

**KEYWORDS**bandsaw  
lathemortiser  
pillar drillscroll saw  
table saw

There are a number of machines in every school workshop. They are larger than power tools and the material is fed into the machine. Because they are large and powerful, machines are usually secured to a bench or the floor.

Machines:

- Allow heavy work to be done quickly
- Repeat processes accurately
- Give a good finish to the work

Always use protective safety equipment when using any machine.

The cutters or blades operate at speed and so they are dangerous. Take great care when around them. Your teacher will use the machines to prepare material for you. The teacher may show you how to use some of the smaller machines.

**TABLE SAW**

Most workshops have a circular saw or **table saw**. Many have sliding tables for sheet materials. It is used only by the teacher.

- Uses: Cutting large boards
- Cutting sheet materials like plywood
- Cutting pieces to length

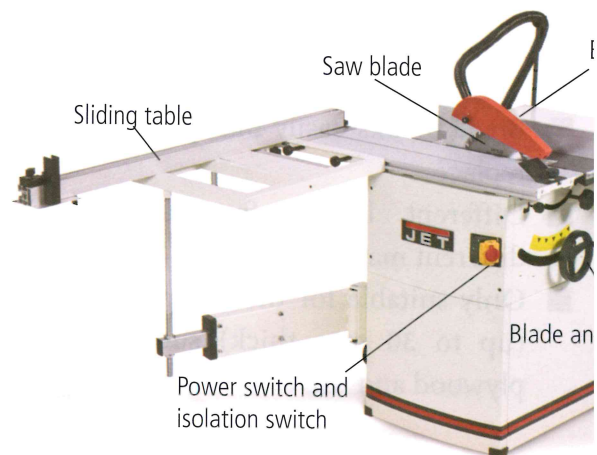
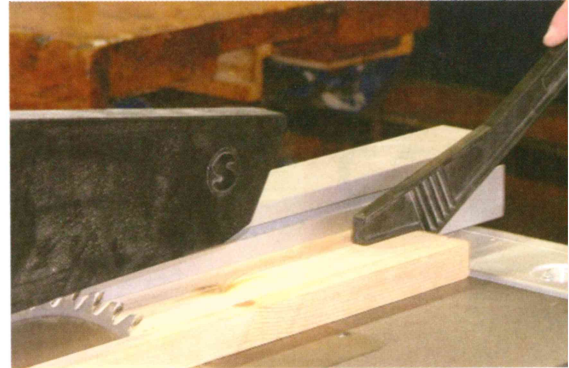


Table saw

### Table saw safety

- Never interrupt someone using the saw (or any machine)
- Ensure guards and other safety equipment are always used and kept well maintained
- Always keep the area around the saw free and clear from any debris
- A push stick is used to push material through, which keeps the operator's hands well clear of the blade



A push stick keeps hands clear of the table

### CHOPSAW

The chop saw is a small cross cut saw. It is used for cutting boards to length and for cutting angles for mitres, etc.

- Uses: Cutting boards
- Cutting angles



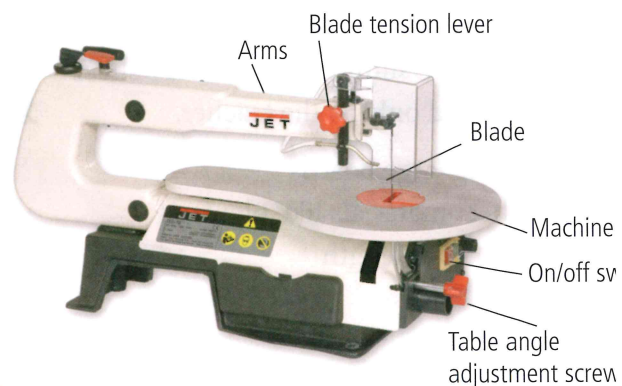
Chop saw

### SCROLL SAW

The scroll saw is a very useful machine found in most school workshops. It has a thin blade similar to a coping saw blade that is fed between two arms that move up and down to do the cutting. The piece is held down on the table and is pushed slowly against the moving blade. The table tilts for cutting angles.

#### Features of the scroll saw

- Easy to use
- Blade breaks easily but quick to replace
- Different blades for cutting different materials
- Only suitable for thinner pieces (up to 30 mm thick) such as plywood and MDF



Scroll saw



*Using the scroll saw*

- Uses: Cutting tight curves
- Cutting out decorative pieces

## BANDSAW

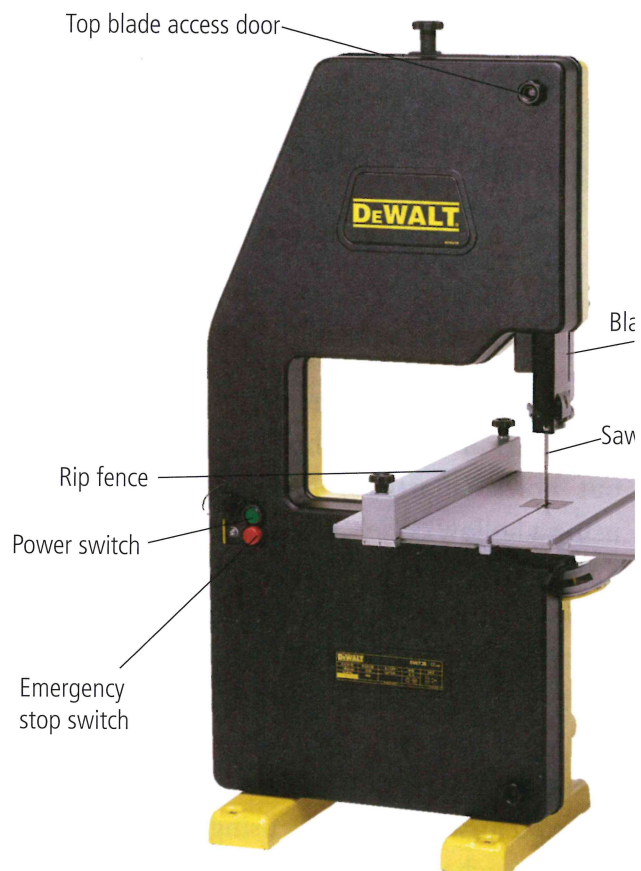
The **bandsaw** has a continuous blade that runs on two wheels. The work is held firmly down on the table while it is pushed slowly through the blade. The table tilts to allow angled cuts. A fence allows for cutting parallel to a side.

The guard is raised or lowered for different thicknesses of material and ensures that only a small portion of the blade is exposed while cutting.

- Uses: Straight cuts in wood
- Curved cuts in wood
- Cutting wood, plastic or soft metal



*Example of scroll saw work*



*Bandsaw*

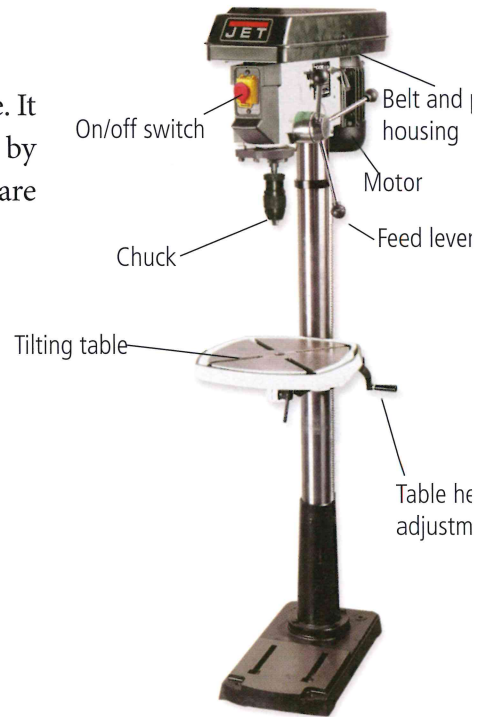
## PILLAR DRILL

The bench or **pillar drill** is a versatile drilling machine. It is used with bigger bits that are more difficult to use by hand. The drill is bench mounted or the larger types are floor standing.

- Uses: General drilling
- Precise drilling
- Drilling larger diameter holes
- Using Forstner drill bits



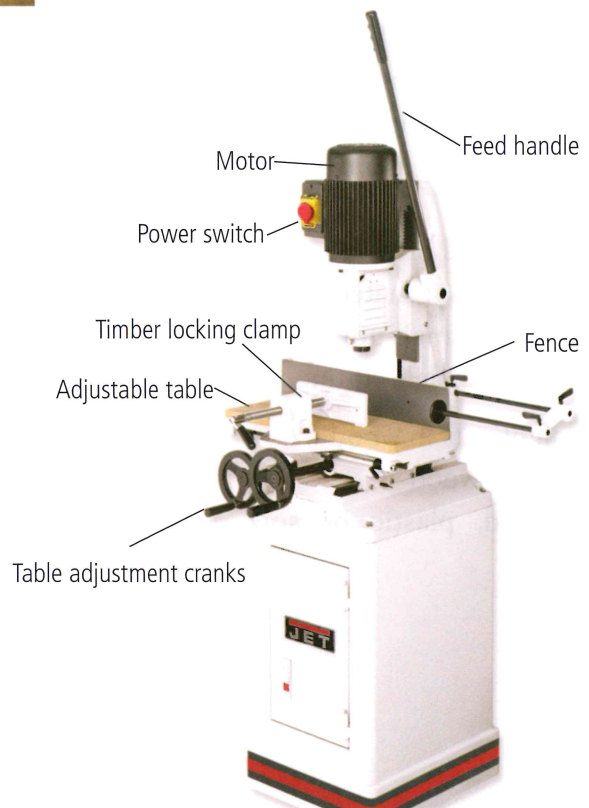
*Forstner drill bits*



*Pillar drill*

## MORTISING MACHINE

The **mortiser** is one of the most used machines in the workshop. It cuts out holes (mortises) from wood using a hollow chisel cutter. This is a drill bit within a square chisel. It also allows for many similar mortises to be completed in a short time. The work piece is secured on the table and against the fence. This table can be moved from side to side and adjusted forward and back using the adjusting wheels.

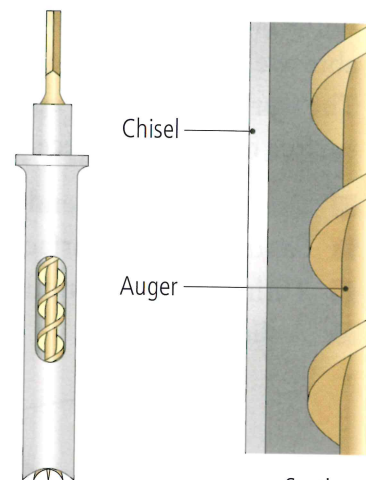


*Mortising machine*

- Uses: Mortises are removed very quickly
- Very accurate work is produced
- Different-sized chisels available (6 mm, 10 mm, 12 mm)
- Cuts out even and deep mortises easily
- Depth stop ensures the correct depth of hole



Using a mortiser



Hollow square chisel

Hollow chisel

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Both sides of the mortise should be marked when mortising all the way through. The hole is cut from both sides to avoid damage to the faces of the piece.

In addition to the usual safety rules, observe the following when using the mortiser:

### Mortiser safety

- Wear eye protection at all times
- Always keep your hands away from the cutter
- Make all adjustments after the machine has been turned off and has completely stopped

## PLANER

The planer is two machines in one. The cutter is protected by a guard. The fence allows for work to be planed to a required angle. The thicknesser underneath has a bed that can be raised and lowered using an adjustment lever.

- Uses: Gives a smooth finish to surfaces
- Plane timber faces square to each other
- Plane faces parallel – down to required thickness
- Fence allows bevels to be planed

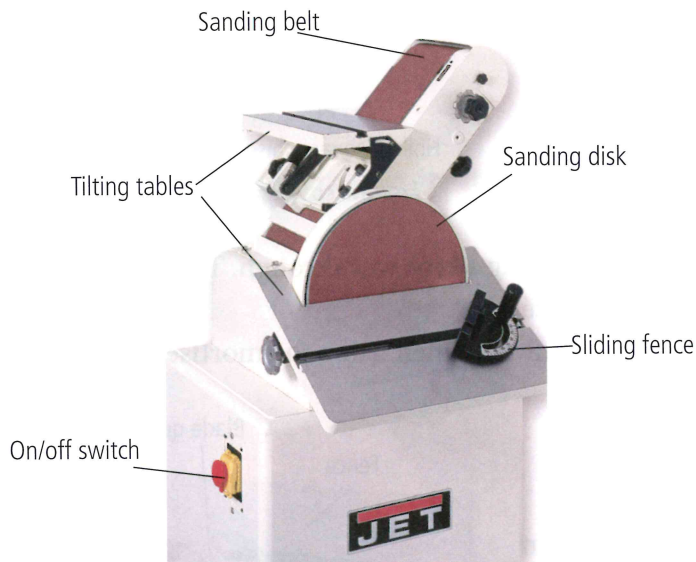


Planer/thicknesser

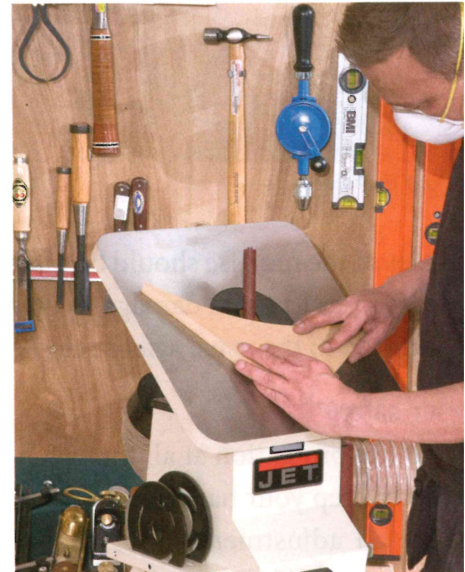
## SANDING MACHINES

There are lots of sanding machines available and they come in different sizes. Sanding machines use abrasive paper to smooth down the material and to remove material to a line or curve. It is important not to put too much pressure on the machine while sanding, as this will clog the abrasive and damage the machine. The speed of the machine and the abrasive will do the work. The work is held down against the table while sanding. The sander is used to put a final sand surface on a curved piece. It should not be used to sand large amounts of material.

- Uses: For sanding end grain smooth
- Sanding curved surfaces
- Tilting table for sanding angled surfaces
- A sliding fence



*Disk and belt sander*



*Oscillating sander*

### Sanding machine safety

Remember the safety guidelines from Chapter 2.

- Keep hands away from the sanding surface
- Keep long hair tied up
- Secure loose clothing
- Remove jewellery before using machinery
- Always wear a dust mask and eye protection while sanding
- The sander should be connected to a mobile dust extraction unit

## WOODTURNING LATHE

The **lathe** is used for turning pieces of wood into decorative shapes. We will look at the lathe in more detail later.

## COMPUTER-AIDED MANUFACTURE (CAM)

Many machines used in industry have been improved by adding computer control. This computer-aided manufacture (CAM) ensures that work can be repeated many hundreds of times with complete accuracy and at great speed. The computerised lathe and router are now common. Designs, in the form of drawings, are stored in the computer, and selected and reproduced at will.



Woodturning lathe



School CNC (computer numerical control) router

## DUST EXTRACTOR

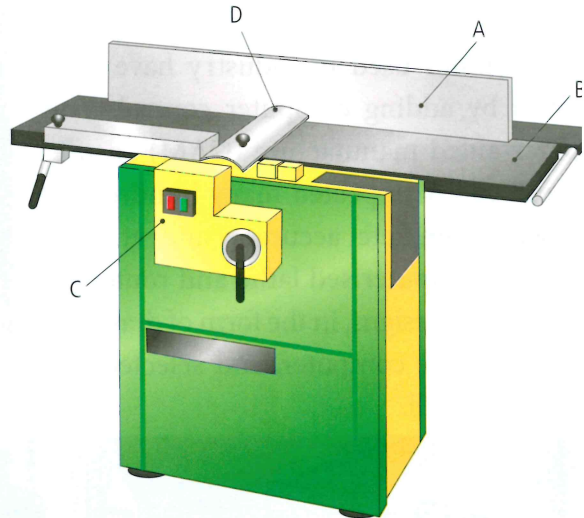
Fine dust and fumes created while working with machines and spraying equipment can cause irritation (see also p. 170). It is best that the air we breathe is as clean as possible.

Dust extractors vacuum the air by filtering out wood particles and fine dust from the machine to a collection bag or bin. Modern machines and power tools are fitted with connections for extractors or dust collection bags.



## Exercises

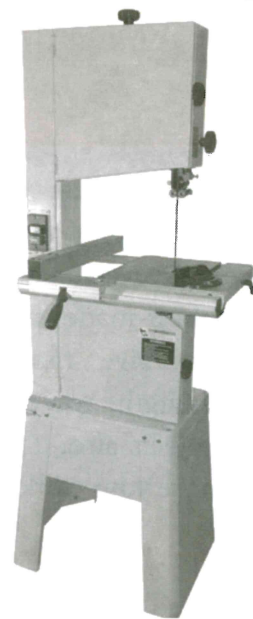
- 1 Explain the term CAM.
- 2 What safety equipment should be worn when using the following machines?
  - Scroll saw
  - Sander
  - Mortiser
- 3 (a) The diagram opposite shows a planer/thicknesser. Name the parts labelled A, B and C.  
(b) Explain the function of the part labelled D.
- 4 Describe two types of material that can be cut using a bandsaw.
- 5 State two safety precautions that must be observed when using a mortising machine.
- 6 Describe, using notes and sketches, how you would cut out a mortise with the mortise machine.
- 7 Explain how you would drill a 25 mm diameter hole in a piece of wood using a pillar drill shown opposite.
- 8 What is the purpose of the guards on the machines in the school workshop?
- 9 Design a safety sign for each of the machines in your school workshop.
- 10 List four safety rules for each machine in the workshop.
- 11 Draw a simple diagram of a scroll saw and label the main parts.
- 12 What is the correct function of a sanding machine?





### Exam Questions

- 1 The diagram shows a machine controlled by a computer. State two advantages of controlling machines in this way.  
(JC, HL, 2009)
- 2 State two specific safety precautions that should be observed when using a pillar drill.  
(JC, HL, 2007)
- 3 (a) What is the correct name for the woodworking machine shown?  
(b) State two specific safety precautions that should be observed when using this machine.  
(JC, HL, 2008)



### Web Links

[www.technologystudent.com/equip\\_flsh/hdrill.html](http://www.technologystudent.com/equip_flsh/hdrill.html)

[www.design-technology.info/equipment/pillardrill/default.htm](http://www.design-technology.info/equipment/pillardrill/default.htm)

[www.popularwoodworking.com](http://www.popularwoodworking.com)

[www.finewoodworking.com](http://www.finewoodworking.com)