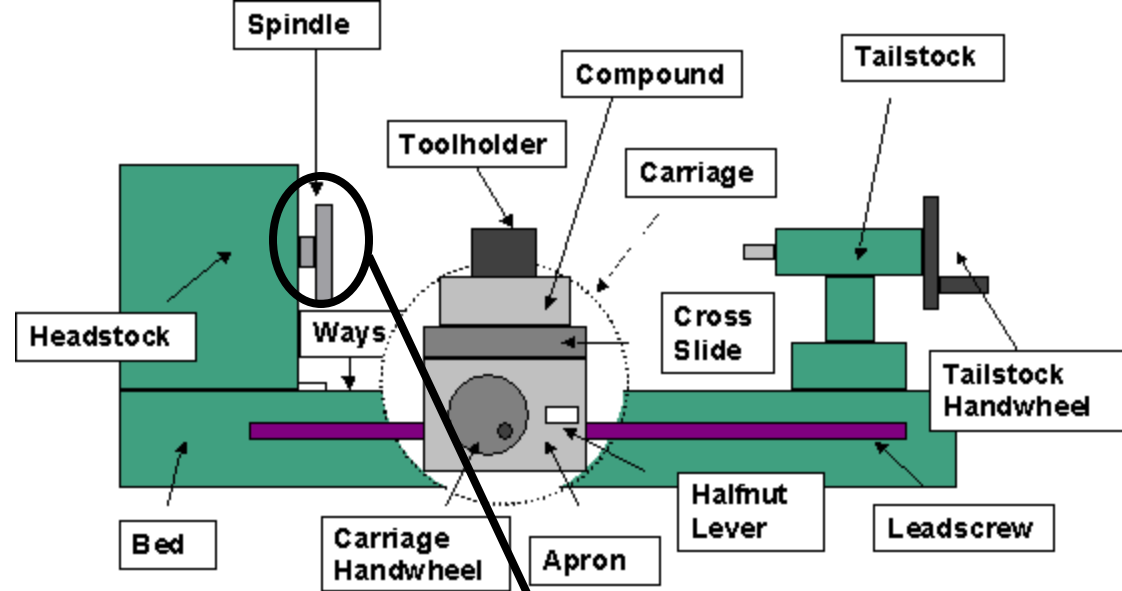


MetalWork

TeachersUnderground.site.io

CAUTIONS!

- (1) Ensure the chuck key is removed from the chuck before powering on.
- (2) Ensure the guard is down over the chuck.
- (3) Always wear goggles
- (4) Swarf (metal filings) can be produced from this machine and are very sharp!

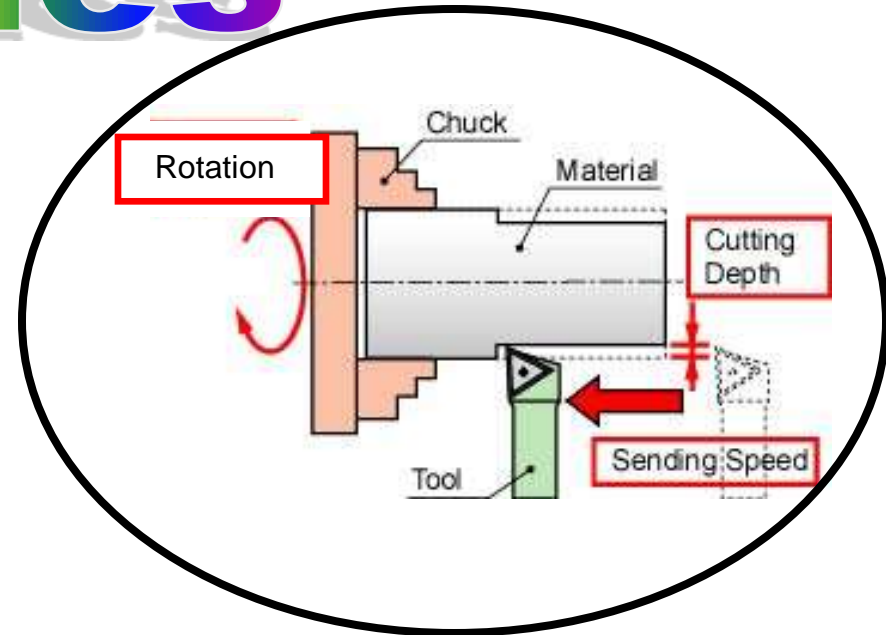


Lathes

There are 2 Main types of lathes

3 jaw self centring for round material

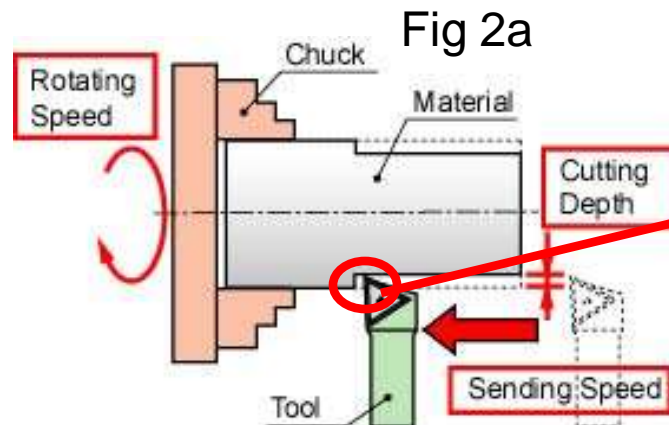
4 jaw independent locking for other shapes



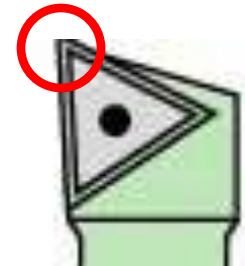
using the lathe

Place the material no more than 2 & half times the diameter protruding or the material will bend or spin off centre

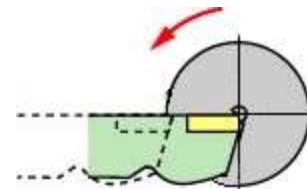
Ensure the material is tight in the chuck and the material should be rotating onto the tool as in the diagram opposite



The tool should come into contact with this part 1st



If the edge of the tools is higher than the centre of material, the blade does not hit the material, and it cannot cut at all. Conversely, if the edge is low, accurate processing becomes impossible.

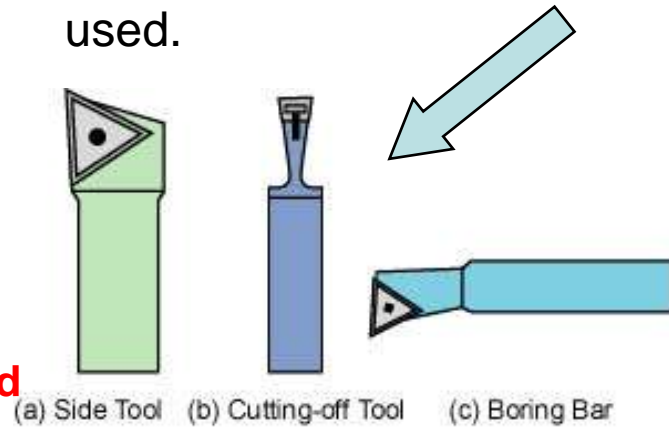


Try and line up the tool in the centre of the material ... use a rule or flat material pinned against the tool and material to check if you are in the centre

Facing

Facing is the name given to the process of cutting off the tip of the material to leave a smooth edge

There are various kinds of cutting tools for a lathe. The 3 below are the most typical cutting tools used.



For this project we will only be looking at facing and parallel turning, for this we will use tool (a) the side tool.

Operations of a Lathe

Three Important Elements

In order to get a good finish and not damage the material or the machine it is important to get the right rotation speed, cutting depth and sending speed. These are different for different sizes, shapes and, materials.

The softer the material the faster it may be rotated.

The bigger the chuck the slower the material should be rotated

it is better to start at a low speed to begin with

Parallel turning

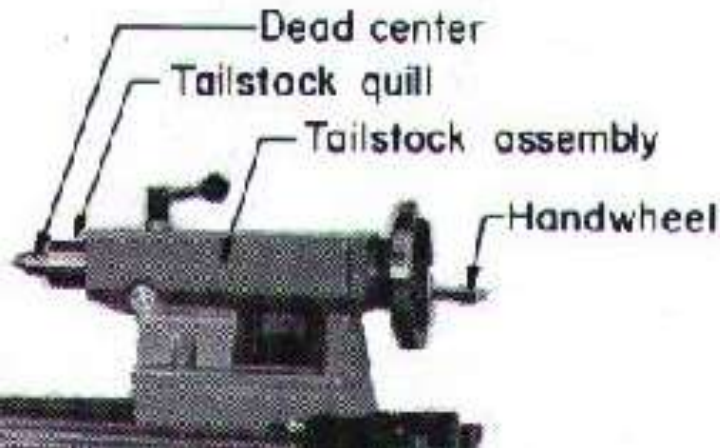
Parallel turning is the name given to the process of cutting the outside edge of the material (as in fig 2a, previous slide)

DRILLING SPEEDS :-

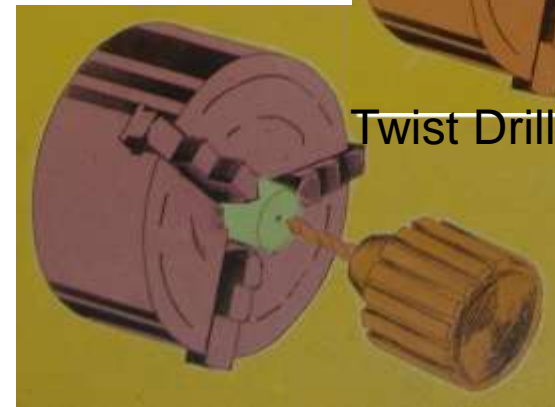
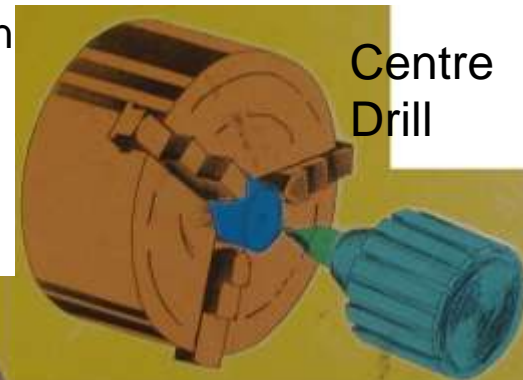
MATERIALS.	CENTRE DRILL.	DRILL.
ALUMINIUM / NYLON.	300.	225.
BRASS.	90.	67.5.
MILD STEEL.	30.	22.5.
CAST IRON.	20.	15.
TOOL STEEL.	15.	11.3.

Using the Tailstock

The tail stock can be used to centre drill the material this centre punch in the material can then be used to guide a drill bit to drill out a hole in the material



The centre drill is used to make a slight indentation for the twist drill, this helps guide the twist drill in the right place.



Buffing your metal

1



Before buffing your metal you must first clean and flatten the surface this can be done with a file, usually you will start with very rough files and work down to the fine files

2



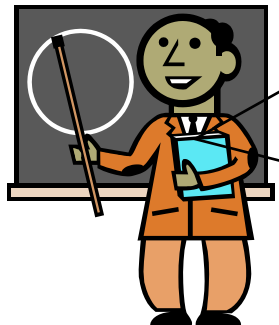
Next you will work through the various types of emery cloth starting with the roughest then gradually working down to the finest paper to get a smooth finish.... After this you will be able to buff your material.

3

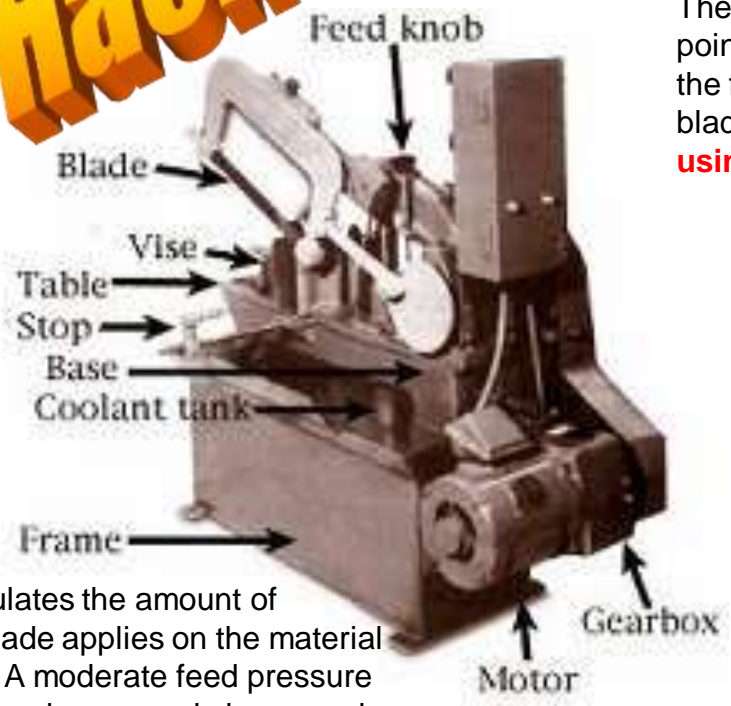
Buffers usually spin at around 3600RPM this is enough to launch parts across the room or into you, so make sure you hold your work firmly, practice holding the work in position before you start the motor, hold your work in the lower part of the wheel so the wheel is gliding over the top, **Do Not** push corners into the wheel! Apply light pressure against the wheel, pull away regularly to prevent your work heating up as this will not only burn you but may soften the material

TIP

Before you start buffing with the buffer you must apply a compound to the wheel known as 'soap'. Running the buffer dry (without soap) can cause grains of metal to be pulled from the work across the surface, resulting in a rough finish.



Power Hacksaw



The power hacksaw's main feature is its reciprocating frame. The frame secures a heavy duty hacksaw blade whose reciprocating action in combination with a downward force causes the material to be cut.

The blade is mounted within the frame with the teeth pointing forward (towards the solid vice jaw). A large nut on the frame regulates the amount of tension for securing the blade firmly in place. **When mounting the blade, avoid using excessive tension.**

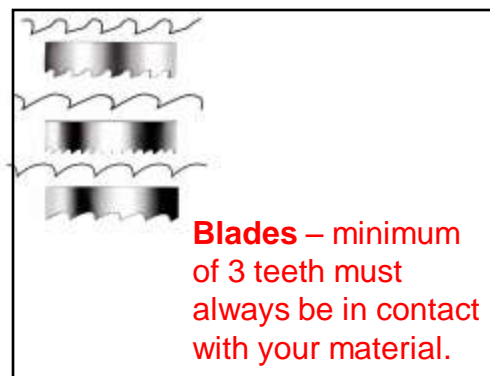
Material is secured in a built-in heavy-duty vice. **It is important to ensure that material is properly secured in the vice, if not the blade can be broken!** As a general rule no less than 80% of the material should be held in the vice! Most power hacksaw vices are capable of rotating up to 45 degrees so that angular cuts may be made. Power hacksaws are better suited for cutting aluminium, brass, and mild steels.

The feed mechanism regulates the amount of downward pressure the blade applies on the material during the forward stroke. A moderate feed pressure is utilized for mild steels; feed pressure is increased for softer materials and decreased for harder ones.

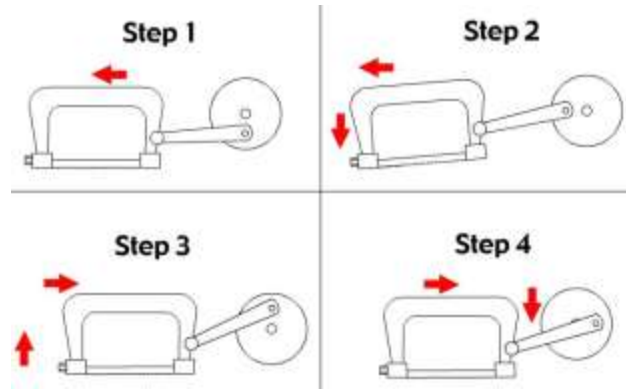
Excessive feed pressure will cause the blade to jam into the material, possibly causing it to break.

You must ensure that the power hacksaw is moving at full speed before contact with the material, and stand as far back from the machine as possible.

Tip:- after use the machine should automatically wind its self back up, if this **doesn't** happen the machine is in need of repair.



Blades – minimum of 3 teeth must always be in contact with your material.



Machine only cuts on the forward strokes

A: Head Assembly – This section must have a lock on it that only teachers have the key for.

B: Pillar

C: Table

D: Chuck – The chuck is the part that holds the Drill bit. The chuck is held into a barrel with a 'wedge', for certain size drill bits the chuck will need to be changed, to do this a 'drift' is used to knock the 'wedge' out of place thus releasing the chuck.

E: Chuck Key

F: Chuck Guard

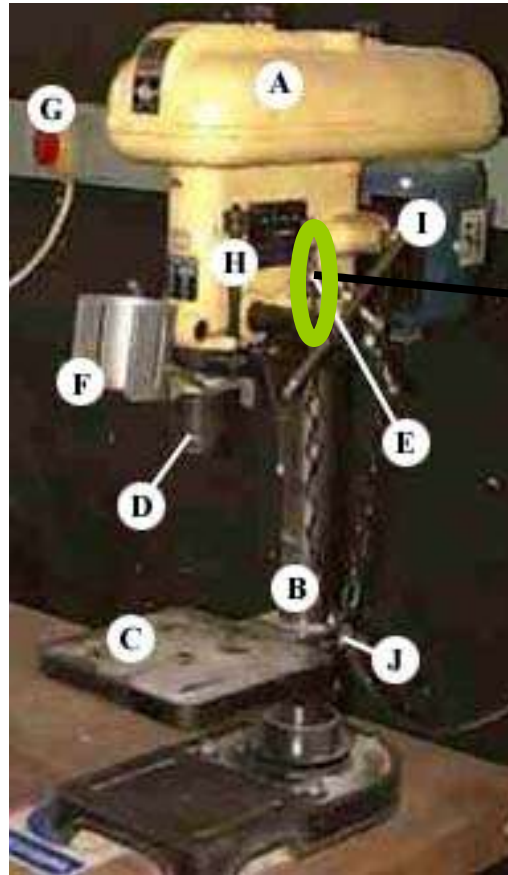
G: On/Off Starter Switch

H: Depth Gauge

I: Up/Down Handle

J: Table Adjustment Lock Nut

P
I
L
L
A
R
D
R
I
L
L



Items under 5mm³ can be held by hand on the pillar drill, any bigger and they must be held down to the bench (C) with a clamp.

The bigger the drill bit you are using the slower the speed needs to be.

Drill Bit



Shank

When holding a drill bit at least 80% of the shank needs to be held in the chuck (D) and secured in place with the chuck key (E)

**Only tool steel is used
on a grinder ('tool steel'
is very hard steel
normally used to make
tools)**



Using the grinder

Place your index finger against the ledge and using your thumb to hold the material down firmly press the tool steel into the grinder in short bursts with out moving your index finger or thumb closer to the grinding wheel.

Quench (dip in water) your steel as often as possible to avoid raising the temperature as this will change the metals structure making it weaker