

Lesson #7: Threaded Fastener Notes

Objectives

Students will be able to...

- Identify the different types of threaded fasteners.

Common Core Standards

Cabinetmaking and Wood Products Pathway

A1.4, A1.7, A2.1, A2.2, A3.1, A2.3, A6.1, A6.2 A3.4, A6.7, A4.1, A5.1, A5.2, & A5.4

Residential and Commercial Pathway

D2.1, D2.2, D3.1, D3.3, & D4.1

Reading 11-12.4

Writing 11-12.1

RIST 11-12.2

Problem Solving/Critical Thinking 5.4

Health and Safety 6.2, 6.3, 6.6, & 6.12

Responsibility and Leadership 7.4 & 9.3

Demonstration and Application 11.1

Technical Knowledge and Skills 10.1, 10.2, & 10.3

Materials

YouTube video <https://www.youtube.com/watch?v=A8kN37b0iDY>
Threaded Fastener Notes

Lesson Sequence

- Watch the *YouTube video* <https://www.youtube.com/watch?v=A8kN37b0iDY> (10 minutes)
- Read as a class *Threaded Fastener Notes*. As you read highlight the important sections. Most students will highlight everything in the sentence or paragraph, but the emphasis should only be on the key words. Use as a guideline the categories on the nail chart.
- Answer any questions the students may have as you are reading.
- Exit ticket: Students should write down three things they learned from the video/notes.

Assessment

Use exit ticket data to display knowledge on content that was taught today.

Accommodations/Modifications

Highlight Important Information on Notes Handout Prior To Reviewing the Notes
Check for Understanding
One-on-One Support

Threaded Fastener Notes

Drive Types



The slot-drive screw has a single slot in the fastener head and is driven by a flat-bladed screwdriver. The slotted screw is common in woodworking applications but is not often seen in applications where a power tool would be used, due to the tendency of a power driver to slip out of the head and potentially damage the surrounding material. The tool used to drive a slot is called a slot-head, flat-tip, or flat head.



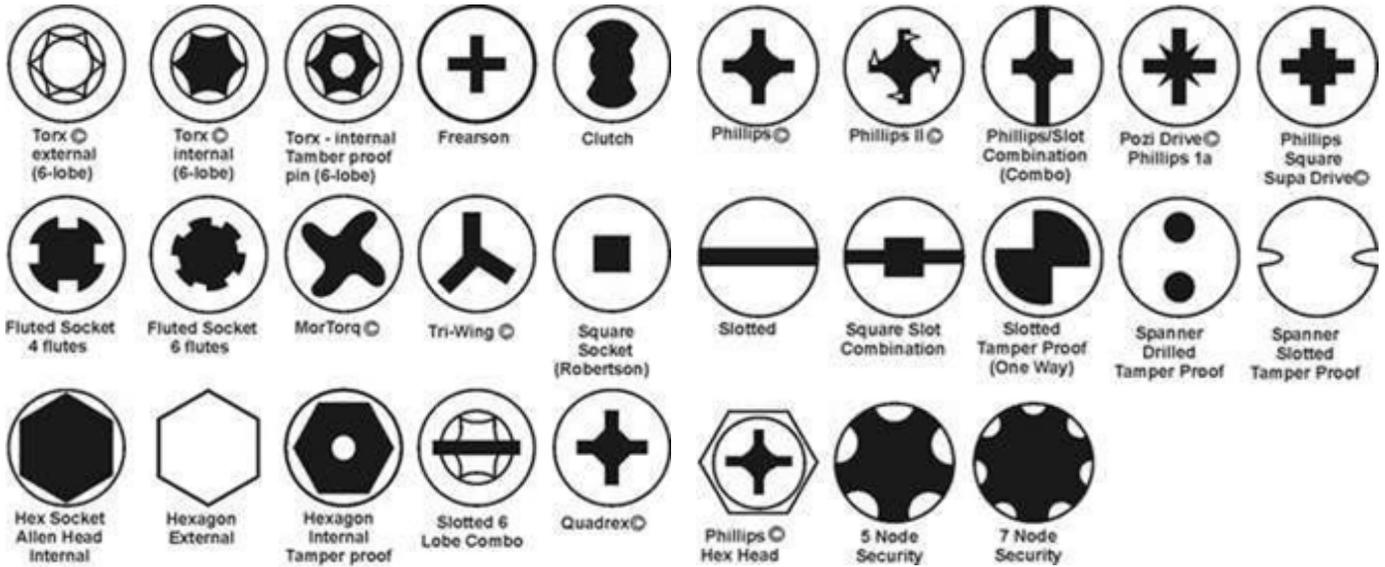
The chief advantage of the Phillips screw drive over the Slot was that the driver did not slip out as easily, especially when using a power tool to drive them, however they were designed to purposely cam-out when the screw stalled, to prevent the fastener damaging the work or the head, instead damaging the driver.



Commonly known as the square -drive screw, it has a square-shaped socket in the screw head and a square protrusion on the tool. Both the tool and the socket have a taper to make inserting the tool easier. Square screwdrivers are easy to use one-handed, since the tapered socket retains the screw, even if it is shaken. They also allow for the use of angled screwdrivers and trim head screws. The socket-headed Square screws are self- centering, reduce cam out, stop a power tool when set, and can be removed if painted-over or old and rusty.



Commonly known as the TORX - drive screw, it uses a star shaped recess in the fastener with six rounded points. It was designed to permit increased torque transfer from the driver to the bit compared to other drive systems. Torx is very popular in the automotive and electronics industries due to resistance to cam out and extended bit life, as well as reduced operator fatigue by minimizing the need to bear down on the drive tool to prevent cam out.



Wood screw

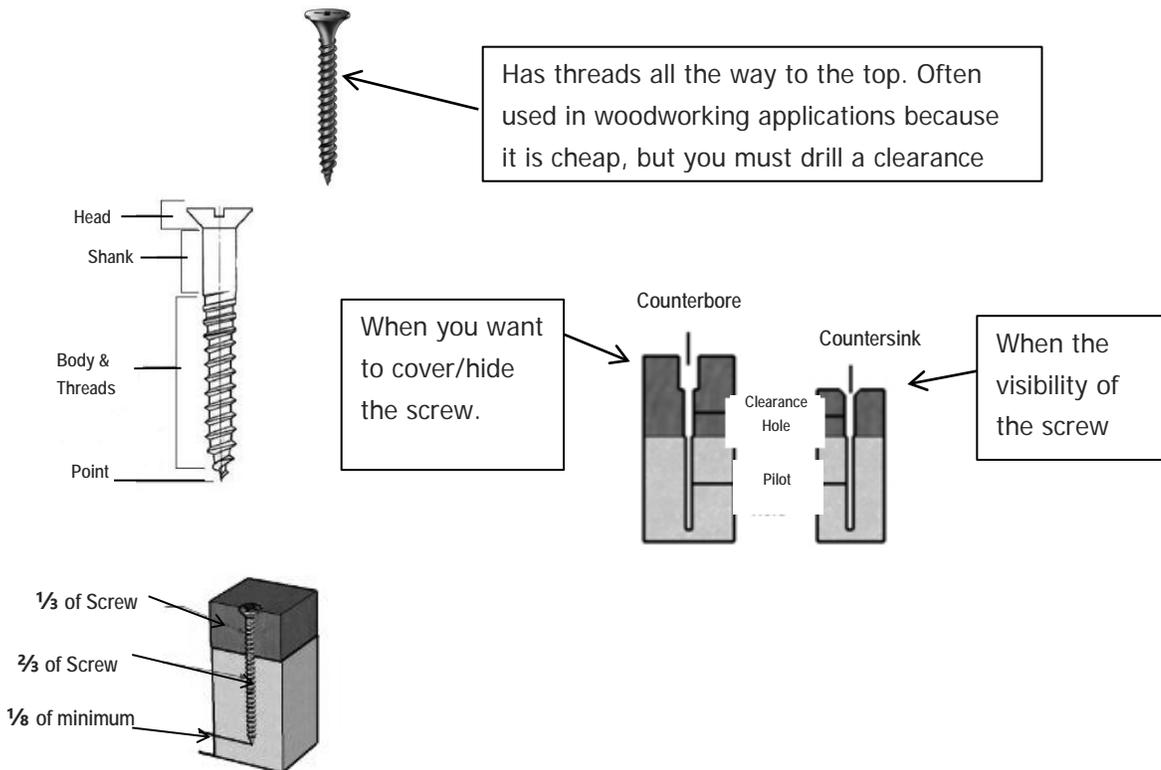
Generally, has an unthreaded shank below the head. It is designed to attach two pieces of wood together.



Notice the lack of threads on the top portion. This is so you can drill a smaller clearance hole or eliminate it altogether.

Drywall screw

Specialized screw with a bugle head that is designed to attach drywall to wood or metal studs, however it is a versatile construction fastener with many uses. The diameter of drywall screw threads is larger than the shaft diameter.



Counterbore: Use when you want to cover the head of the screw with a plug or button. Drilled slightly larger than the screw head and about 1/4"-3/8" deep.

Countersink: Use when the appearance of the screw head is not an issue. Generally drilled deep enough so the top of the screw head is even with the surface of the material or slightly below.

Clearance Hole (Shank Hole): Drilled so that the threads of the screw do not touch the piece of material that the screw is inserted through first. If no clearance hole is drilled the screw threads can hold the pieces of material apart. Also used so that the material will not split. Correct size: Outer diameter of screw threads.

Pilot Hole: Guides the screw in the correct direction AND makes room for the shank of the screw so that it does not split the material. Correct size? - Inner diameter of screw threads.

Fastener Basics

Common Fastener Types



Hex bolts, or *hex cap screws*, are used in machinery and construction. Can be used with a nut, or in a tapped hole. Fully threaded hex bolts are also known as *tap bolts*.



Wood screws have large threads and a smooth shank for pulling two pieces of material together. They can be used in wood and other soft materials.



Sheet metal screws have sharp points and threads, and are designed to be driven directly into sheet metal. They can also be used in softer materials like plastic, fiberglass, or wood.



Machine screws are fully threaded for use with a nut or in a tapped hole. Certain types are sometimes referred to as *stove bolts*.



Socket screws are machine screws with an internal hex socket (*Allen*) drive. Longer lengths may have a smooth shank.



Lag bolts, or *lag screws*, are large wood screws with hex heads. Typically used for wood construction and landscaping.

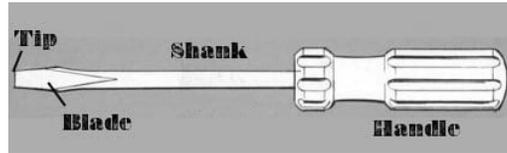


Carriage bolts have smooth, domed heads with a square section underneath that pulls into the material to prevent spinning during installation.

How to Use a Screwdriver

Parts of a Screwdriver

The screwdriver consists of four parts: 1) The handle, 2) the shank, 3) the blade, and 4) the tip.



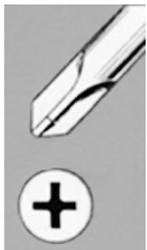
Types of Screwdrivers

Screwdrivers are distinguished from each other based on their tip and what type of screw they drive. The two most common screwdriver tips are:

- 1) the slot head screwdriver
- 2) the Phillips-head screwdriver



Slot head screwdriver (Flathead/regular screwdriver). A slot head screwdriver consists of a single, flat blade that fits in the single slot of traditional screws. You find these everywhere, though the practice of using screws with slotted drives is on the decline because the screwdriver slips out of the slot, particularly when you are applying heavy torque to really tighten down (or loosen, for that matter) these types of screws.



Phillips-head Screwdriver. A Phillips-head screwdriver has a four-star point at the end that fits into the corresponding screw's shallow, cross-shaped depression. This design allows a user to apply more torque than is possible with a flathead screwdriver. The depression forces the blades of the Phillips screwdriver to slip out before any damaging over-torquing can occur.

Select the Correct Screwdriver

The biggest mistake people make when using a screwdriver is using the wrong kind for the job. Consequently, they either strip the screw, making it difficult to remove if they need to, or they damage a perfectly good screwdriver. Avoid these headaches by following these tips.

Slot head screwdrivers for slot screws, Phillips-head screwdrivers for Phillips-head screws. You'd think this would be obvious, but a lot of people will take a flathead screwdriver to a Phillips screw when they don't have a Phillips-head screwdriver handy. Sure, you might be able to get away with it a few times, but you're risking stripping the screw or damaging the blade on your screwdriver.

- Use the right tip size. The tip of the screwdriver should completely fill the slot of the screw you're driving or removing. If the tip is too narrow, there will be considerable loss of leverage while driving, which means you'll have to use more muscle to drive the screw. Also, you risk stripping the screw and bending the tip of your screwdriver.
- If the tip is too wide, you risk damaging the surface you're screwing into.
- If the tip is too thick, the blade won't fit in the screw slot and will just slip out as you're driving.

How to Use a Screwdriver

Create a pilot hole. When driving screws into wood, it's a good idea to drill a pilot hole first. Without pilot holes, screws tend to follow the grain of the wood, which results in crooked screws. Thus, pilot holes ensure that you drive the screw in straight.

Moreover, pilot holes prevent the wood from splinting as you drive the screw in. For small screws in softwood, make a pilot hole by using a punch hole and an awl. For larger sized screws and all screws in hardwood, drill a pilot hole with a boring tool of some kind.

Start the screw. Place the screw on the driver tip and hold both screw and tip together with the fingers of one hand. Apply very little pressure on the driver while turning in a clockwise direction until the screw engages the wood.

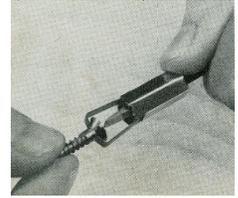


Keep driving. When the screw's thread engages with the wood, move your fingers that were holding the screw in place to the screwdriver shank. Use these fingers as a guide to hold the tip directly in line with the screw. Apply enough pressure on the driver to keep it in the slot.

Screwdriver Tips

Rub beeswax or soap on screw threads. This makes screws easier to drive, especially in hardwood.

For tough to reach places, use a screw holder. Sometimes you just can't get your hands into a place to hold a screw as you start driving it. For moments like this, bust out a screw holder. It's placed on the end of your screwdriver and has a set of jaws that holds the screw in place as you start the driving.



Get more power. For more driving power, use a screwdriver with a shorter shank. Also, try exerting downward pressure on the top of the screwdriver with your free hand.

Maintaining Your Screwdrivers

Use screwdrivers for driving screws only. Screwdrivers do one job: drive and draw screws. They shouldn't be used as putty knives and wood chisels, or for opening paint cans. Using your screwdriver for a purpose it wasn't meant for will only result in a damaged screwdriver.

Keep the tip square (just like your chin). No matter how much care you take with your screwdrivers, they're bound to get worn or chipped. If you notice your screwdriver's tip getting a bit rounded or chipped, avoid using it. You risk the screwdriver slipping from the screw and either injuring yourself or the surface that you're screwing into. To correct any rounding or chipping in your tip, just grind it square with a bench grinder. Avoid overheating the tip. You'll mess up the metal's temper if you do.

Oil things up. To avoid rusting, keep your tools stored in a cool, dry place. It also doesn't hurt to rub the shank down with oil and take some steel wool to your screwdrivers every now and then.