

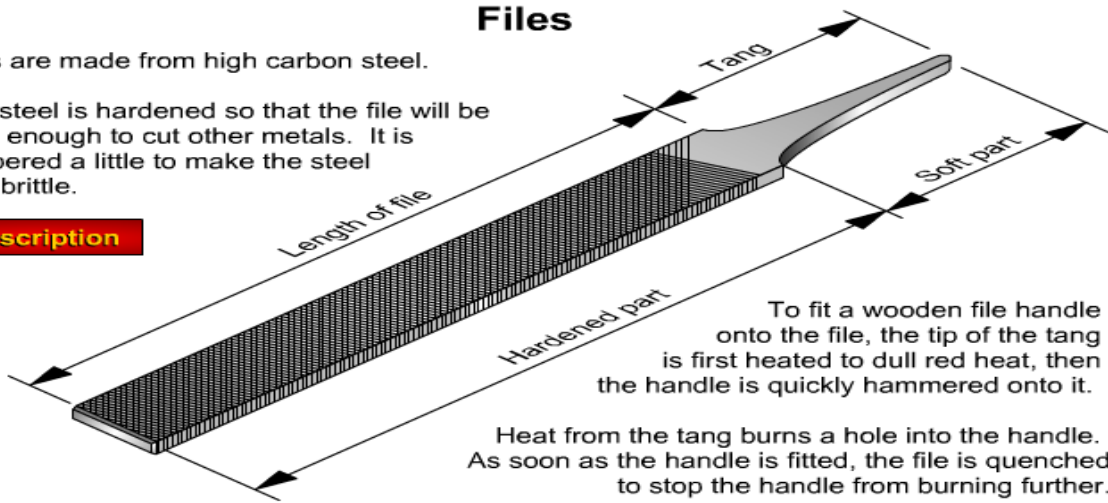
HAND TOOLS

Files

Files are made from high carbon steel.

The steel is hardened so that the file will be hard enough to cut other metals. It is tempered a little to make the steel less brittle.

Description



To fit a wooden file handle onto the file, the tip of the tang is first heated to dull red heat, then the handle is quickly hammered onto it.

Heat from the tang burns a hole into the handle. As soon as the handle is fitted, the file is quenched to stop the handle from burning further.

Files: Roughness of Cut



The roughness of cut increases from:

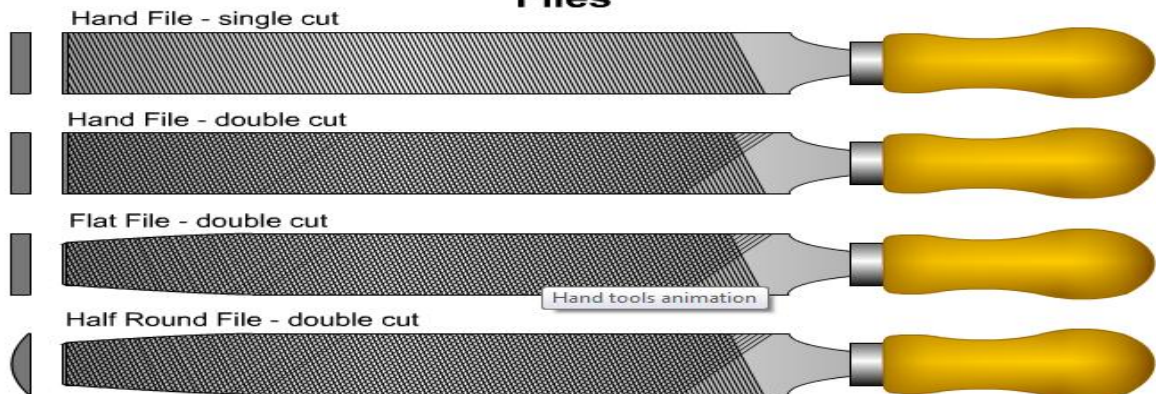
Dead Smooth;
Smooth Cut;
Second Cut;
Bastard Cut;
Rough Cut;
Rasp.

Files are available in various lengths from tiny needle files to massive hand files.

Files may be single cut or they may be double cut.

There are other types used for special purposes e.g. filing soft materials such as wood, wax or plastics.

Files



WORKSHOP PRACTICE



Needle Files



Needle files are small files, about 150mm long.

Some have plastic handles, although the traditional needle files (or Swiss files) have a steel handle, as shown in the photograph.

Needle files are used for any small work such as jewellery making.

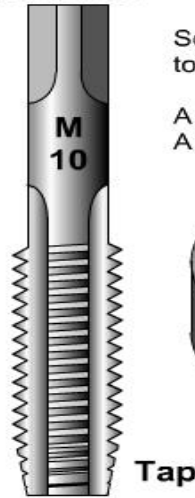
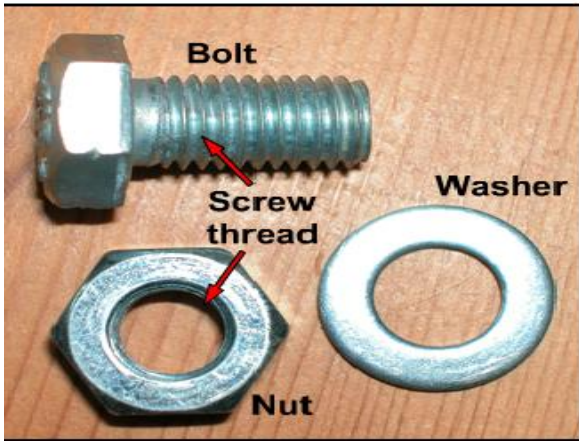
Swiss Wax (Rasp) Files



Swiss files with very rough cuts are used for modelling soft materials such as wax.

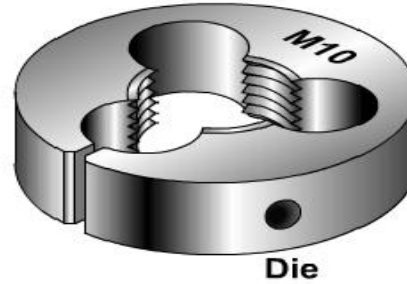
WORKSHOP PRACTICE

Taps and Dies

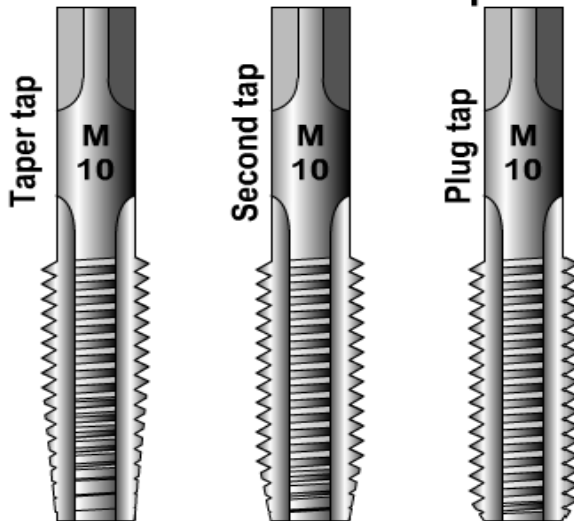


Screw threads may be cut using tools called taps and dies.

A tap cuts an internal thread.
A die cuts an external thread.



Taps and Dies



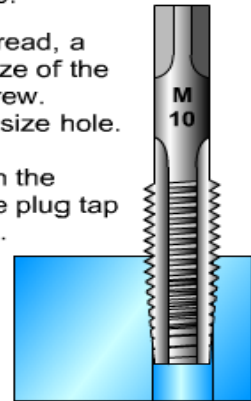
Screw cutting taps are sold in sets of three,

1. Taper tap;
2. Second tap;
3. Plug or bottoming tap.

To create an internal thread, a hole is first drilled the size of the core diameter of the screw. This is called a tapping size hole.

Next, the taper tap, then the second tap and then the plug tap is screwed into the hole.

The taps cut a screw thread in the hole.

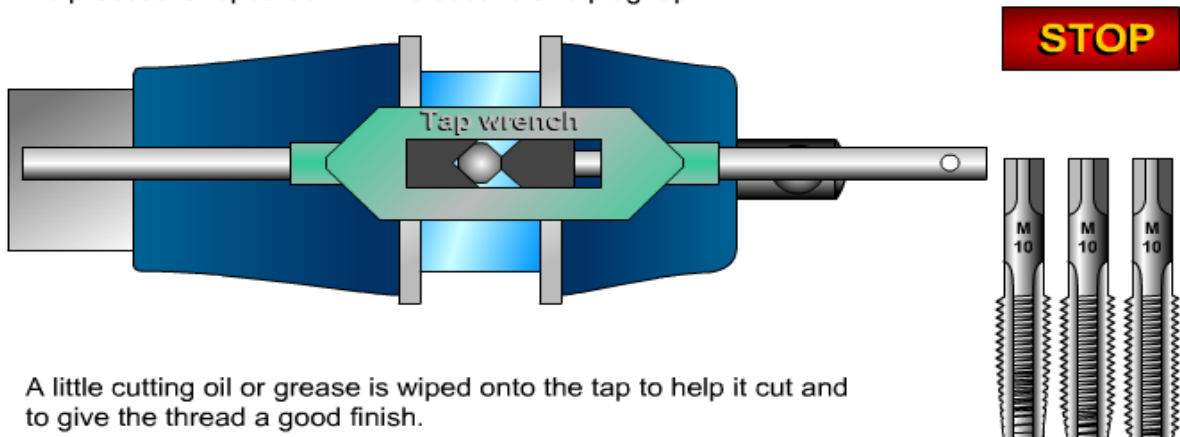


Taps and Dies

Taps are held in a tap wrench.

The taper tap is screwed into metal first by turning the tap wrench $1\frac{1}{2}$ turns clockwise, then $\frac{1}{2}$ a turn back. This process is repeated until the tap is screwed right in.

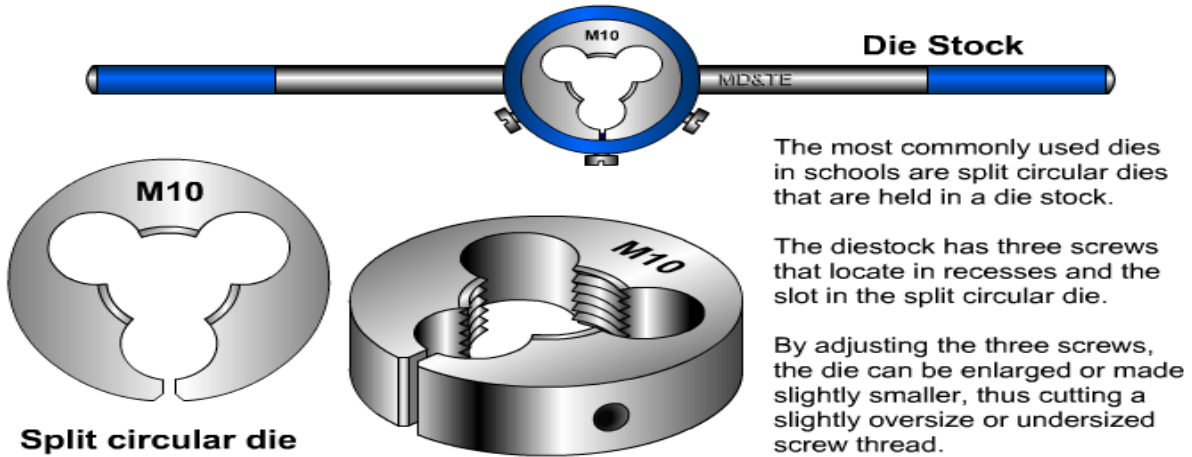
The process is repeated with the second and plug tap.



A little cutting oil or grease is wiped onto the tap to help it cut and to give the thread a good finish.

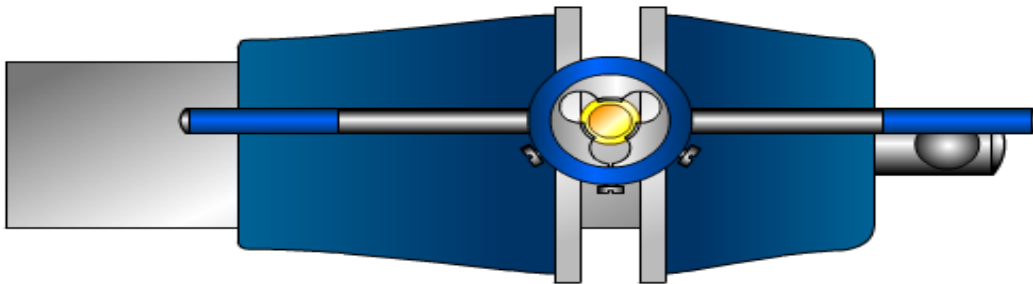
WORKSHOP PRACTICE

Die and Die Stock



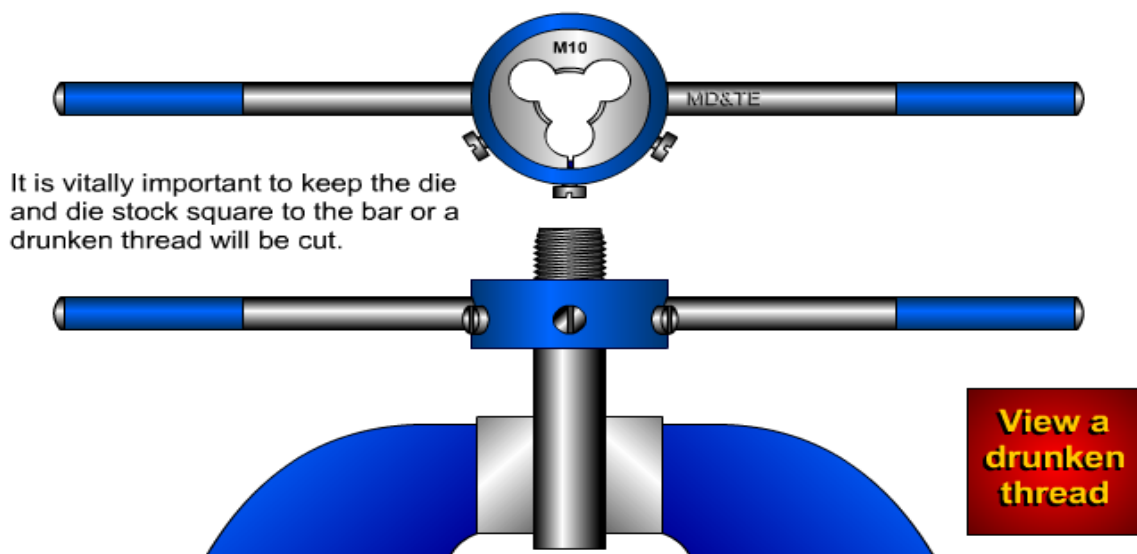
Taps and Dies

The die stock is turned over so that the bottom is facing upward. The die is located on the shaft and then screwed onto it, turning $1\frac{1}{2}$ turns clockwise, then $\frac{1}{2}$ a turn back. This process is repeated until a sufficiently long thread is cut.



A little cutting oil or grease is wiped onto the die to help it cut and to give the thread a good finish.

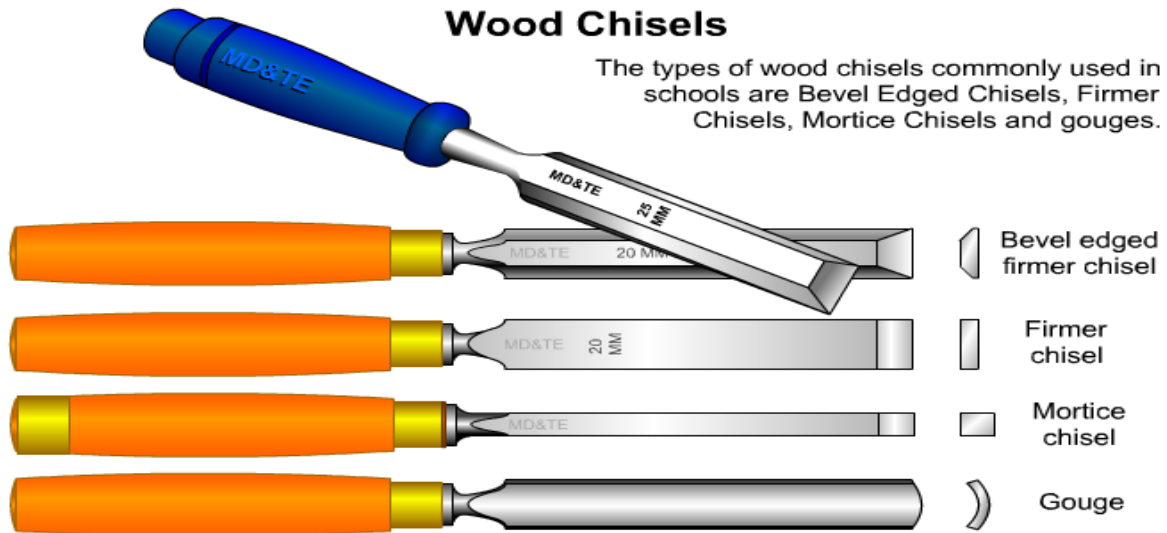
Die and Die Stock



WORKSHOP PRACTICE

Wood Chisels

The types of wood chisels commonly used in schools are Bevel Edged Chisels, Firmer Chisels, Mortice Chisels and gouges.



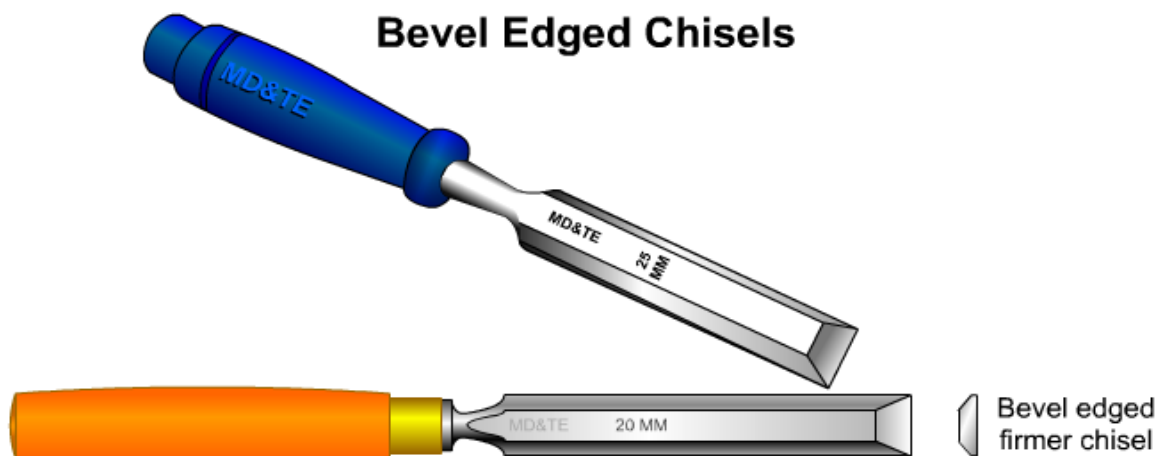
Firmer Chisels



Firmer chisels are used for all light chiselling jobs in wood where the chisel is not hit hard with a mallet. Typical uses are to adjust the shoulders of tenons and to pare off waste wood when cutting dovetails, etc.

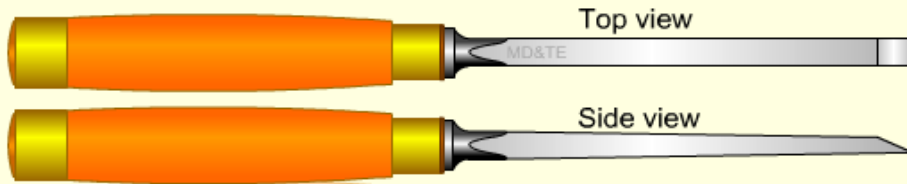
Waste wood is first sawn off close to the line with a coping saw, then the remaining waste wood is removed by paring with a firmer chisel.

Bevel Edged Chisels



Bevel edged chisels are firmer chisels with the edges ground off. The sides are bevelled so that the chisel may be used in tight corners without the chisel damaging adjacent sides.

Mortice Chisels



A mortice chisel is used to cut a rectangular hole in timber called a mortice. The chisel is beaten into timber with a mallet by giving the chisel two sharp clouts with the mallet.

Brass rings called ferrules help prevent the handle from splitting. A leather washer is usually fitted between the handle and the chisel blade to absorb the shock from the mallet.

The most common sizes of mortice chisel used in schools are 6, 8, 13, 16, 19, 22 and 25mm. In industry, much larger sizes are also used.

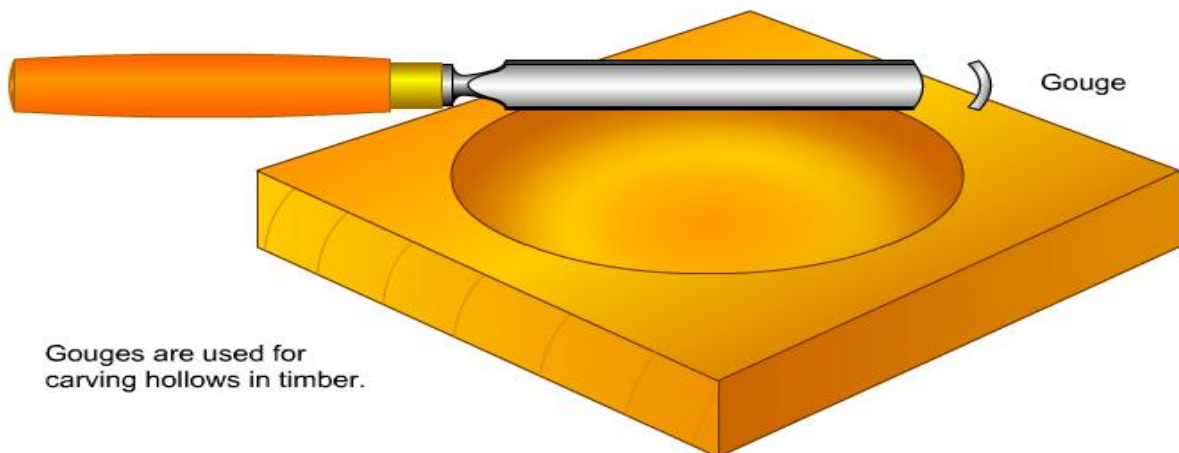


Mortice Chisels

Using a mortice chisel to cut a slot in timber.



Gouges



Gouges are used for carving hollows in timber.

WORKSHOP PRACTICE

Cold Chisels



Cold chisels are called cold chisels because they are used on cold metals.

(There are hot sets that are used on hot metal).

Cold chisels, like wood chisels, cut by shearing.

Before modern machines were readily available, keyways, slots and other cutting operations were carried out using hand tools such as cold chisels.

Today, engineers only use cold chisels for operations such as cutting the head off a seized bolt, when power tools are not available or where space is limited and using a cold chisel is the only practical option.

Cold chisels are still used by bricklayers to cut bricks and concrete. Cold chisels have also been adapted to be fitted to electric hammer drills and to pneumatic hammer drills.

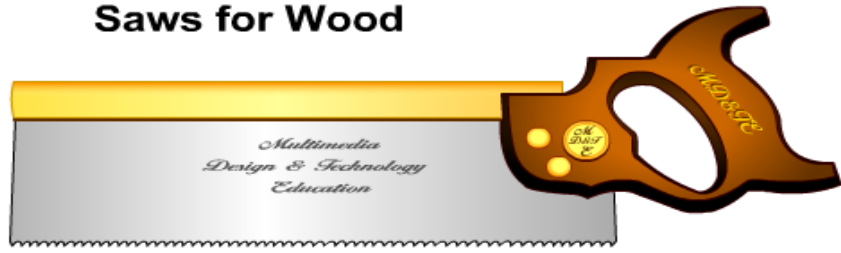
WORKSHOP PRACTICE

Saws for Wood

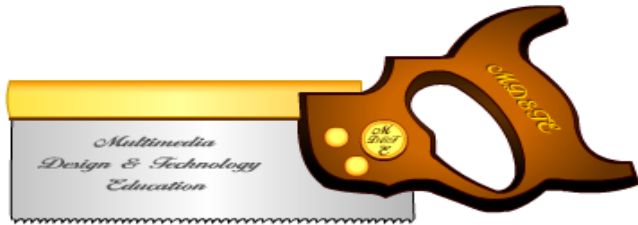
Tenon saws and dovetail saws are used to make straight, accurate cuts in timber.

As their names suggest, tenon saws are used to cut tenons and dovetail saws are used to cut dovetails, however, they may be used whenever fine, straight cuts are required in timber.

The brass back keeps the blade straight. The teeth are off-set slightly to the left and to the right so that the saw will cut a slot slightly wider than the blade thickness. This helps prevent the blade from sticking in the slot.



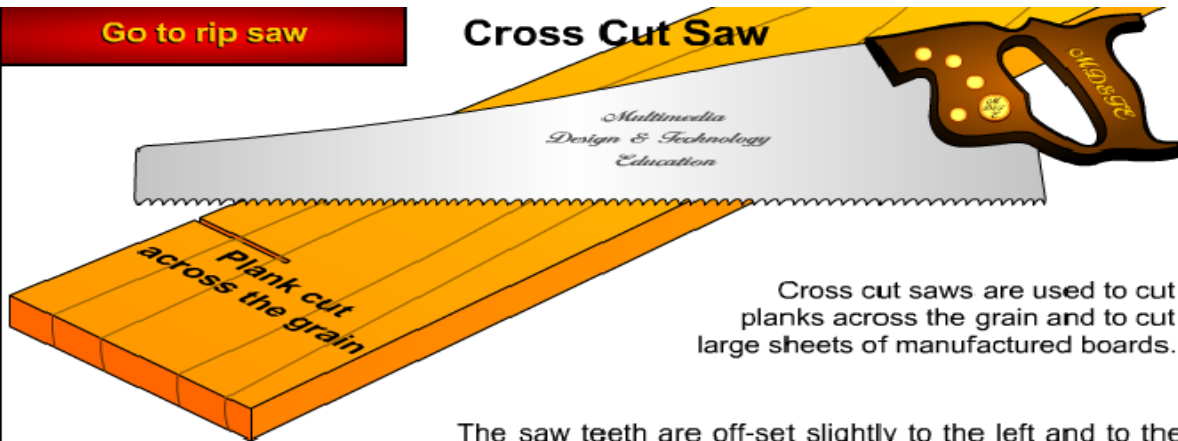
Tenon saw



Dovetail saw

[Go to rip saw](#)

Cross Cut Saw

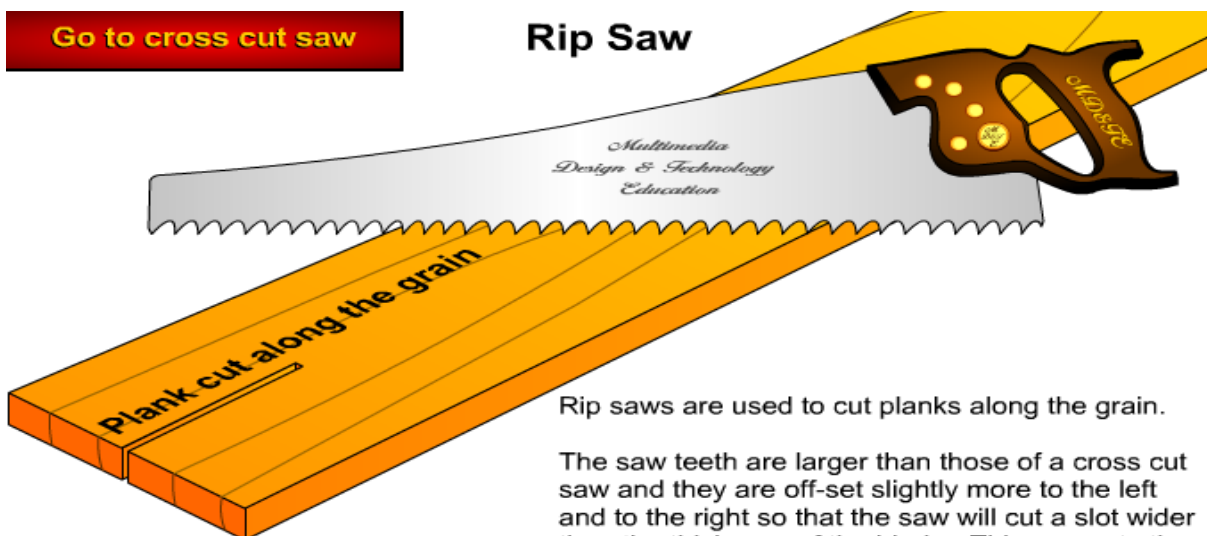


Cross cut saws are used to cut planks across the grain and to cut large sheets of manufactured boards.

The saw teeth are off-set slightly to the left and to the right so that the saw will cut a slot slightly wider than the thickness of the blade. This prevents the blade from binding in the slot.

[Go to cross cut saw](#)

Rip Saw

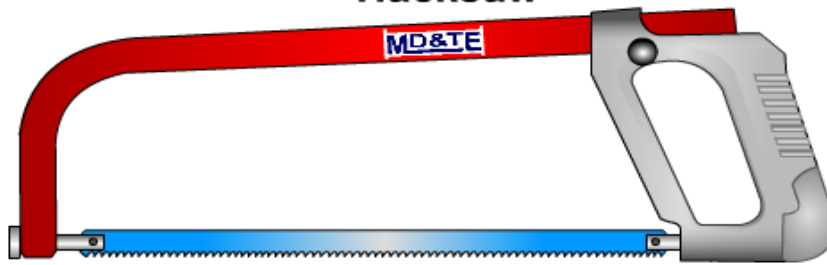


Rip saws are used to cut planks along the grain.

The saw teeth are larger than those of a cross cut saw and they are off-set slightly more to the left and to the right so that the saw will cut a slot wider than the thickness of the blade. This prevents the blade from binding in the slot.

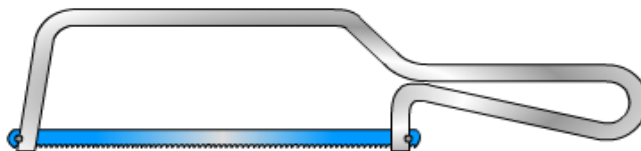
WORKSHOP PRACTICE

Hacksaw



Hacksaw

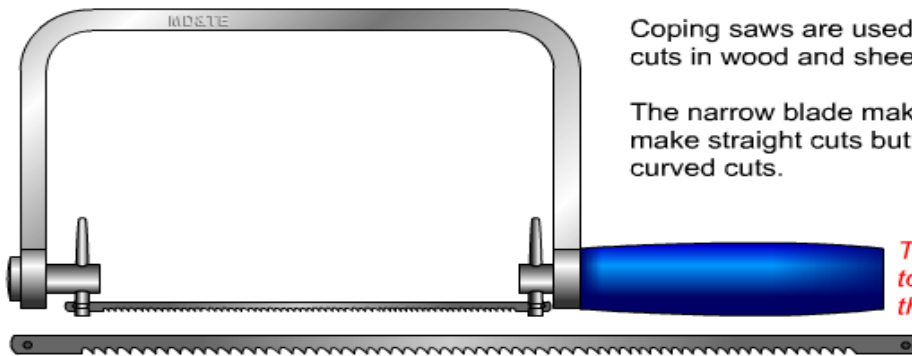
Hacksaws and junior hacksaws are used for cutting metals.



Junior hacksaw

Hacksaw blades are fixed in the saw frame so that the saw teeth point forwards. The coarseness of the blade is shown by the number of teeth per inch of blade, (TPI).

Coping Saw



Coping saws are used for making curved cuts in wood and sheet plastics.

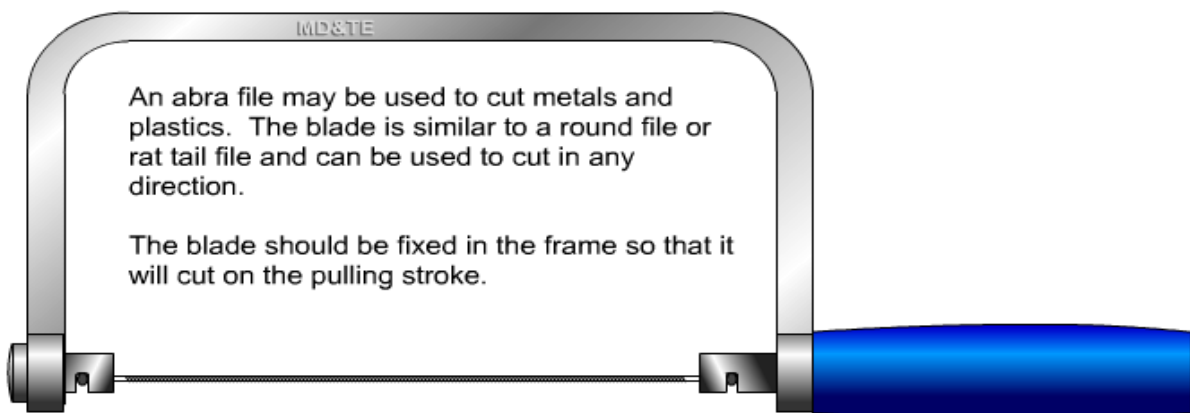
The narrow blade makes it difficult to make straight cuts but is ideal for making curved cuts.

The handle is twisted to tighten or slacken the blade.

Enlarged view of a coping saw blade

Coping saw blades are fixed in the saw frame so that the teeth point backwards. This is so that the saw will cut on the pulling stroke. This prevents the saw frame from flexing, the saw blade becoming loose and snapping.

Abra File

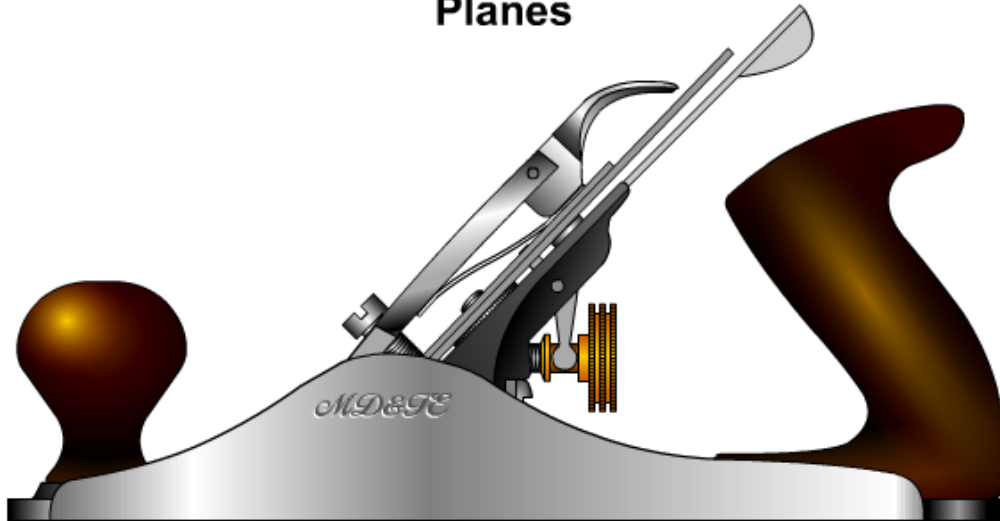


An abra file may be used to cut metals and plastics. The blade is similar to a round file or rat tail file and can be used to cut in any direction.

The blade should be fixed in the frame so that it will cut on the pulling stroke.

Enlarged view of an abra file blade

Planes



Bench planes are a group of similar planes ranging in size from the Smoothing Plane at 240mm long, to the mighty Jointer Plane at 610mm long.

