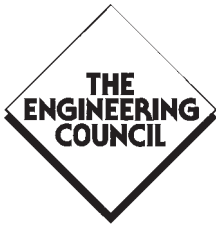


A STUDENT'S GUIDE TO  
HEALTH AND SAFETY  
IN THE DESIGN AND  
TECHNOLOGY WORKSHOP



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## FOREWORD

The first edition of this handbook is informed largely by practical experience of ensuring health and safety in school workshops. **It does not seek to present an interpretation of the law** - many aspects of which have yet to be tested.

It is written to be edited by teachers for use by their pupils. A second edition is planned, and TEP would be grateful for any observations or additional materials from practising teachers. If you have any views or materials to add, please write to:

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# A STUDENT'S GUIDE TO HEALTH AND SAFETY IN THE DESIGN AND TECHNOLOGY WORKSHOP

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## INTRODUCTION

Workshops can be dangerous places. They are full of machines and tools that are designed to cut hard, rigid materials, and unfortunately every year people are injured in them through having accidents. Sometimes these accidents are just bad luck, but in most instances they are the result of people behaving wrongly, or not understanding how to do something correctly.



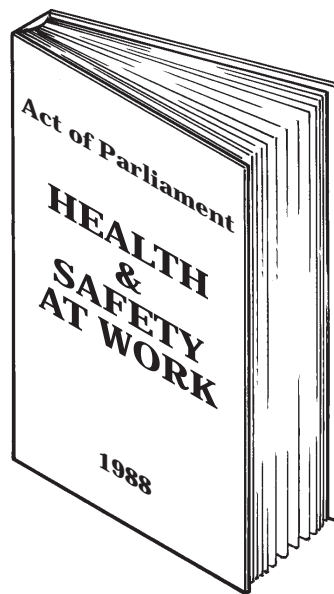
This booklet is aimed to help you manage your design and technology activities safely. It is aimed at making you think about your own personal safety, about safe workshop practice, and also at giving you the information that will help you carry out some of your making and manufacturing tasks in a way that is safe for you, and the other people that are around you.

In a school workshop, as in any other workshop, you are governed by the Health and Safety at Work Act. This is an act of parliament which tells us how to organise and manage workshops and how to behave in them. Being an act of parliament it is the law. It is a large document and you do not have to read it. What you have to remember is

- that it requires you, by law, to be safe.

## HEALTH AND SAFETY

When you have read this booklet you will realise that a lot of the principles of safety are just common sense. Unfortunately, some people need to have this common sense pointed out to them.



There are really two types of safety that you have to consider. To keep things simple we will call them personal safety and safe practice.

Personal safety is about how you present yourself and act in a workshop. It is all of the things that you have to consider that are to do with you.

Safe practice is about the right way to use tools and machines. It is information which you have to learn if you want to be safe when you are making things. But first of all you have to think about safety.



### THINKING ABOUT SAFETY

Being safe in a workshop is very much about being aware. An awareness of possible dangers is learnt by being taught about the right way to do things, and why it can be dangerous to do things in a wrong way, to hold a chisel or use a drill incorrectly for example. But this awareness is also very much about being 'with it' about being wide awake and concentrating on what you are doing. A lot of accidents are caused each year by people simply not concentrating on what they are doing - by not being 'with it'.

## SECTION ONE - PERSONAL SAFETY

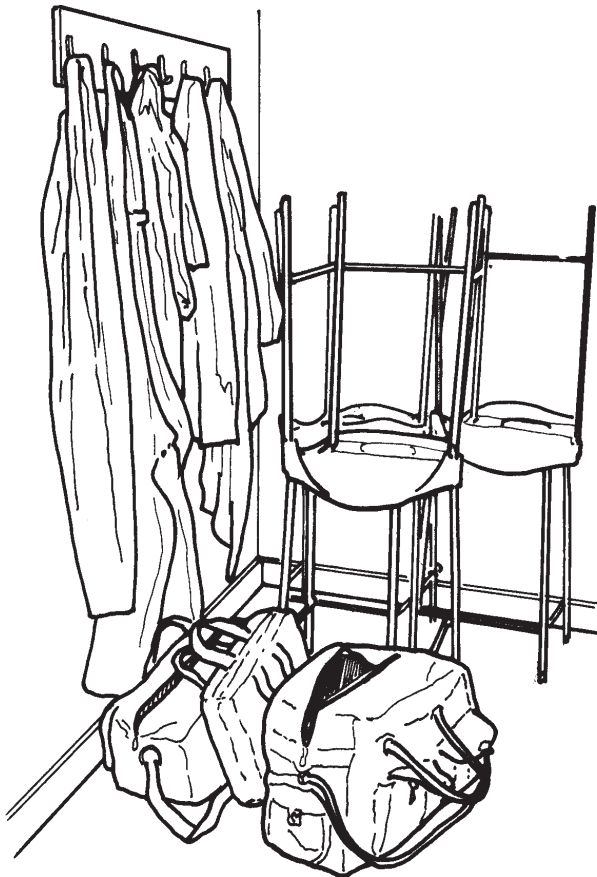
### THE WORKSHOP AS AN ENVIRONMENT

A school workshop is not a classroom, it is a very special environment covered by its own set of laws within the Health and Safety at Work Act. All school workshops are different, but most of them contain the same kinds of equipment, working areas and storage for hand tools and materials. As there are similarities, some general rules can be made about keeping these environments safe.

- **Workshops should be kept clean and tidy**

Keeping a workshop clean and tidy will greatly reduce the risk of accidents. It should also help you find tools and materials quickly, give you a reasonable quality of space to work in and put you in the right frame of mind for neat and tidy work.

One of the biggest hazards in the workshop is the floor. Anything put on a workshop floor can be fallen over, and if you fall in a workshop you are liable to bump into something hard on the way down. The most dangerous things to put on a workshop floor are school bags and scrap offcuts of material.



- **School bags should be put in one corner of the workshop as soon as you enter it. They should not be kept around benches where they can be fallen over.**
- **Scrap offcuts of material should be picked up and put into scrap bins.**

Small pieces of wood, metal and especially plastic are very easy to slip on. After you have cut off what you do not want, put it on the bench or in a scrap bin.



Among the other main hazards on a workshop floor, which people often fall over are stools. Sometimes a lesson will contain some writing or drawing and you will sit down to do these, but when practical activity starts you must take the stools out of the main workshop area, perhaps by stacking them up against a wall.

- **During practical sessions keep the main workshop floor area free from stools.**

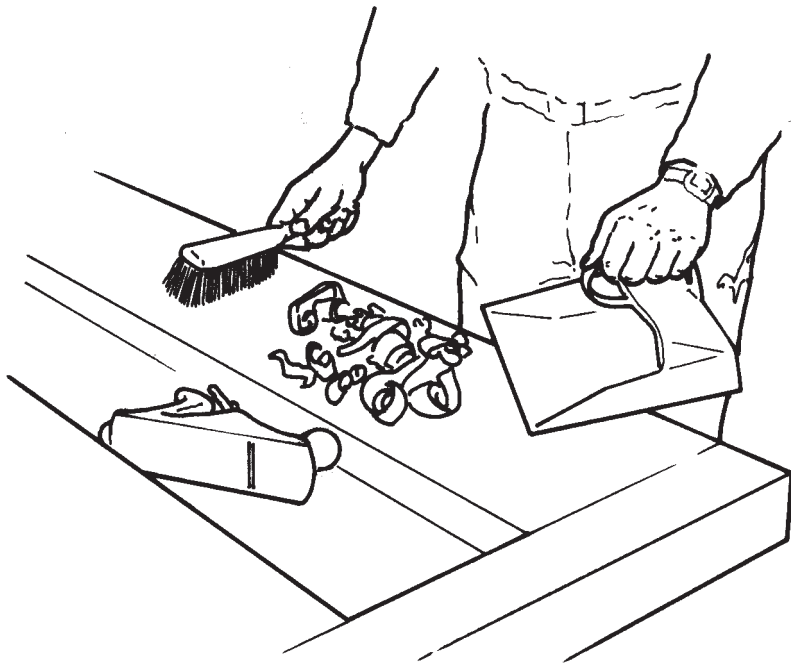
Another reason that people put stools in a workshop is that they think that they can saw and file sitting down. Actually it is much harder to do these activities well sitting down rather than standing up.

- **Do not try to do practical, making activities sitting down. You are making it harder for yourself.**

## HEALTH AND SAFETY

When you have done some planing, sawing or filing you are going to have created waste material, either shavings or dust. In general, dust is dangerous and some dusts are more dangerous than others (see the section on dust on page 18). Dust is the one thing that should go on the workshop floor, and it should be swept off the bench and from around the vices using a small hand brush.

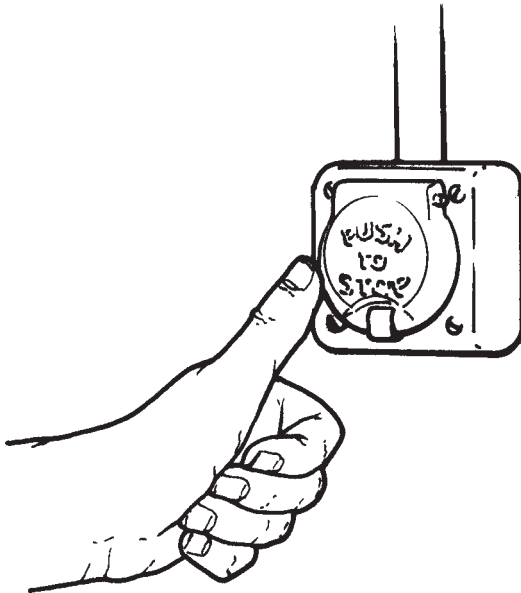
- **Never blow dust away from the work area.**



If you blow dust it will create a cloud around where you are working and you will breathe it in. It will also get in your eyes. Dust from timbers and plastics, and especially acrylic, is very difficult to get out of your eyes.

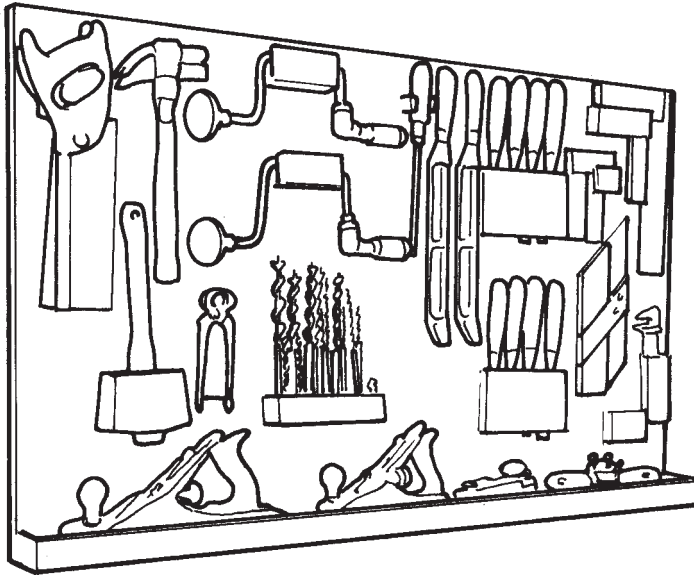
In your workshop, probably mounted on the walls, you will find red stop buttons. These are push switches that when activated cut off the electricity supply to the workshop. Learn where the stop buttons are.

- **If you get into difficulties on a machine, or see someone else in difficulties push a red stop button.**



Some people like to work surrounded by lots of tools and materials on the bench. This may be all right when you are a little more experienced but it is not good practice in a school workshop where you often have a limited space to work in and other people want to use the same tools.

- **Keep the area you are working in clear of excess tools and materials.**
- **Put materials away once you have taken what you want.**
- **Put tools back in their racks or cupboards once you have used them. It is selfish to hang on to a lot of tools that other people may need.**



As workshops tend to be busy places just moving around them takes some concentration. This means that you have to be very careful of other people when you are carrying tools and materials across a workshop.

- **Always carry tools, especially edged tools, for example chisels and saws, with their cutting edges pointing downwards.**
- **When carrying materials that are large or long, for example sheet plastics or lengths of wood, be very aware of the other people around you.**

It is very easy to bump into things and hurt yourself in a workshop if you are not looking where you are going. And it is much easier if you are going too fast.

- \* **Never run in a workshop. There is no need to and it is very dangerous.**

If you are aware of your environment and concentrating you will find that you develop a controlled way of behaving in a workshop. And you have to remember that workshops, although they are exciting places, are not playgrounds, and anyone that is not willing to behave in a controlled and safe way can be asked to leave.

- **If you are acting in a way that is a danger to yourself or others you can be required, under the Health and Safety at Work Act, to leave a workshop immediately.**

### ACCIDENTS

Life is full of risks and taking chances. Every time we cross the road we risk being run over. But so that we minimise the risk we cross at traffic lights or a zebra crossing because we have learnt that these are the safest places to cross the road. If we are forced to cross in moving traffic we learn to judge the speed of the oncoming vehicle, through experience, to minimise the risk. Although we can never be absolutely certain that we will cross the road, by assessing and minimising the risks we can control the uncertainty, and by controlling this uncertainty we develop a skill in crossing the road. Controlling the uncertainty of how tools and materials react together helps us minimise the risk of accidents in workshops.

- **Most accidents happen where we have wrongly assessed the risk, or did not know what the risk was in the first place.**

Accidents happen in workshops when;

- **people do not know how to do something correctly**

This may mean that they have not been shown how to do an activity correctly and try to work it out for themselves. This can be very dangerous when using tools and especially machine tools. The solution is very simple. If you are not absolutely certain how to do something, ask. There is no problem with asking, everybody has to ask how to do things.

There is a famous sign in many British factories that says, 'If in doubt, ask.' By asking you will learn how to do technological activities correctly and safely.

- **If you are not certain that it is safe, ask.**



People also have accidents when, although they have been shown how to do something once, they may have forgotten and cannot remember all the details. They are trying to do something when they are inexperienced and have not developed a skill in the activity. Even if you have been shown how to do something, if you are uncertain, ask. By being certain you will minimise the risk of an accident.

Accidents happen when people are

- **trying to do the wrong activity with a tool or machine.**

Tools and machines are designed to do very specific tasks. If you try to make a machine or tool do what it is not designed to do then you run the risk of an accident. To be safe you have to understand what the correct use for that tool or machine is so that you do not use it outside of its designed capabilities. To give a simple example of this, you may sometimes see people trying to open cans of paint with a wood chisel. This is stupid and very dangerous. A chisel has a fine cutting edge that will be damaged on a paint can lid, and if it slips it could cut a hand badly. It is an inappropriate use of a tool that can easily cause an accident.

People also have accidents in workshops when

- **they are not paying regard to personal safety requirements.**

In the section on the workshop environment we looked at a number of ways in which you can be aware of your own personal safety. In the next section, called personal presentation, you will look at how you can make certain that the way you are, and dress, reduces the risks of you having an accident.

- **You must take some responsibility for your own personal safety.**

And finally, people have accidents in workshops when

- **they are not concentrating.**

You really have got to be 'with it', and wide awake in a workshop.

### PERSONAL PRESENTATION

Workshops are designed for practical activities, which means making and manufacturing things. Because of the nature of this activity you will need to protect your clothing and yourselves from dust and swarf and sometimes oils and paints and the other materials that you need when you are engaged in technological activities. Protecting yourself means that

- **you should at all times wear adequate protective clothing, for example an apron.**



Wearing protective clothing not only helps you to keep your school clothes clean, but it also helps to keep your clothes in place. An apron, securely tied, will stop your school clothes becoming entangled in moving machinery, which is, unfortunately, a common cause of accidents.

Aprons should be made of cotton, and most are made of fire retardant cotton. You should not wear an apron made from nylon as this could easily catch fire. For casting, where you are handling hot metals, the apron that you wear will be made of leather.

The other form of protection that you must wear when operating a machine tool is eye protection. Obviously, your eyes are very valuable to you and must be protected from dust, swarf and particles of material that come from sanding machines and pillar drills for example.

- **You must wear safety glasses, goggles and when necessary a full face shield when using machine tools or carrying out hazardous operations.**



As has already been mentioned, loose clothing is very dangerous in a workshop situation. A stray tie, or the sleeve of a loose fitting shirt or pullover can easily become caught in the moving part of a machine, like the chuck on a lathe or pillar drill. Because of this

- **school clothing should be tucked in underneath an apron and shirt sleeves and the sleeves of pullovers should be rolled up.**



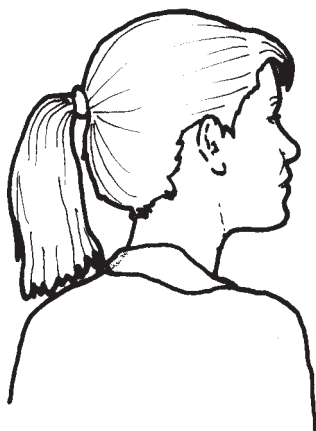
Any loose clothing is dangerous so

- **loose ties should be tucked into shirts and scarves should never be worn in a workshop.**

Along with scarves, in cold weather people often wear gloves. You will find gloves in a workshop as they are used to handle hot materials. But you must not wear your outdoor gloves in a workshop, and you cannot use hand tools or machines wearing gloves.

Another hazard with moving machinery, especially machinery with rotating parts is long hair. You do not want to get your hair caught in a machine. Students with long hair, both male and female

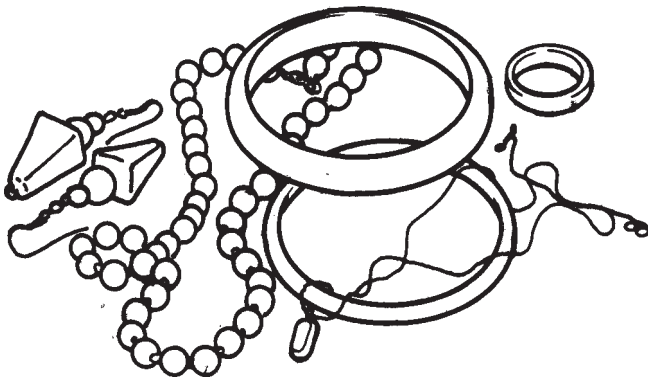
- **must tie long hair back and secure it out of the way.**



## HEALTH AND SAFETY

One other set of items that stand a chance of being caught in moving machinery is jewellery, for example rings, bracelets, necklaces and chains. Some schools have a policy that states that jewellery should not be worn in the school at all, but in other schools jewellery is allowed. Bracelets, necklaces and chains are particularly dangerous when you are using machinery. You do not want to get your jewellery caught in a machine as it may drag you into it.

- **It is dangerous to wear loose jewellery in a workshop. Take it off and give it to your teacher to look after until the end of the lesson.**



This section has been about personal safety. It has been about all the things that you have to remember about yourself when working in a workshop. The next section is about safe practice. It is about facts that you have to learn to carry out some design and technology processes safely and successfully.

## SECTION TWO - SAFE PRACTICE

This section is about safe practice which means it is about tried and tested ways of undertaking various forms of technological activity safely. This practice has been learnt and developed over many years and is based on facts, which in some instances have been passed down from one generation to another. Like all people who work in workshops you will have to learn these facts. When you have learnt these facts and built up some experience in using them you will have developed safe practice.

Most of the technological activities done in workshops require the use of tools, either machine tools or hand tools. It is therefore not surprising that most workshop accidents are caused by people either cutting themselves or otherwise injuring themselves with tools. Most accidents to students are caused by mishandling hand tools. Most accidents to teachers are caused when they are using machine tools. In this section you are going to look at some of the basic points of safe practice when using hand and machine tools, and look at some of the specific tools that cause problems in school workshops.



### SAFE PRACTICE IN THE USE OF MACHINE TOOLS

All machine tools are potentially dangerous, but unfortunately, even though some machine tools are large, powerful and seem frightening at first sight, some people seem to forget this very basic fact. Some machine tools, like a disc sanding machine, appear very simple to use. Because people think that they are simple they do not concentrate when they are using them, and a momentary loss of concentration can cause a serious accident.

- **You have got to concentrate on what you are doing when you are using machine tools.**

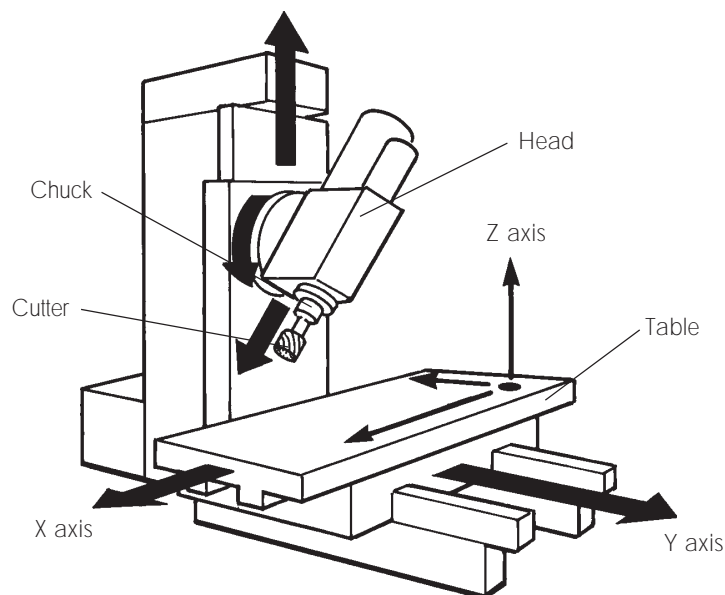
## HEALTH AND SAFETY

However the dangers in machine tool use can be overcome by a knowledge of safe practice, by practising and developing experience in their use, and by the application of some common sense rules. But the potential danger is always there.

- **Only use a machine tool after you have been taught how to use it, and when you have been given permission to use it by a member of staff**

Machine tools can be used safely when the person that is operating the machine has

- **an understanding of the design of the machine and what the appropriate use for the machine is.**



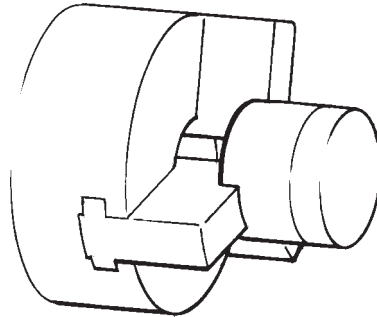
Vertical milling machine

You have to have an understanding of why the machine is designed the way it is and what the various parts of the machine are called. You also have to understand what the machine is designed to do. If you can understand the design, and the capabilities of the design, you will not try to make the machine do what it is not designed to do, and so you will use the machine in an appropriate and safe way.

Many accidents on machines are caused before the machine is even switched on. They are accidents waiting to happen. This is because people set the machine up wrongly in the first place, and then when they do switch it on an accident occurs. You have to

- **understand how to set up a machine correctly.**

This especially concerns the use of machine guards, how to hold the cutting tool and how the material to be worked is to be held securely in place.



How a machine is guarded, and how the work is held will be different for the different workshop machines being used, but in general all materials that are to be cut on a machine must be held down very securely. This means for example, that work to be turned on a lathe will be held securely in a lathe chuck and work to be cut on a mill will be held in a large machine vice. We will talk more about holding work a little later on.

Most machine tools are capable of running at different speeds. This is because different materials of different sizes need to be machined at different speeds. In many instances it is as dangerous to run a machine too slowly as it is too fast. You have to try to have

- **an understanding of the correct speed that the machine should run at with regard to the work undertaken and the material being cut.**

Cutting speeds using H.S.S. tools

Material to be cut	Cutting speed in metres per min			
	Drilling	Turning	Shaping	Milling
Mild steel	25	30	20	30
High carbon steel	10	15	10	15
Cast iron	15	15	10	15
Stainless steel	20	20	15	20
Brass	50	60	30	50
Copper	55	60	30	45
Bronze	20	20	15	25
Aluminium alloy	60	100	40	100
Zinc alloy	30	40	30	45
Plastic	50	50	35	50

## HEALTH AND SAFETY

From the table the cutting speed (S) for turning mild steel is 30 metres/min. Therefore, the R.P.M. for a 75mm diameter (d) bar of mild steel is:

$$\frac{S \times 1000}{\pi \times d} = \frac{30 \times 1000}{3.14 \times 75} = 128 \text{ approx}$$

The speed of the machine would be set at the nearest speed to 128.

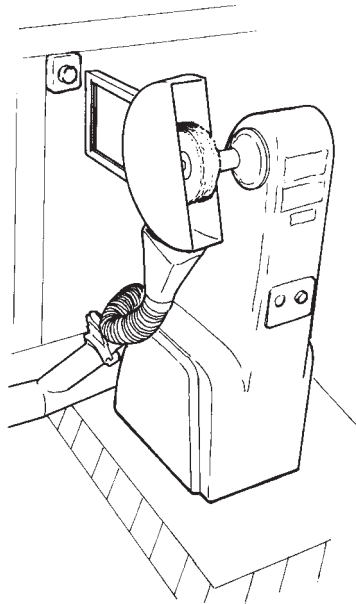
In general your teacher or a technician will set the correct speed for the machining activity for you. However it is a good idea if you start to learn some of the basic facts, for example, how fast should a pillar drill be running to drill a 5mm hole in a block of aluminium?

You also have to remember that machines do not just produce a finished workpiece, they also produce waste material in the form of dust and swarf. So you must

- **be aware of some of the other hazards arising from dust and swarf when using machines.**

If a machine is fitted with a dust extractor then make sure that the extractor is running when using the machine. Don't stand there in a cloud of dust. And remember that swarf, especially metal swarf, can be very sharp. Do not pick up swarf in your hand, brush it into a waste bin.

As machines produce waste material they will get dusty and dirty. You do not want to use a dirty machine as dust, dirt and grime are big contributors to safety hazards. You must



- \* **keep the machine and the surrounding area clean and tidy.**

It does not cost anything to keep a machine clean except a bit of effort.

## HEALTH AND SAFETY

Sometimes several people may want to use a machine at the same time, so they form a queue next to the person using the machine and wait their turn. This is not a very sensible thing to do.

- **Do not get too close to a person using a machine. Give them room, and remember only one person can use a machine at any one time.**

Waiting to use a machine is really a waste of time, and your time in the workshop is precious. There is always some other part of the job that you can be getting on with until the machine is free.

Some people seem to want to touch the moving parts of machinery, to feel it slip under their fingers. This is a bit like lemmings wanting to throw themselves off of cliffs. It is a very dangerous thing to do, so

- **never touch the moving parts of a machine.**

And finally of course when you use a machine you need

- **an understanding of personal safety and the safety of others in the working environment.**

## DUST

Dust is a big problem in workshops, as breathing a lot of dust is a health hazard, and so the levels of dust in the workshop air have to be strictly controlled. In fact there is a section of the Health and Safety at Work Act called the Control of Substances Hazardous to Health (or COSHH for short) which specifically covers dust.



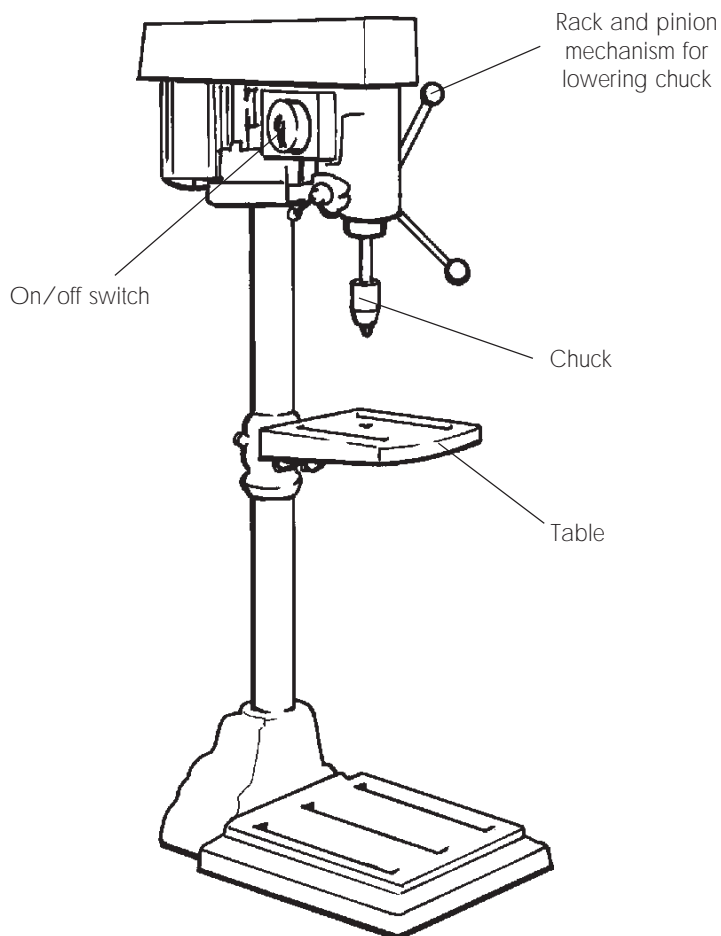
## HEALTH AND SAFETY

Although some dust is caused by the hand sanding of timbers most is caused by sanding machine use. However the amounts of dust in a workshop can be limited by

- **always turning on extractors where they are fitted to machines**
- **only sanding off the minimum amount of a material. If you have got a lot of material to remove, file it or saw it off.**

Having looked at some of the general points to do with safe practice in machine use here are some check lists for three of the most commonly used workshop machines that you should go through before you start to use them.

### THE PILLAR DRILL



## HEALTH AND SAFETY

This is a check list for safe practice when using a pillar drill.

Make certain that;

- **you are observing all of the aspects of personal safety.**

You should be wearing;

- **Protective glasses or goggles, and an apron.  
Loose hair should be tied back.  
Roll your shirt or pullover sleeves up and be sure that you have no jewellery on that can get caught in the drill chuck.**

Make certain that;

- **the material you are going to drill is held firmly in a machine vice, or G-cramped down to the table of the drill.**

Never hold the material in your hand because if the drill gets caught in the material, the material will turn and damage your fingers.

Check with your teacher or technician that

- **the drill is set to turn at the right speed. Large diameter drills need to run at slower speeds than small diameter drills.**

Check that

- **the drill is being held by all three jaws of the chuck. Tighten the drill in the chuck with the chuck key, and then remember to remove the chuck key from the chuck.**

Check that;

- **the chuck guard is in place.**

Check that;

- **you know how to stop the drill. Some drills may have foot operated stop switches.**

When you are drilling:

- **do not try to push the drill through the material too quickly. Raise the drill occasionally from the hole to allow the swarf to break away.**

### THE DISC SANDING MACHINE

This is a check list for safe practice when using a disc sanding machine

Make certain that;

- **you are observing all of the aspects of personal safety.**

You should be wearing;

- **protective glasses or goggles and an apron.**  
**Loose hair should be tied back.**  
**Roll your shirt or pullover sleeves up and be sure that you have no jewellery on that can get caught in the rotating disc.**

Make certain that;

- **you have got the dust extractor switched on**

Make sure that

- **you are holding the material that you are sanding down on the machine table. Do not lift it up to sand it.**

Make certain that

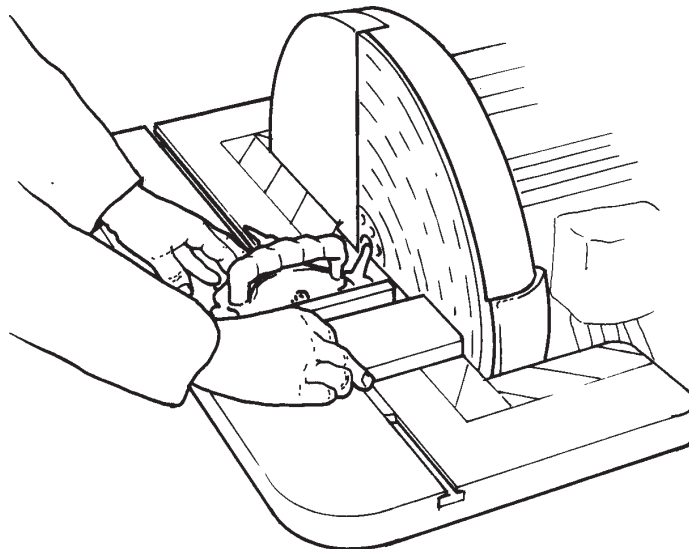
- **you do not put your fingers too close to the revolving disc; 40mm away is quite close enough.**

Do not

- **force the material into the rotating disc. Pushing too hard will generate a lot of friction and this will leave a burn mark on the end of a piece of timber**

Check that

- **the gap between the rotating disc and the machine table is no more than 3mm. If it is tell your teacher or technician and they will adjust it.**



Remember to concentrate.

- **People think that disc sanding machines are easy to use so they do not concentrate enough. In fact they are a very common cause of accidents in school workshops.**

### THE ROTARY POLISHING MOP

The rotary polishing mop appears to be a very simple machine to use, but in fact it is a common cause of accidents. But this often results in the work being damaged rather than the machine operator. When you are using this machine make certain that you remember to concentrate,

- **people think that rotary polishing mops are simple to use, so they do not concentrate and then they have accidents.**

And remember to

- **observe all of the aspects of personal safety.**

You should be wearing;

- **protective glasses or goggles, and an apron.  
Loose hair should be tied back.  
Roll your shirt or pullover sleeves up and be sure that you have no jewellery on that can get caught in the rotating mop.**

People often have accidents when using rotary polishing mops because they forget the direction that the mop is turning in. It turns towards you. This means that the work has to be offered up to the mop in the right way.

When using a rotary polishing mop always,

- **use the bottom of the mop.**

If you use the top of the mop the workpiece will get caught and it will be pulled from your grip and thrown onto the floor.

When you are polishing a length of material,

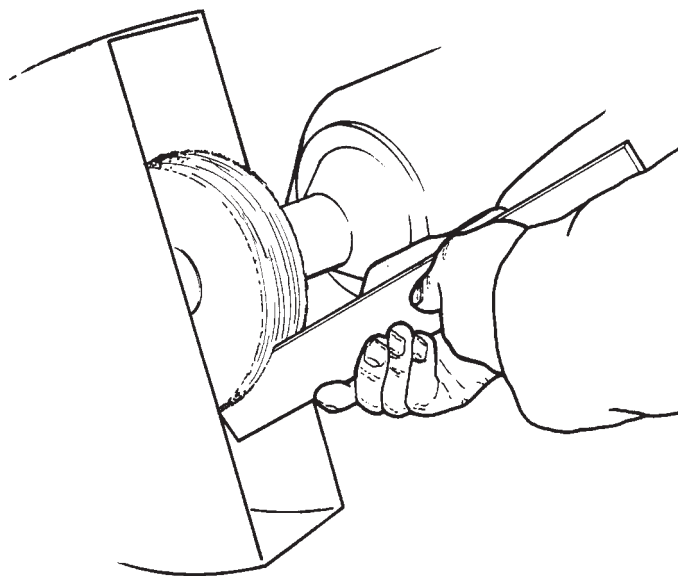
- **start in the middle of an edge and work the material towards you. Do not press too hard.**

Look at the illustration opposite and you will see the position of the material on the mop.

Remember,

- **a polishing mop will not polish out deep scratches.**

It will only give a good quality polished finish on a piece of material if the material has first been smoothed using abrasive papers.



## HEALTH AND SAFETY

### THE CENTRE LATHE

This is a check list for safe practice when using a centre lathe

Make certain that

- **you are observing all of the aspects of personal safety.**

You should be wearing

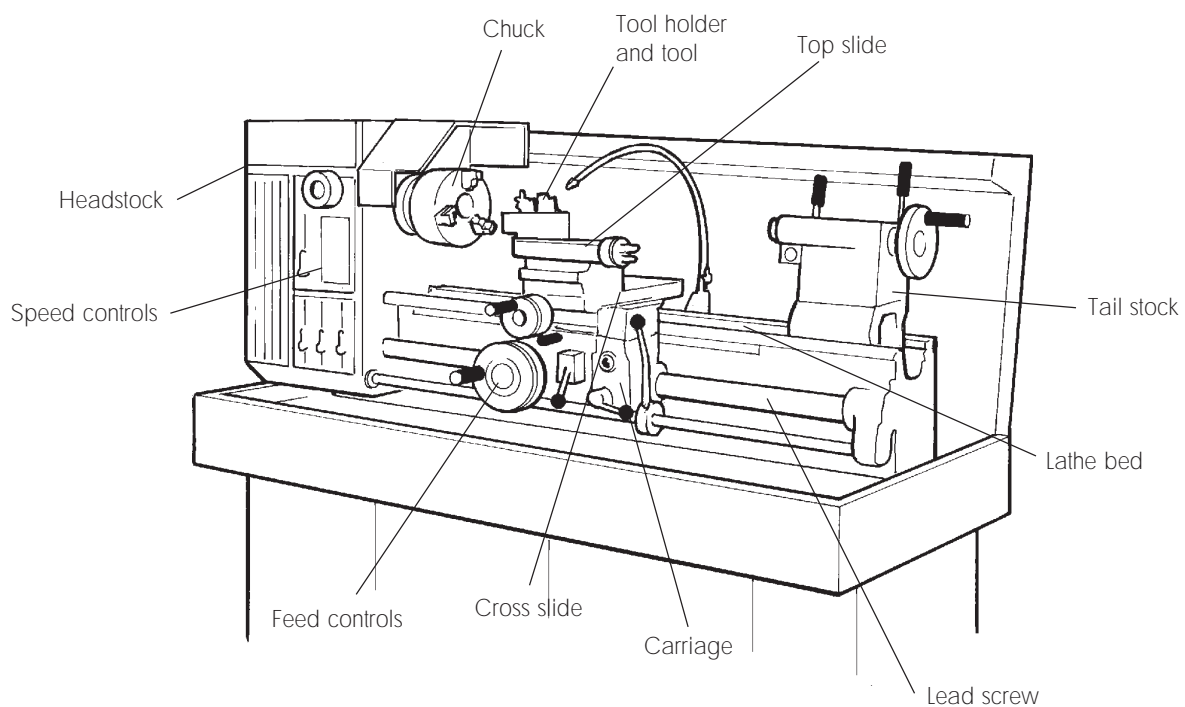
- **protective glasses or goggles, and an apron.**  
**Loose hair should be tied back.**  
**Roll your shirt or pullover sleeves up and be sure that you have no jewellery on that can get caught in the lathe chuck.**

Make certain that

- **the material to be turned is securely fastened in the jaws of the lathe chuck. Tighten the chuck up with a chuck key and then take the chuck key out of the chuck.**

Check with your teacher or technician that

- **the lathe is set to turn at the right speed. Different operations with different materials require different speeds.**



Check that

- **you have got the right lathe tool in the tool holder for the operation and material that you want to turn. If in doubt, ask.**

Check that

- **the lathe chuck guard is in place before starting the machine.**

Check that

- **you know how to stop the lathe. Some lathes may have foot operated stops.**

Before starting the lathe check that

- **the chuck will turn clear of the tool and tool post when the machine is started.**

Remember

- **never walk away from a lathe when it is cutting on an automatic feed.**

### SAFE PRACTICE IN THE USE OF HAND TOOLS

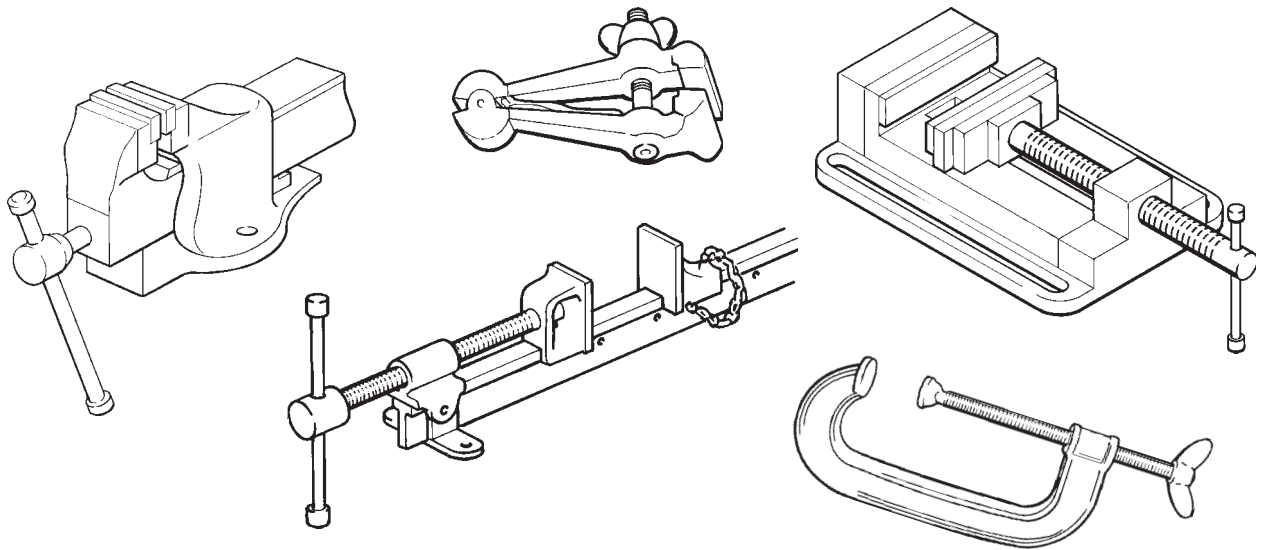
As most workshop activity is carried out using hand tools it is not surprising that hand tools cause the most workshop accidents. It is also not surprising that the majority of tools that cause accidents are the frequently used cutting tools such as saws, chisels and craft knives. However, before we look at these tools individually it is worth pointing out that many accidents that are caused when cutting a material are caused because the material is not being held properly.

### HOLDING MATERIALS

There are a variety of holding and clamping devices available in a workshop to hold materials when we are working them. Some of the more common ones are;

wood work vices	metal work vices
hand vices	machine vices
G cramps	sash cramps
bench hooks	

They are all designed to hold materials in different ways and for different purposes, but their common function is to hold materials whilst we work them. They all hold the materials mechanically, which saves us relying on our own strength to hold them, and avoids getting our hands too close to the tools' cutting edges.

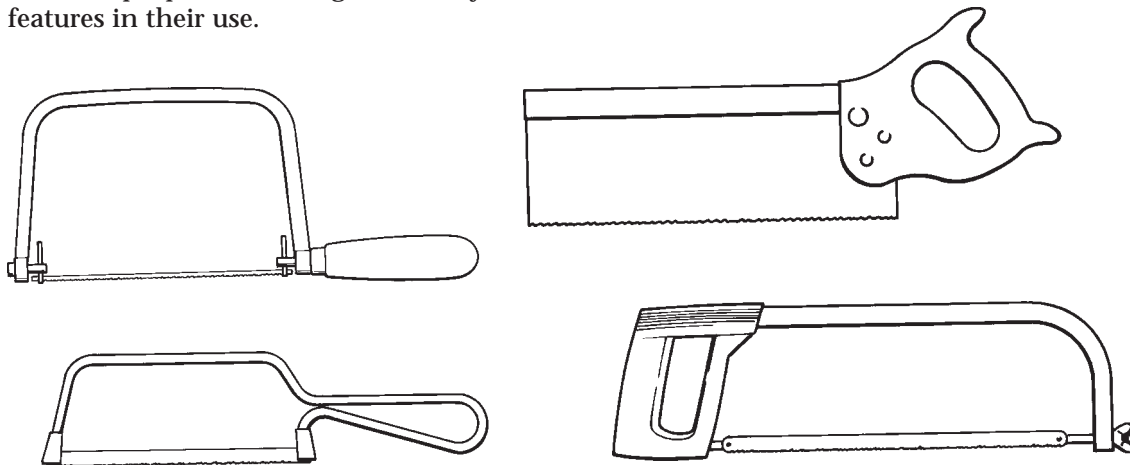


In terms of safe practice what these tools mean is that we do not have to hold the material in one hand whilst trying to cut it with a tool held in our other hand. Doing this is a very common cause of workshop accidents.

- **Hold materials that you are cutting in a vice or cramp, not in your hand.**

### SAWS

There are many different types of saws for different materials and different purposes. But in general they all share some common features in their use.



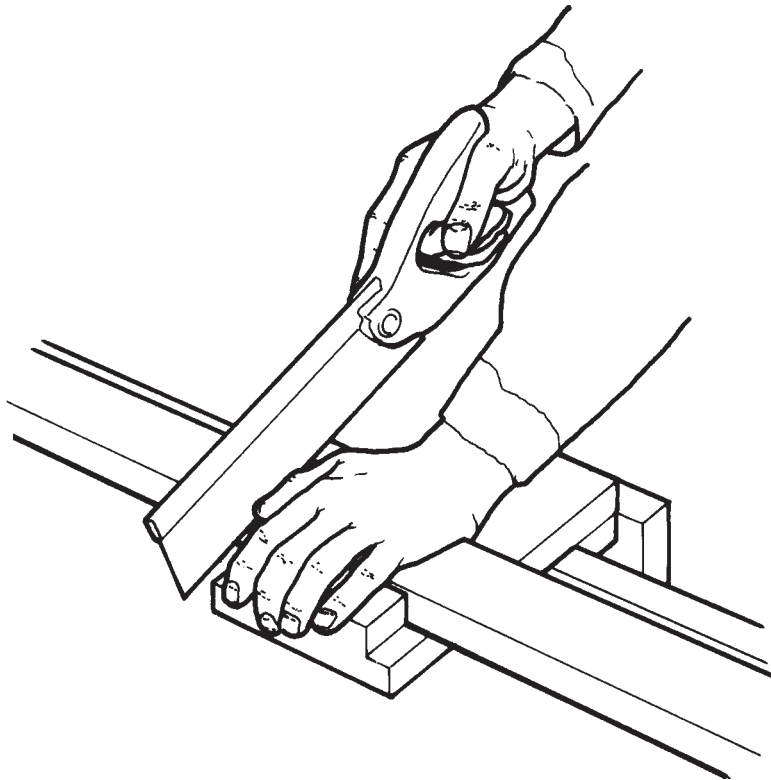
When you need to saw a piece of material to a length or shape try asking yourself the following questions;

- **Is the material clearly marked out so that you have a line to follow when you are sawing ?**
- **Is the material securely held in a vice, or clamped to a bench on a bench hook ?**
- **Is the material held in the right position ?**

For example, if you are sawing acrylic sheet in a metalwork vice, the cut needs to be close to the jaws of the vice or the material will vibrate or shatter.

- **Are you using the right saw for the shape and material that you are cutting ?**
- **Are you holding the saw correctly ?**

One of the main difficulties with sawing is starting the cut in the first place. This is when the saw may slip across the material. A good practice is to start the cut on the opposite side of the material from you, and to start it by pulling the saw backwards until a small groove is created. You can put your thumb on the line that you have drawn to saw along and rest the saw against it, if you are careful you will not cut yourself. Once you have cut the groove the saw has got somewhere to sit in and you can start sawing normally.



When you have finished sawing put the saw back in its rack or cupboard.

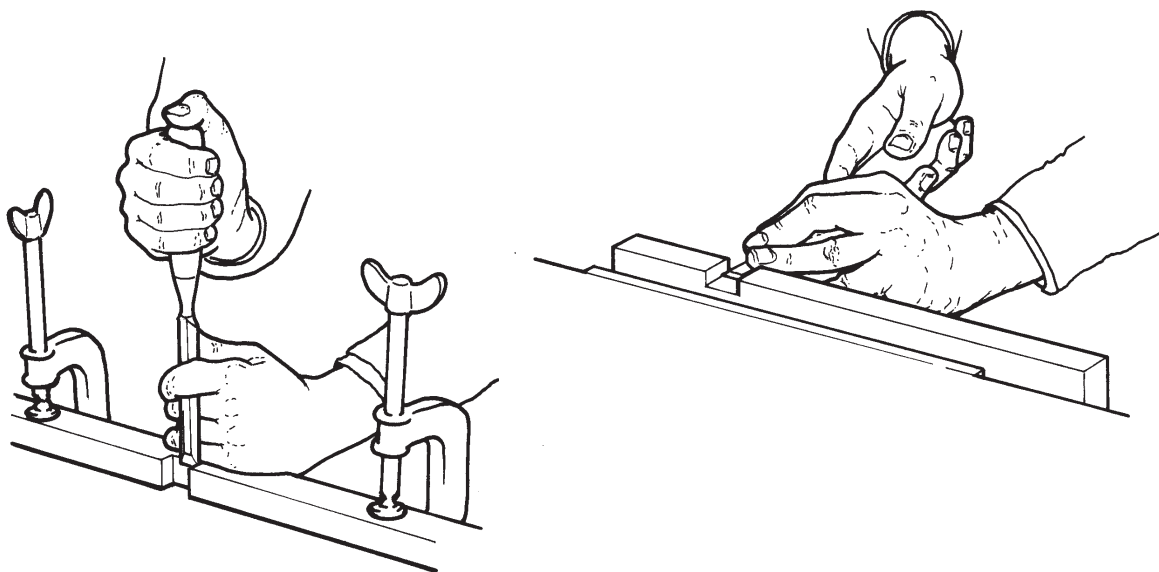
### CHISELS

Chisels are precision wood working tools that are designed to remove small parings or chips of timber. Sometimes to do this effectively they have to be struck by a mallet. Like all woodworking tools they have to be kept very sharp if they are to work properly. In fact they are safer to use when they are sharp than when they are blunt. If they are blunt they have to be forced to cut and forcing them can cause them to slip.

When you are using a chisel;

- **never hold the workpiece in your hand. Make certain that the workpiece is securely held in a vice or by a G clamp to a bench**
- **always work away from you. Never push the chisel towards yourself.**
- **hold the chisel properly. Look at the illustration below. Look at the way the hands are positioned when paring vertically and horizontally.**
- **If a chisel slips off a bench do not try to catch it. Better the chisel is damaged on the floor than damages your hand on the way down.**
- **Be careful as you carry a chisel across a workshop. Hold it with the cutting edge pointed at the floor.**

When you have finished using the chisel put it back in its rack or cupboard.

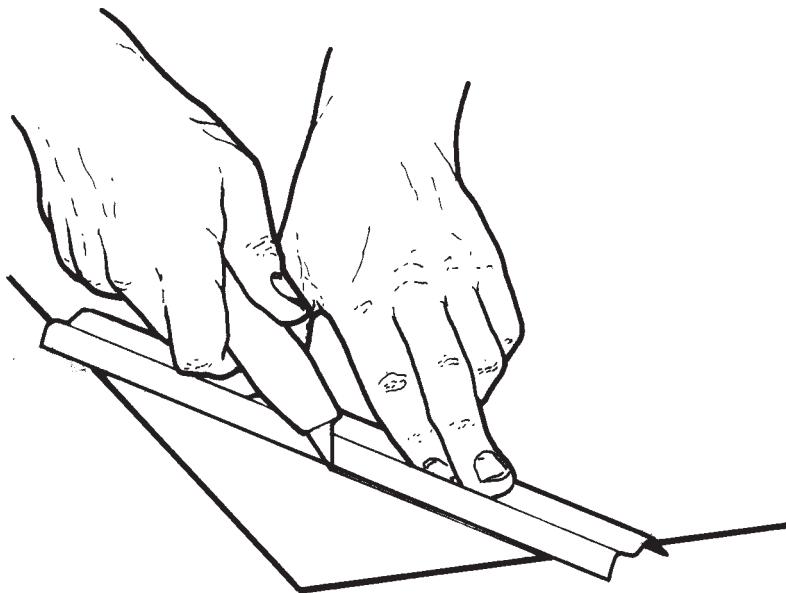


### CRAFT KNIVES

Craft knives, such as Stanley knives, should only be used to cut paper or cardboard. Being a very sharp hand tool many of the suggestions made in the section on chisels also apply to craft knives.

Craft knives are often used to make straight cuts. These should always be made against the edge of a safety ruler. Look at the illustration below to see the best way to hold the craft knife and safety ruler.

- **A craft knife will ride over the edge of a metal workshop ruler. Always cut against the edge of a safety ruler.**



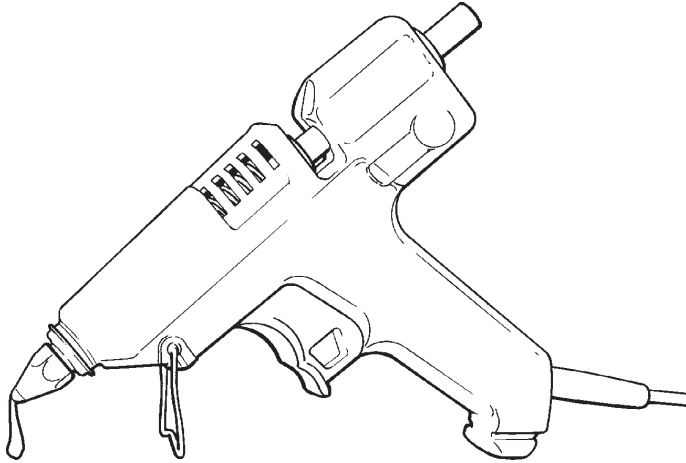
### GLUE GUNS

Hot melt glue guns have become very popular in school workshops over the past few years. They are useful for making prototype models when the finish of the item is not too important. Unfortunately they have also become a major cause of accidents because people do not realise exactly how hot the glue is.

The glue inside a hot melt glue gun melts at between 180°C and 200°C. This is much hotter than the boiling point of water. Although the glue cools quickly when it leaves the gun it is at this very hot temperature when it comes out. And the nozzle of the gun is at this temperature all the time.

## HEALTH AND SAFETY

- **Never touch the nozzle of a hot melt glue gun**
- **Do not touch the molten glue. Allow a couple of minutes for it to cool down first.**

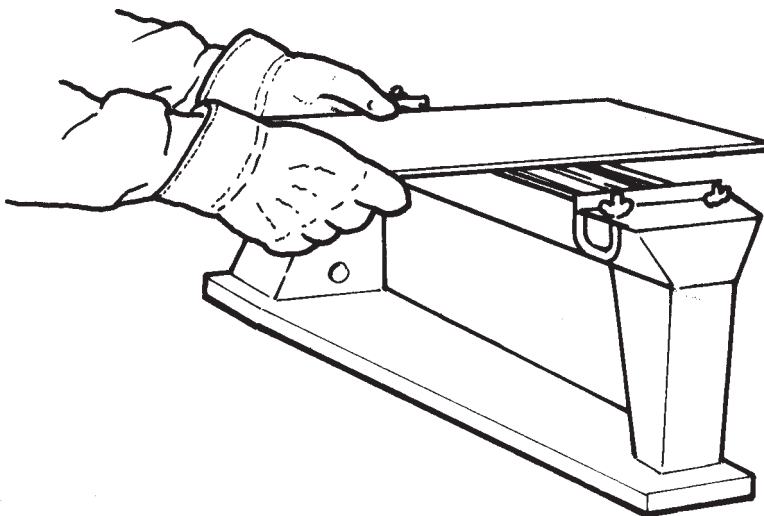


### HANDLING HOT MATERIALS

Sometimes in a workshop situation you will need to heat materials. You may need to do this for example when you thermoform sheet plastics, braze metals together, or heat metals so that you can form them. When you handle hot materials

- \* **you will need to wear suitable protective gloves.**

These are usually large white gauntlets made of substitute asbestos.



Be careful handling materials that you find on brazing hearths and other hot areas. They may not be cherry red but they still might be hot.

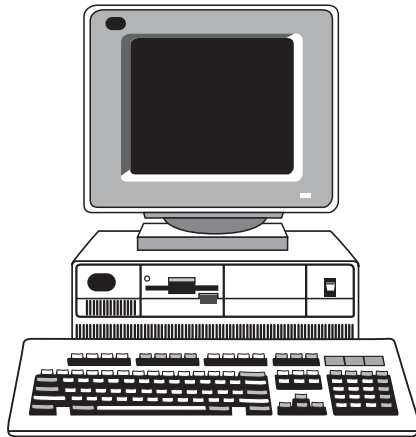
### COMPUTERS

More and more computers are finding their way into workshops. They are used for graphics and design work and computer aided design and manufacture.

Some people find computers very addictive. Looking at a computer screen for long periods is not good for your eyesight. The European Union has laid down guidelines for computer use which state that

- **you should not spend longer than forty minutes in any hour looking at a computer screen.**

When you have been working on a computer for a while give your eyes a rest by looking at something in the distance.

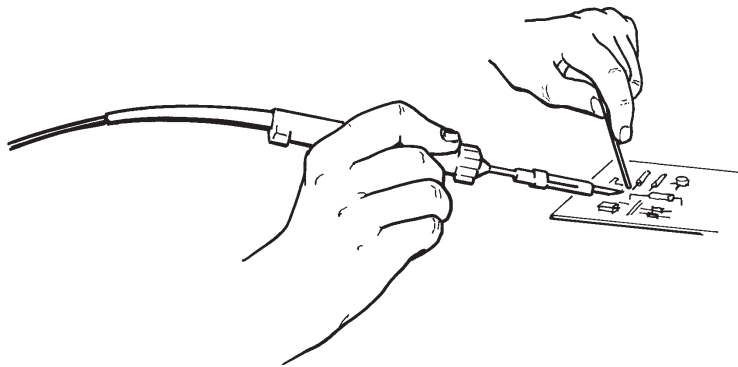


### SOLDERING IRONS

Much technological activity nowadays requires the construction of electronic circuits. This involves the use of soldering irons to mount electronic components. Although soldering appears to be a very simple process it does, in fact, require considerable practice and an awareness of some fundamental safety implications.

When using a soldering iron you must remember :

- **The tip of the irons heats up to approximately 350°C. Do not touch the tip of the soldering iron.**
- **When the soldering iron is switched on but not in use it must be stored in an appropriate stand. Do not lay the soldering iron down on the work bench. The tip will easily burn most work surfaces.**
- **In a school workshop only low voltage soldering irons should be used. This means that if the cable is accidentally burnt through there is no danger of fatal electric shock. You can tell if you are using a low voltage iron as there will be some kind of transformer unit between the iron and the mains plug.**
- **When solder is melted the flux in the solder will burn. This gives off fumes that look like grey smoke. These fumes are harmful. Do not breathe them. Soldering should always take place in a well ventilated room or with special extractor units available.**
- **The solder that is used to mount electronic components is an alloy of lead and tin. Lead is poisonous. Do not put solder into your mouth. Lead is a very soft metal. When you have been using solder small quantities will rub off onto your fingers. You must wash your hands after soldering.**



### LEARNING ACTIVITIES

Now that you have read this booklet here are some activities for you to do that will make you think about being safe in your workshop.

- **Think of how you normally present yourself in a workshop. Go back to the section on personal presentation and list what you have got to change and do to make yourself more safe.**
- **Draw a plan of your workshop. Mark where all the machines and stop buttons are.**
- **Do some drawings of the machine tools in your workshop and label their different parts.**
- **Make some notes on what each part does and how it connects to the other parts.**
- **Make a list of the activities that you can do on each machine.**
- **Take this book and read through the safety check lists on the disc sanding machine, the pillar drill and the centre lathe again while standing in front of the machines. Make certain that you understand what each check point means.**

### FACTS ABOUT ACCIDENTS

- **You must take some responsibility for your own personal safety.**
- **Most accidents happen where people have wrongly assessed the risk of an action, or did not know what the risk was in the first place.**
- **Accidents happen in workshops when people do not know how to do something correctly.**
- **Accidents happen when people are trying to do the wrong activity with a tool or machine.**
- **People have accidents in workshops when they are not concentrating.**
- **If you are not certain that what you are doing is safe, ask.**

### A CHECK LIST OF PERSONAL SAFETY

- **The Health and Safety at Work Act requires you, by law, to be safe.**
- **If you are acting in a way that is a danger to yourself or others you can be required, under the Health and Safety at Work Act to leave a workshop immediately.**
- **Workshops should be kept clean and tidy.**
- **School bags should be put in one corner of the workshop as soon as you enter it. They should not be kept around benches where they can be fallen over.**
- **Scrap offcuts of material should be picked up and put into scrap bins.**
- **During practical sessions keep the main workshop floor area free from stools.**
- **Do not try to do practical, making activities sitting down. You are making it harder for yourself.**
- **Never blow dust away from the work area, use a hand brush to sweep it onto the floor.**
- **If you get into difficulties on a machine, or see someone else in difficulties, push a red stop button.**
- **Keep the area you are working in clear of excess tools and materials.**
- **Put materials away once you have taken what you need.**
- **Put tools back in their racks or cupboards once you have used them. It is selfish to hang on to a lot of tools that other people may need.**
- **Always carry tools, especially edged tools, for example chisels and saws, with their cutting edges pointing downwards.**
- **When carrying materials that are large or long, for example sheet plastics or lengths of wood, be very aware of the other people around you.**
- **Never run in a workshop. There is no need to and it is very dangerous.**
- **You should at all times wear adequate protective clothing, for example an apron.**

- **You must wear safety glasses, goggles and when necessary a full face shield when using machine tools or carrying out hazardous operations.**
- **School clothing should be tucked in underneath an apron and shirt sleeves and the sleeves of pullovers should be rolled up.**
- **Loose ties should be tucked into shirts and scarves should never be worn in a workshop.**
- **It is dangerous to wear loose jewellery in a workshop. Take it off and give it to your teacher to look after until the end of the lesson.**

### A CHECK LIST FOR SAFE PRACTICE IN THE USE OF MACHINE TOOLS

- **You have got to concentrate on what you are doing when you are using machine tools.**
- **Only use a machine tool after you have been taught how to use it, and when you have been given permission to use it by a member of staff.**
- **You need an understanding of the design of the machine and what the appropriate use for the machine is.**
- **You have to understand how to set up a machine correctly, i.e. how to hold the cutting tool and the workpiece.**
- **You need an understanding of the correct speed that the machine should run at with regard to the work undertaken and the material being cut.**
- **You need to be aware of some of the other hazards arising from dust and swarf when using machines.**
- **You need to keep the machine and the surrounding area clean and tidy.**
- **Do not get too close to a person using a machine. Give them room, and remember only one person can use a machine at any one time.**
- **Never touch the moving parts of a machine.**
- **When you use a machine you need an understanding of personal safety and the safety of others in the working environment.**