works: Thread the bolt into the insert with the nut between the insert and the bolt head. Tighten the nut to contact the insert, and with a wrench on the bolt head, drive the insert into the pilot hole. If the insert wants to back out while unthreading the bolt, just hold the nut against the insert with the other wrench and back out the bolt.

Production drivers

At the other extreme are expensive, hardened-steel industrial production drivers for use in a drill press, variable-speed drill or screw gun. There are two types, and they aren't cheap. But if you drive inserts into hardwoods all day long, they may be worth the investment.

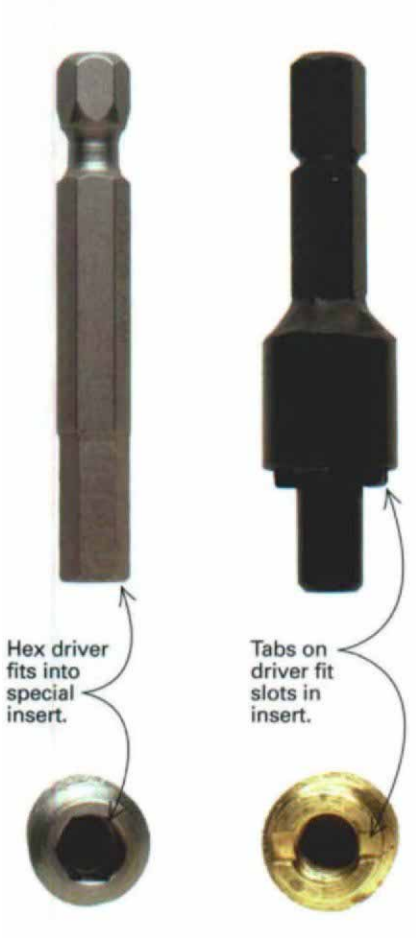
The less expensive version is basically a nut-and-bolt driver with a shank that chucks into a drill. A wrench is used to break a jam (see the photo at right above). Prices start around $50.

A more expensive version can break a

Photos except where noted: Scott Phillips

jam without a wrench (see photo on the facing page). These drivers look complicated, but they are nothing more than fancy nut-and-bolt drivers that produce an impact to break a jam. They cost upward of $150 each.

Specialty drivers

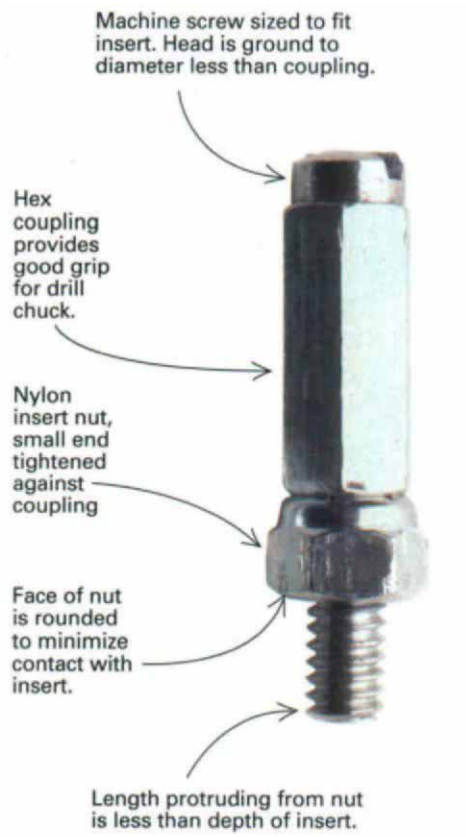


Internal-thread drivers can install any insert, but some inserts also can be installed with a specialty driver. Two kinds of specialty drivers are readily available at a cost of around $11 each. One has a smooth shaft to pilot the driver in the bore, with small tabs that engage a slot in the top of the insert, and the other uses a hex socket (see the drivers in the photos above).

Specialty drivers have two clear advantages over stud-type drivers. For one thing, jamming isn't an issue. Drive the insert, and then pull out the driver. More important, inserts made for specialty drivers can be removed. If you don't want the insert where you drove it, just reverse the drill and back it out. Inserts without a slot or socket have to be drilled or split out.

Shopmade power driver

Made from commonly available parts, this driver will install inserts efficiently.



***Avoiding jams**—To reduce contact between driver and insert, the author rounds over the nut at the bottom of the driver. The nut has been threaded on a machine screw that is chucked in a drill to make grinding easier.*

For my work, a shopmade driver (see the top photo above) is just as effective as a top-of-the-line production driver. I can make a set to fit every size insert for lunch money or less. I make smaller-size drivers from a machine screw threaded through a hexagonal coupling. To make a good bearing surface against the insert, I snug a nylon-lined stop nut against the coupling. I put the small end of the nut facing the drill.

Before assembling a driver made with a coupling, I grind the head of the machine screw to make it slightly smaller than the diameter of the coupling. This helps the drill chuck grip the coupling, not the screw. Then I grind a radius on the large end of the stop nut, as shown in the bottom photo, so the nut touches the insert but not the surrounding wood.

This works well in the smaller machine screws, but the outside diameter of a 5/16-in. coupling won't fit in a 3/8-in. chuck. For larger inserts, I use a bolt that isn't threaded full length and cut the head off.

Drill the right size pilot hole

No matter what driver you use, the right size pilot hole is essential. I determine the right size the same way I do when driving wood screws. For hardwood, I make the pilot hole for an insert slightly larger than the root diameter of the insert. For softwood, I make the hole slightly smaller. I always run a test in a scrap piece of the same wood to make sure the insert drives easily.

Whenever I can, I drill the pilot holes in a drill press to ensure they're square to the surface. I drill the holes a little deeper than the insert by about one diameter, and I keep them one insert diameter from an edge. □

William Tandy Young is a furnituremaker and conservator in Stow, Mass.

Sources of supply

The following are sources for threaded inserts and drivers:

Groov-Pin Corp. (201) 945-6780. Minimum order $200. For smaller orders, call for name of local distributor.

McFeely's (800) 443-7937

Paxton Hardware (800) 241-9741

Professional Discount Hardware (800) 248-1919

Spirol International (860) 774-8571

Sta-fast (800) 782-3278

The Tool Club (800) 486-6525

Yardley Products Corp. (800) 457-0154

Bottom photo: Aimé Fraser