Unit CSA–L2Occ40
SET UP AND OPERATE CUTTING AND SHAPING MACHINERY

LEARNING OUTCOMES
LO1/2: Know how to and be able to prepare for operating cutting and shaping machinery
LO3/4: Know how to and be able to set up cutting and shaping machinery
LO5/6: Know how to and be able to operate cutting and shaping machinery
INTRODUCTION

The aims of this chapter are to:

- help you to operate machinery to cut wood and wood-based products
- help you to maintain, use and change tooling on cutting machinery.

PREPARING FOR OPERATING CUTTING AND SHAPING MACHINERY

Cutting and shaping machinery is said to be the major cause of woodworking accidents. Many accidents can easily be avoided, but investigations by the Health and Safety Executive have shown that many circular saws, for example, are being used without adequate guards, or are even missing guards. To avoid accidents, you need to have a properly adjusted saw guard and use a push stick. Another hazard associated with using circular rip saws is ‘kickback’. This can occur if the timber binds on the saw blade, causing the workpiece to be ejected at high speed towards the machine operator.

Never use cutting or shaping machinery unless you have had proper training.

Cutting and shaping machinery is either fixed or transportable. Their uses and hazards are different. This chapter covers both.

Potential hazards

There are many things to consider when using cutting and shaping machinery. All possible safeguards should be implemented to prevent injury. The following examples apply to cross cutting on circular saws:

- A fixed guard should enclose the non-cutting part of the blade as far as the spindle.
- The nose guard must be set as close as practicable to the workpiece to minimise the risk of the operator’s hands coming into contact with the saw blade. This nose guard also stops you from touching the front of the blade while it is cutting. It should not be able to reach beyond the front of the saw table.
- A brake should be fitted, to stop the blade within 10 seconds.
- The timber being cut should be supported by a fence on either side of the cutting line. The gap should only be wide enough for the nose guard.
- A portion of the table, at least 300 mm on either side of the blade, should be cross-hatched and designated a ‘hands free’ area.
When the circular saw is in operation, any off-cuts must be removed using a push stick or similar safety aid to ensure the operator’s hands are kept out of the ‘hands free’ area at all times.

For small pieces of wood, holders or jigs should be used.

If the wood being cut is bowed then the bow should be on the table and wood should be packed to prevent it springing.

![Diagram of safe use of manually operated cross-cut saws](image)

**Figure 6.1 Safe use of manually operated cross-cut saws**

**Legislation and manufacturers’ instructions**

You should always read the risk assessment before starting work. This will help to identify any action that you might need to take, to ensure any hazards are eliminated or control measures are put in place to minimise any risk to the operator. There may be a safer way to carry out the operation and sometimes this might mean not using the piece of machinery at all.

It is vital to always use cutting machinery bearing a CE mark. Reputable manufacturers will always have this mark. The machinery will have been designed and built to meet British Standards as will accessories such as saw blades.
Both legislation and manufacturers recommend ways in which you should set up your cutting machinery. This extends to the workpiece support that is an essential part of a bench. Legislation and manufacturers recommend that:

- large work pieces should be supported both at the in-feed and out-feed ends
- if there is a second operator then they should always be at the out-feed end and never reach forward towards the saw
- a rip fence or cross-cut fence should always be used to support the timber during cutting to prevent ‘grabbing’ or ‘kickback’ of the workpiece
- when you are making shallow or angled cuts, a normal fence needs to be replaced with a low fence and you must use a push stick.

**Provision and use of Work Equipment Regulations 1998 (PUWER)**

These regulations aim to make sure that any machine that is used is safe and that it is only used for the right job. You should be trained before you use the machine and you should only ever use it if it has suitable safety devices and push sticks are readily available.

The regulations cover nearly all types of equipment that you might use either in the workshop or on site. This means everything from hammers through to dumper trucks.

The most important thing to remember is that all equipment needs to be suitable for what you are using it for. It needs to be maintained and regularly inspected.

**Health and Safety At Work Act (1974)**

Cutting and shaping machinery is powered in different ways. Health and safety law tries to cover any potential problem. Obviously there are particular hazards if you are using machinery powered by mains electricity. But even battery powered machinery can be hazardous.

You should refer to Chapter 1 for general advice about safety in the workplace.

**PPE**

Each different machine and job may require a different type of PPE. In some cases the machines produce a great deal of noise, so ear defenders must be used. Any machine that produces dust or particles that could fly up into your eyes, nose or mouth could require you to wear some form of eye protection. Face screens are sometimes more appropriate for better protection rather than a simple pair of goggles.

To protect yourself against inhaling dust a suitable dust mask should always be used. For prolonged exposure to dust you may need to wear a respirator.
Some jobs, particularly when handling the machines, make it difficult to wear any kind of hand protection. But if you are assisting in, for example, holding or pushing timber into a machine then you should wear gloves.

**PRACTICAL TIP**

Gloves are not just worn to protect against splinters and other damage. They are vital as many tools cause vibration and gloves will help prevent any long-term damage.

**Machines and components**

The following table outlines most of the major sorts of machines used by carpenters.

<table>
<thead>
<tr>
<th>Cutting and shaping machine</th>
<th>Description and use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular saw</td>
<td>This cutting machine is useful for a variety of different tasks, including rip sawing, bevelling, grooving, trenching, cross-cutting and cutting up sheet material. There are various different blades for various materials and tasks. Tungsten carbide tipped saw blades are extremely effective for a wide variety of these different materials.</td>
</tr>
<tr>
<td>Chop saw and mitre saw</td>
<td>These are down stroking saws. They have a rotating base plate and saw, so square or mitred cross-cuts can be made. The blade can also be set at an angle.</td>
</tr>
<tr>
<td>Bench saw</td>
<td>A portable bench saw, with the correct blade, can not only cut through timber products but also through bricks, blocks and tiles. Some will have blade assemblies that allow mitre cutting.</td>
</tr>
<tr>
<td>Jig saw</td>
<td>The blade cuts on the upward stroke on most machines, but more expensive versions have an action that moves the blade into the material on the upward stroke and away on the downward stroke. This minimises wear and tear on the blade. Again a number of different blades are available.</td>
</tr>
<tr>
<td>Drill</td>
<td>Drills are perhaps the most common type of portable power tool. Good quality drills can perform a variety of different actions and with the right bits, drills and other accessories they can reduce the effort needed and the time taken.</td>
</tr>
<tr>
<td>Mortiser</td>
<td>A mortiser is designed to replace the mortise chisel. It is ideal for cutting mortises in the construction of doors and windows.</td>
</tr>
<tr>
<td>Biscuit jointer</td>
<td>This is like a small circular saw for forming edge joints. Biscuit jointing involves fitting oval biscuits into saw slots cut by the jointer and then gluing them into position.</td>
</tr>
<tr>
<td>Planer</td>
<td>A planer is used for chamfering, rebating and edging. On site it is often used to trim the edges of sheet material and for door hanging.</td>
</tr>
<tr>
<td>Sander</td>
<td>These machines aim to take much of the effort out of finishing work. Each different type of sander leaves a more or less smooth surface, so it is important to use the right belt or paper for the job. Belt sanders are good for removing stubborn defects or old paint. Orbital sanders are good for fine finished work.</td>
</tr>
<tr>
<td>Router</td>
<td>Routers have a huge number of uses – from trimming and recessing to dovetailing, drilling, moulding, rebating and grooving. They have a router cutter that can be adjusted on a spring-loaded column.</td>
</tr>
</tbody>
</table>

Table 6.1
Figure 6.2 Safe working practices of circular saw benches

**WARNING**
Minimum diameter of saw blade that may be used in this machine is 360mm in order to comply with safety requirements
There are several key components in a range of different cutting and shaping machinery. Not all of the cutting machines and planers will necessarily have all of the following components, but as a carpenter you will come to know these components. You will not only need to be able to identify them, but also know their purpose and importance. The following set of headings describes their purpose in circular saws.

**Guards**
Circular saws have fixed or interlock bottom guards that aim to prevent contact with the moving parts of the mechanism and the blade. They also have either an adjustable or self-adjusting crown guard. This covers the saw blade above the table.

All guards should:
- be designed in such a way that you cannot access any moving parts, even after the power is turned off, until all movement stops
- be difficult to either disable or bypass
- not obstruct your view of the cutting
- restrict access, but allow you to be able to carry out any repairs, servicing, installation or normal maintenance. These operations should require you to use either a tool or key to remove the guard
- be easily adjustable and easy to maintain
- be rigid so they do not touch the blade when it is in motion and if they are knocked they are not bent out of shape
- cover the main moving parts, including the pulleys and shafts, motor and belts. The crown guard needs to be set as close to the timber that is being cut as possible.

**Extraction points**
The machine should be fitted to a dust extraction (LEV) system that must operate efficiently. The extraction system should be fitted both above and below the table.

**Fences**
The bench needs to be fitted with a rip fence that can be adjusted. The fence positioning should be possible without using a tool. The fence is usually made either from wood, plastic or a soft alloy. This is so that it will not damage the blade if contact occurs.

**Riving knife**
The riving knife is a thin plate that is mounted behind the saw. This is designed to reduce the chance of timber being ejected at high velocity. It should prevent the work piece from closing on the body of the saw blade and loose material from coming into contact with the blade. The knife is manufactured from steel and is a gauge thicker than the body plate of the saw blade, but slightly narrower than the saw kerf.

**Bed**
The bed is the working surface which the timber being cut is placed on. It is important that the bed is clean and flat, in order to cut accurately and reduce potential hazards.
Blade
Unlike most artificial sheet material, natural woods have directional fibres. Consider this when you are choosing to use either a coarse or fine blade. Usually you should pick a rip saw blade if you want to cut with the grain. Cross-cut blades are mandatory if you want to cut across the grain.

Steel blades are relatively cheap and are good for cutting softwood, but they will dull very quickly if cutting hardwood. The other two main choices are tungsten-carbide tipped (TCT), which will stay sharper for longer, or blades with polycrystalline diamond tips, which are consequently more expensive, but they will stay sharp for much longer.

Information plate
Manufacturers label their blades with information about the saw type and materials or how each one is designed to be used. Circular saw machines should also have an information plate that states the diameter of the smallest blade that can be used with the machine.

Faults and hazards
You should make other checks before the machine is regarded as safe. These are:
- damage to machinery – cracks, splits, missing parts
- DIY repair – gaffer or insulation tape or temporary repairs to the machine
- missing riving knife – the machine will kickback any timber without this
- poorly fitted or missing guards – this exposes you to the moving cutting part of the machine
- poor wiring – if the cable is frayed, damaged or poorly repaired you could get an electric shock
- lack of maintenance – broken, dirty and damaged machinery should not be used
- inadequate or blocked extraction – this may cause the machine to overheat which could cause a short circuit or fire, or jam due to insufficient removal of waste material (saw dust)
- unsafe work area – balancing cutting and shaping machinery on uneven surfaces or in wet conditions could be very hazardous.

Safety aids
There are several different safety aids that you can use to help to prevent or minimise accidents. A push stick is usually custom-made. It may get damaged or destroyed, but it saves your fingers and hands from being injured. Push sticks must always be used to feed the workpiece, to ensure that the operator’s hands are kept a minimum of 300 mm away from the saw blade. A push stick must be used to feed the last 300 mm of the workpiece through the saw. The push stick has a ‘birdsmouth’ that helps to get a firm hold on the piece of wood being
pushed. You should also use the push stick to remove any cut pieces between the saw blade and the fence.

**Jigs**

Bevelled pieces, angled pieces, tapered firings and wedges can be produced on the circular rip saw, provided that a suitable and well-constructed jig or saddle is used to support and guide the work piece. It may not be necessary to use a saddle to support the cutting of bevelled pieces on saws with blades that are able to cant (tilt), such as dimension saws.

Wedges can be cut safely on the circular rip saw using an appropriate jig with the guards set correctly. The jig may be used with a push stick to hold the work piece in the jig and move the cut wedges away from the saw.

For tapered firings, use the circular rip saw with a firing template. The firing piece template can be held securely to the work piece using nails that are long enough to penetrate the work piece but not so long as to be at risk of coming into contact with the saw during the cut, as the nails would damage the saw teeth.

![Figure 6.3 Bed pieces, saddles and jigs](image)

**Pre-operational checks**

It is your responsibility to make sure that the machine, or what you are expecting it to do, will not injure you. You should always carry out the following before using any machine:

- **Check the voltage** – does the setting match the power using? This means checking whether any adaptors have been properly adjusted.

- **Safety cut-offs** – these will shut the machine down if, for example, the blade is jammed. You should not use a machine that does not have safety cut-offs or if they have been disabled.

- **Circuit breakers** – these safety devices cut off the power supply to the machine and isolate it from the main power system if you damage or accidentally cut through the cable. This will reduce the chance of you being electrocuted, as the electricity will flow through a cut cable.
HOW TO SET UP CUTTING AND SHAPING MACHINERY

You should always ensure that you follow the manufacturer’s instructions and use the correct blade or accessory for the job.

Changing blades and accessories

The diameter of the smallest blade that can be used for the machine will be marked on the machine. If you use a blade that is less than 60 per cent of the diameter of the largest blade for the machine then it will cut in an inefficient way and be more likely to kick back.

To minimise the risk of kickback, when you change a saw blade you must ensure that it is adjusted high enough above the machine table for the saw teeth at the gullet of the saw tooth to project above the surface of the workpiece. You should not set the blade higher than is needed. It is also important to make sure that you are using the correct saw blade designed for the type of work. For example, use a cross-cut or combination blade for cross-cutting and not a ripping blade.

Safe methods of changing saw blades

You should always make sure that the blade is of a type stipulated by the manufacturer. The blade selected must have a saw tooth configuration that is suitable for cutting the nature of materials to be processed.
You should make sure that the saw blade teeth have enough clearance to prevent burning. Saw blades with good vibration dampening qualities can significantly reduce the noise levels when cutting. Above all, the saw blade must be kept sharp as a blunt blade is very dangerous.

**1. PROCEDURE FOR CHANGING A CIRCULAR RIP SAW BLADE**

**STEP 1** Isolate the machine from the electrical supply. Remove or raise the guards/crown guard out of the way.

**STEP 2** Remove finger plate and packing, if fitted (the saw spindle on some machines may require the machine table to be slid out of the way). If access is from under the table remove the appropriate cover to expose the saw spindle.

**STEP 3** Using the correct tools undo the nut by slackening it off in the same direction as the saw rotates (left-hand thread). Remove the nut.

**STEP 4** Wearing gloves, remove any collar or washers then carefully remove the saw blade.

**STEP 5** Clean the saw spindle including the nut and collar/washer.

**STEP 6** Ensure that the replacement blade is of the correct size and type for the machine and for the materials to be cut. Locate the replacement blade on the saw spindle (on the driving pin if one is fitted), making sure that the saw is in the correct running direction.

**STEP 7** Refit the collar/washer and replace the nut ensuring it is tightened securely.

**STEP 8** Check that the riving knife on the rip sawing machine is of the correct size and is set in the correct position in relation to the saw blade.

**STEP 9** Replace any packings if fitted and ensure that any guards protecting the lower portion of the saw are replaced.

**STEP 10** Reset the guards/crown guard and position them to suit the saw blade and thickness of the timber to be sawn. Some guards automatically adjust to the thickness of material being cut.

**STEP 11** Rotate the saw by hand to ensure it does not come into contact with the guards or with the machine table.

**STEP 12** Remove all tools from the machine table and store them in the appropriate place.

**STEP 13** Switch the isolator back on and turn the machine on to check that it runs correctly. Perform a test cut.
Fitting the riving knife

A riving knife must be fitted to a circular saw to ensure the rear of the saw is guarded to prevent materials from being inadvertently pushed into the back of the saw. It also holds the saw cut open as the material is being cut to minimise the chance of kickback and avoid serious injury to the operator.

The riving knife must be made of a material that is robust and hardwearing. It must also be adjustable to suit the minimum and maximum size of saw that can be fitted to the machine. It has a chamfered leading edge. The thickness of the riving knife should be greater than the steel plate that the saw is made from but less than the saw kerf, to prevent the work piece from binding on it. The riving knife must be large enough to extend to a minimum of 225 mm above the saw table for saws of 600 mm and above in diameter, and to within 25 mm from the top of the saw blade for saws below 600 mm in diameter. The distance from the saw blade to the riving knife must be no more than 8 mm.

Machinery guards

At least 10 people die each year, and as many as 40,000 injuries occur, as a result of poorly maintained or missing guards on machinery.

You should always use the equipment’s guards and any safety devices correctly and never remove them or restrict them so that they cannot operate. The guard is there to cover the cutting edge of a saw. Some machines and power tools have guards that automatically retract as the material is being cut and close on completion of the operation.

Guards are there to control the risk to the person using the machine. You should always follow the manufacturer’s instructions and the 1998 PUWER regulatory requirements about using the guard and making sure that it works properly.

Maintaining and cleaning

Over time the blade can become contaminated with materials that cling to the teeth of the saw blade, and other parts of the blade body. These can be natural materials from the wood, such as resin or adhesive deposits from manufactured boards. The problems are:
the contaminants will cause friction, which generates heat

they also insulate the blade preventing heat that can build up during the cutting process, discharging from the saw blade

as a result of both of these situations, friction and an excessive heating of the saw blade can mean the blade becomes blunt prematurely

the blade is more likely to warp or distort causing it to run out of true, which in turn could result in kickback

you might need to push the timber through the blade with much greater force. The feed rate will be far slower and you may even notice smoke.

Many serviceable blades are thrown away when all they actually need is to be cleaned.

**Inspecting saw blades**

Over time the blade will lose its effectiveness. It can burn the timber, overheat and will require extra pressure to cut through the timber. Circular saw blades should never be sharpened on the machine but should be removed and either hand-filed or sharpened using a saw sharpening machine.

If any resin or adhesive deposits are found on a saw blade, these should be first softened using a solution of oil and paraffin, and then the deposits should be removed using a scraper, ensuring the saw teeth are not damaged by the process.

**Lubricants**

Lubricants have a wide variety of different uses. There are a number of traditional types, such as oil or paraffin, but increasingly plant oil is used. The key benefits of using lubricants are:

- they are rust inhibitors (they stop rust)
- the blade is cleaner
- the times between having to sharpen the blades are longer
- the blade tension is retained for longer.

Specialised lubricants often act as cleaners as well and they will dissolve organic substances such as resin or oils. They are biodegradable and solvent-free.

**Servicing and cleaning**

You should always follow the instructions in the manufacturer’s maintenance manual. This will ensure that the equipment is always kept effective and efficient. You should always check the dust extraction system at the same time.
The following general maintenance list should be carried out:

- Check the general area of the machine for woodworking debris and other materials that could get into the machine.
- Check the guards, fences and tables, making sure that they can all be adjusted without a problem.
- Check that the guards and other safety devices are in a safe condition. This includes braking devices.
- Check the saw blade and teeth to see if they are dull or defective in any way.

A maintenance schedule should be developed which stipulates what needs doing and the frequency at which it should be carried out. This should:

- include any changes to manufacturers’ recommendations for the machine
- identify all regular maintenance requirements.

However, circular bench saws are quite low maintenance. Using a sharp blade will significantly improve the safe operation of the machine. The saw blades do need to be maintained, so they should be kept clean and sharp. Always have an additional saw blade ready, as this will avoid delays with work while a dull blade is being re-sharpened.

Routine maintenance, cleaning and lubrication will go a long way to ensuring that the saw works and that the safeguards are fully functional.

**OPERATING CUTTING AND SHAPING MACHINERY**

Having set up your cutting and shaping machinery, you now need to use it safely and efficiently. Wherever you are working, construction needs to be efficient and produce minimum amounts of waste and dust.

**Cutting lists**

When particular jobs have to be done either in the workshop or on site a document called a cutting list will be prepared. It will:

- state the job title, such as making rods for stairs or architrave for doors
- identify the materials that you will be using
- state the number of finished items that need to be produced
- describe the items to be produced and the finished size of each item.

The cutting list will aim to make sure that the maximum number of finished items is made from the minimum amount of original material, with the minimum amount of waste. This will be an important part of the original setting out procedure for a job.
Dust extraction

Efficient dust collection is vital for health reasons but also to comply with the law. Circular saw operators can suffer from allergic reactions which can affect the nose, eyes and skin. A build-up of dust can also pose a fire hazard. Larger particles that cling to surfaces can cause scoring and poor visibility can make accurate measurement and cuts impossible.

A simple dust collection system uses a duct system. This moves the dust from the saw to a collection device that is attached to the ducting. Metal ducting is usually thought to be better than plastic piping. This is for three reasons:

- There is a limited choice of suitable plastic pipe fittings that would meet the needs of the extraction.
- The elbows in plastic pipes tend to clog.
- Plastic piping is non-conductive – it builds up a static charge as the charge particles pass along it. This charge can shock and there is also the risk of explosion or fire.

Spiral, steel pipe with fittings that have a long radius are less likely to clog. They can also be fitted with sections that can unclip and be cleaned out. The pipe is conductive and is less likely to be a fire hazard.

Waste disposal

Nearly every cutting and shaping task will produce some waste, whether it is dust or small pieces of wood. A good cutting list will minimise the number of off-cuts.

The Building Act (1984) clearly states that it is construction’s responsibility to prevent and control waste. It should also make sure that resources are not wasted unnecessarily.
Building Regulations cover the problem of waste disposal. This is in Part H, which covers all types of building materials, including wood.

The drive towards sustainable and secure buildings also aims to control waste and to protect the environment. You could refer back to Chapter 3, to refresh your memory about sustainability.

In order to reduce the amount of waste the following table can be used as a guide.

<table>
<thead>
<tr>
<th>Waste reduction and disposal method</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elimination</td>
<td>Don’t produce the waste in the first place. Regularly checking materials on site or in a workshop stops over-ordering. Using cutting lists means you can order the right lengths of materials and reduce the waste. Once the materials have arrived, if they are stored properly they will be in a good state for another job.</td>
</tr>
<tr>
<td>Reduction</td>
<td>Always keep materials in their protective packaging and try not to handle the material unless necessary as this will avoid damage. Always put materials back into storage. If you have large off-cuts set them aside as they might be useful later. Always use up opened stock before breaking into a new package.</td>
</tr>
<tr>
<td>Re-use</td>
<td>Use off-cuts for pegs, profile boards and repairs. Re-use timber off-cuts as many times as you can. They can be used for hoardings or form work.</td>
</tr>
<tr>
<td>Recycle</td>
<td>Most timber can be recycled. Some has a high value, such as reclaimed oak or pine for furniture. Most other timber, no matter how small the off-cut, can be used to produce chipboard or MDF. You should only throw wood into a skip as a last resort.</td>
</tr>
</tbody>
</table>

Table 6.2

2. SETTING A CIRCULAR SAW UP FOR RIP SAWING TIMBER

OBJECTIVE
To practise setting up a circular saw.

PPE
In this and the tasks that follow, ensure you select PPE appropriate to the job and site where you are working. Refer to the PPE section of Chapter 1

<table>
<thead>
<tr>
<th>STEP 1</th>
<th>Ensure the machine is switched off and cannot be accidently started. Check the blade is sharp and in good condition, and is of the correct type for the material to be cut.</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP 2</td>
<td>Adjust the height of the saw blade to suit the thickness of timber to be sawn.</td>
</tr>
<tr>
<td>STEP 3</td>
<td>Set the guards as close as practicable to the work piece (some machines have guards that are self-adjusting). Set and lock the fence to the required dimension.</td>
</tr>
<tr>
<td>STEP 4</td>
<td>Ensure the machine table is clear of any off cuts or other debris and check that all safety aids (push sticks) are available and in place ready for the operation.</td>
</tr>
</tbody>
</table>
3. SETTING UP A CROSS CUT SAW FOR CUTTING BOARDS TO LENGTH

OBJECTIVE

To practise setting up a cross saw.

STEP 1  Ensure the machine is switched off and cannot be accidently started. Check the blade is sharp and in good condition with the correct hook angle (negative hook).

STEP 2  Set the stop or stops to the required positions.

STEP 3  Load the work piece onto the cross cut table. Trim the end of the work piece to check it is sound and to remove any foreign bodies that might damage the saw or the tooling on other machines if more operations are to be carried out on it. (This is known as fair ending.)

STEP 4  Push the end that has just been trimmed up to the stop, taking care not to hit the stop too hard as this may move it and make the timber oversize. Check that there is no debris trapped between the stop and the work piece as this may cause it to be cut undersize.

STEP 5  On completion of the work, stop the machine. Ensure that the saw has come to a complete halt then remove any waste or other debris from the machine table and leave the area tidy for the next operation.

PRACTICAL TIP

If quantities are being cut stack safely and not in a position that might obstruct the safe use of the machine.

PRACTICAL TIP

Ensure the longest pieces required are cut first to minimise waste. If a quantity of pieces is required check the first piece to ensure it is the correct size.
Objective

To practise setting up a chop saw.

Step 1
Ensure that the machine is disconnected from the power supply then check that the blade is sharp and in good condition with the correct hook angle (negative). Check that the blade is set at 90° to the fence.

Step 2
If long lengths are to be cut ensure the material is supported at each side of the machine using trestles or tables. Some machines have specially designed frames to support long work pieces. Where fitted, set length stops.

Step 3
Load the material to be cut onto the table. If the material is bent ensure it is down on the table at the point that the saw makes contact. If the timber is bowed, the convex face of the board needs to be placed down on the machine table and the convex edge of the board needs to be pushed up to the fence.

Step 4
Cramp the work piece to the machine bed – refer to manufacturers manual for how to do this.

Step 5
Hold the timber, taking note of the ‘no go areas’ on the machine table. If the work piece is too short, hold it with the cramp and, if necessary, with a push stick.

Step 6
Ensure there are no tools such as tape measures left on the machine bed.

Step 7
Turn the power on. Activate the start switch and draw the saw down steadily until it has cut through the work piece. Release the start switch but do not let the saw back up until it has stopped. When the saw blade has stopped, return the saw back to the home position.

Step 8
Unclamp the timber and check for size.

Step 9
Repeat cycle until the job is completed.

Step 10
When operations are complete, remove all waste and off-cuts from on and around the machine, leaving it in a safe condition ready for the next operation.

Practical Tip

When angled and/or compound angled work pieces have to be cut, more of the saw blade can be exposed. This means that you must take extra care when holding the timber and act with extreme caution at all times.
No gloves are worn in these pictures, in order to clearly show how to use hand tools. However, you should wear gloves and other PPE required by your college or employer.
Figure 6.6 Types of cut using a mitre saw

Crosscut
Mitre
Bevel
Compound mitre

Figure 6.7 Use of biscuits for jointing

Butt
Mitre
Edge
Start at one end and move forward, keeping pressure downwards and against fence

Set depth gauge and fence to required rebate

Use ‘V’ guide to plane chamfer

Plane the surface of wide boards diagonally then finish off along the grain

Figure 6.8 Using a planer

No gloves are worn in these pictures, in order to clearly show how to use hand tools. However, you should wear gloves and other PPE required by your college or employer.

Figure 6.9 Router operation
1. What is the device called that should stop a circular saw blade within 10 seconds?
   a. Spring
   b. Jig
   c. Push stick
   d. Brake

2. What should be worn as a form of protection against machinery vibration?
   a. Goggles
   b. Gloves
   c. Face screen
   d. Respirator

3. How can you minimise waste when cutting boards to length?
   a. Cut the shortest pieces first
   b. Cut the longest pieces first
   c. Cut each piece to the same size and trim them afterwards
   d. Ensure there is debris between the stop and the work piece

4. Which of the following is true about guards?
   a. They should be easily adjustable and easy to maintain
   b. They should be rigid
   c. They should not obstruct your view
   d. All of these are true

5. If you are cutting a piece of material on a circular rip saw, what must you use to protect yourself?
   a. Push stick
   b. Jig
   c. Gloves
   d. Wedge

6. What device should be fitted to a mains powered cutting or shaping machine to prevent electrocution?
   a. Voltage meter
   b. Guard
   c. Circuit breaker
   d. Riving knife

7. What is the term used to describe a material that allows an electric current to pass through it and not build up in it?
   a. Magnetic
   b. Non-conductive
   c. Conductive
   d. Metallic

8. Which part of the Building Regulations covers waste disposal?
   a. A
   b. C
   c. H
   d. J

9. What is elimination of waste?
   a. Not producing the waste in the first place
   b. Keeping offcuts for later
   c. Reusing timber
   d. Disposing of waste carefully

10. What shape is the leading edge of a riving knife?
    a. Flat
    b. Triangular
    c. Chamfered
    d. Square