

# S3 Design and Manufacture

OLHS Technical Department



# Spice Rack

Theory Booklet

# Information Sheet 1

*In this unit you will be manufacturing a Spice Rack which will hold Spice Jars. During the manufacture process you will further develop knowledge and understanding of the skills from S1 and S2. You will also be involved in producing a **Design Folio** for the Spice Rack during your Knowledge and Understanding lessons in the graphics room.*



## Learning Outcomes

- Safety in the workshop.
- Identification of hardwoods and softwoods and their uses.
- The use and naming of various tools.
- The use of various finishes on wood and why they are used.
- Various types of joint used to secure wood together.

**First, you should remember all of the safety rules you have learned to date and which should be observed at ALL times.**

e.g.

- Ask your teacher if you are unsure about anything.
- Wear an apron, safety glasses and all other safety equipment as required.
- Tie back long hair. You will not be allowed at machines if you do not.
- Tuck in loose clothing.
- Walk, don't run.
- Never carry on.
- Listen carefully to all instructions and follow them precisely.
- Do not throw anything in the workshop.
- Do not distract others while they are working.
- Keep your workspace tidy at all times.
- Make sure you know where all the EMERGENCY STOP buttons are located.



# THE TIMBER TREE



By Mr. Cooper  
& Miss Giles

## Hardwoods and Softwoods:

## The Difference

- The terms softwoods and hardwoods are used to describe the leaves, seeds and structure of the trees.
- It is not used to describe the type of wood produced.

### Examples

- Balsa is light and very soft to use. It is used to make light weight models. It is however a hardwood.
- Yew is a coniferous tree, softwood, but is heavy and hard to use like some hardwoods.



# Information Sheet: Hardwoods



## ■ *Hardwoods*

Hardwoods are produced by **broad leaved trees** whose seeds are enclosed in fruit e.g. acorns. They have a variety of grains and a multitude of colours as well as having few knots. They generally grow very slowly, taking around 100 years to mature, and are expensive.

There are two types of hardwoods.

## ■ *Deciduous Hardwoods*

These are the trees that lose their leaves in winter. They generally grow in **temperate** (mild) climates including the British Isles, Europe, Japan, New Zealand, Chile, and central U.S.A.

Examples of Deciduous Hardwoods are:-

*Oak, Ash, Elm, Beech, Birch, Walnut, Sycamore, Chestnut and Lime.*

## ■ *Evergreen Hardwoods*

These are trees that keep their leaves all the year round. They generally grow quicker than deciduous trees and grow to a larger size. They are usually softer and easier to work than deciduous trees.

There are only two European evergreens and these are **holly** and the **laurel**. Most evergreens are found in **tropical** or **sub-tropical** countries such as South America, central America, Africa, Burma, India and East and West Indies.

Examples of Evergreen Hardwoods are:-

*Mahogany, Teak, African Walnut, Iroko, Afrormosia, Ebony and Balsa.*



# Information Sheet: Softwoods



## ■ *Softwoods*

These are produced by the **cone bearing trees** (conifers).

They are generally evergreen and have easily recognizable needle-like leaves.

They grow in cold or cool temperate climates.

These are countries such as Canada, Scandinavia and Northern Russia.

They grow much quicker than hardwoods but have many knots and are cheaper, softer and easier to work.

Their seeds are held in cones.

Common examples are:-

*Pine, Fir, Spruce, Larch, Cedar and the Giant Redwood.*



# Information Sheet 2

The following information is about wood and its different types as well as their properties.

- The terms **SOFTWOODS** and **HARDWOODS** are used to describe the leaves, seeds and structure of the trees. It is not used to describe the type of wood produced.  
e.g. Balsa is light and very soft to use. It is used to make light weight models. It is however a hardwood. Yew is a coniferous tree, softwood, but is heavy and hard to use like some hardwoods.
- The table displays a variety of common hardwoods. It explains where and why each wood is used. It also explains the properties of hardwoods and provides information on the advantages and disadvantages of using each one.

Table 1: **Hardwoods**

Name	Uses	Advantages	Disadvantages	Colour
<i>Beech</i>	A very HARD wood used for furniture, floors, veneers and wooden toys.	Hard, tough and very strong. The close grain withstands wear and shocks.	Not suitable for outside work because it is not durable to moisture changes. Difficult to work and does warp	White or pinkish
<i>European Oak</i>	Boat building, garden furniture, quality furniture and gate posts.	Very strong and durable. It is both hard and strong. Easier to use than beech.	Heavy and expensive, prone to splitting and its tannic acid content corrodes iron and steel fittings.	Light to dark brown
<i>Elm</i>	Turnery, garden furniture when correctly treated, some furniture.	Elastic, tough, durable, does not split easily, medium weight, good for use under water.	Will warp unless well seasoned.	Light reddish brown
<i>Teak</i>	Ships decks, garden furniture, veneers.	Naturally durable to moisture because of its oil content. Does not corrode iron and steel fittings, strong and hard.	Difficult to glue because of the moisture content. Blunts tools very quickly.	Golden brown
<i>African Mahogany</i>	Shop fittings, furniture, veneers	Available in wide long boards, easy to work, fairly strong	Warp, hardness varies.	Pink to reddish brown
<i>Meranti</i>	A mahogany substitute. Furniture, interior joinery. Can be used outside if preserved properly.	Cheaper than mahogany	Does not polish as well as mahogany.	Dark red or yellow
<i>African Walnut</i>	High class furniture. Sometimes used a teak substitute in furniture.	Attractive appearance. Available in larger sizes.	Can be difficult to plane and finish.	Bronze, yellowish brown with irregular dark lines
<i>Afrormosia</i>	Sills, gates, doors, stairs, floors.	Works well, durable	Stains in contact with iron and moisture	Yellow to dark brown



## Information Sheet 2a

The table displays a variety of common softwoods. It explains where and why each softwood is used. It also explains the properties of woods and provides information on the advantages and disadvantages of using each one.

Table 2: **Softwoods**

<u>Name</u>	<u>Uses</u>	<u>Advantages</u>	<u>Disadvantages</u>	<u>Colour</u>
<i>Redwood, Scots Pine, Pine, Fir</i>	Suitable for all types of indoor work. Used for wood turning. Can be used outside with suitable preservatives	Fairly cheap and readily available, easy to work and finishes well. Durable.	Knotty.	Cream to pale reddish brown.
<i>Parana Pine</i>	Staircases and furniture	The best quality internal softwood, attractive grain. Available in long and wide boards. Works easily.	Lacks toughness. Does tend to warp and can be expensive.	Pale yellow with attractive streaks.
<i>Western Red Cedar</i>	Cladding for the outside of buildings.	Resistant to insect attack because of natural preservative oils. Weather and dry rot. Knot free. Very durable. Very easy to work.	More expensive than red or whitewood. Not that strong.	Dark reddish brown.
<i>Douglas Fir</i>	Outside construction, ladders and masts.	Water resistant. Knot free, durable and easy to work.	Splits easily.	Attractive reddish brown
<i>Whitewood Spruce</i>	General outside work.	Resistant to splitting. Easy to work.	Small hard knots. Not durable.	Pale creamy white

### Dowel Rods

Dowel rods, or cylindrical wooden pegs, are available in sizes from 3mm to 50mm.

Common timber used for dowel rods are Ramin or Beech.



# Assignment

*Using the previous tables answer the following questions.*

1. Which type of hardwood would be suitable to make tough kitchen surface tops from? The surface would have to withstand shocks and wear.
2. If mahogany proves too expensive to use what would be an ideal substitute?
3. Give two examples of suitable hardwoods that may be used to make quality garden furniture?
4. A manufacturer intends to create wooden sailing boats. Suggest a suitable hardwood?
5. Explain why European oak is not normally joined together with iron and steel fittings?



## Assignment (cont)

*Using the previous tables answer the following questions.*

6. Name one property of Teak which makes it difficult but not impossible to use?
  
  
  
  
  
  
  
  
  
  
7. Why is Western Red Cedar a suitable material to use in the construction of children's playgrounds?
  
  
  
  
  
  
  
  
  
  
8. Name a softwood that is water resistant?
  
  
  
  
  
  
  
  
  
  
9. Explain what happens to Afrormosia if is placed in contact with iron in damp conditions?
  
  
  
  
  
  
  
  
  
  
10. Name a hardwood which is both elastic and strong.  
This type of hardwood is also durable and does not split easily.



# Information Sheet 3

## *Timber: Processing*

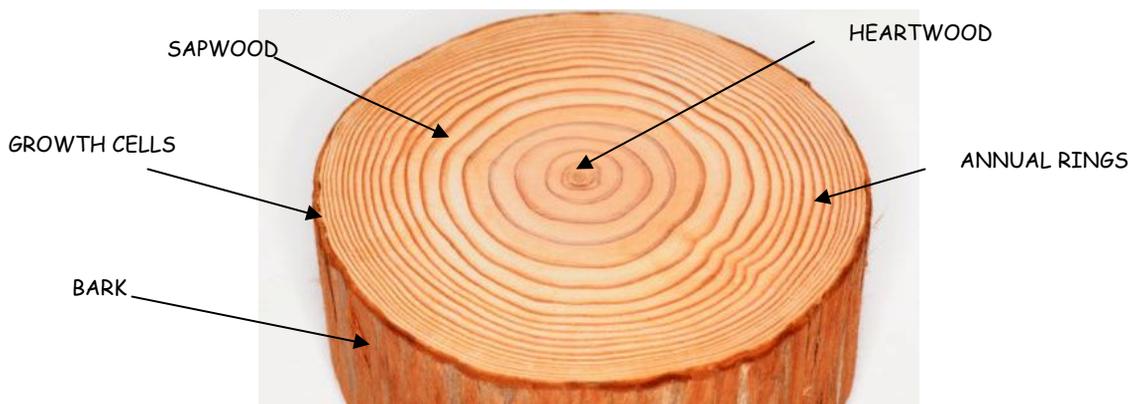
*There are three areas in timber processing:*

- *Growth*
- *Conversion*
- *Seasoning*

### ■ *Growth*

Trees grow by an action called **PHOTOSYNTHESIS** in their leaves. This is where the energy from sunlight along with nutrients in the earth and of course, water, combine to provide food for the tree.

Each summer, new growth in the tree shows up as an **ANNUAL RING**, which is often used to provide the age of the tree when counted.



*Heartwood:* This is the part of the tree which is mostly used in timber construction.

*Sapwood:* This is the part which surrounds the heartwood and conveys water and minerals up to the branches and leaves to provide food for the tree.

*Annual rings:* These are the distinct patterns of each years growth.

*Growth cells:* This is the layer surrounding the sapwood and is the layer which makes new wood and also makes new bark to replace dead bark.

*Bark:* This is a layer of protection for the tree.



# Information Sheet 3a

## *Timber: Processing*

*There are three areas in timber processing:*

- *Growth*
- *Conversion*
- *Seasoning*

### ■ **Conversion**

When a log (cut down tree with branches removed) arrives at the sawmill it is cut into boards, planks, battens, etc. by circular saws or bandsaws.

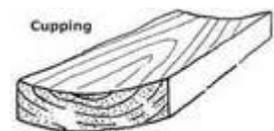
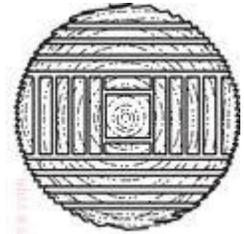
This process is called **TIMBER CONVERSION**.

There are two methods that are used.

### ■ **Through and through cutting (Slash Sawing).**

This is the simplest method as the boards can be cut to any thickness parallel to each other.

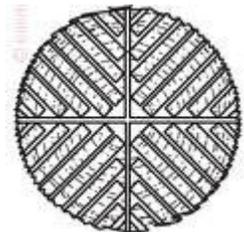
When a log is cut in this way the boards tend to "cup" and attractive grain patterns can be lost.



### ■ **Quarter sawn**

When a log is quarter sawn most of the boards are cut on the radius of the log. This reduces the tendency for the boards to "cup".

It is also a more costly method of cutting the log.



# Information Sheet 3b

## *Timber: Processing*

*There are three areas in timber processing:*

- *Growth*
- *Conversion*
- *Seasoning*

### ■ **Seasoning**

The seasoning of timber is very important and must be carried out properly.

The aims of seasoning are:

- (1) to reduce the moisture content*
- (2) to prevent attack by fungi and insects*
- (3) increase the strength of the timber*

When a tree is felled it contains a large amount of water. In this condition it is known as "green" timber. To reduce this moisture content the timber is seasoned, i.e. partially dried out.

Different uses for timber require a different moisture content.

### Additional Notes

- ***Moisture content (MC)** is a measure of how much water is in a piece of wood relative to the wood itself.*
- *MC is expressed as a percentage and is calculated by dividing the weight of the water in the wood by the weight of that wood if it were oven dry. For example, 200% MC means a piece of wood has twice as much of its weight due to water than to wood.*
- *Two important MC numbers to remember are **19%** and **28%**. We tend to call a piece of wood dry if it is at 19% or less moisture content.*



# Information Sheet 3c

## *Timber: Processing*

*There are three areas in timber processing:*

- *Growth*
- *Conversion*
- *Seasoning*

### ■ Methods of seasoning

There are two common methods of seasoning timber;

*(1) natural, or air, seasoning*

*(2) kiln seasoning*

### ■ Natural seasoning

This is a slow process as it relies on the sun to complete the process.

The picture shows how the planks of timber are set up.

The sun is required to heat up the air which is passed between the planks by the wind.



Natural seasoning

### ■ Kiln seasoning

Kiln seasoning is a faster method of drying as higher temperatures can be reached and the air is circulated more effectively.

A kiln is constructed and heated by pipes containing hot water or steam. The pipes are laid at the bottom of the kiln so that the hot air rises. The air is normally circulated using fans.



Kiln seasoning



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## Assignment 2

*Answer the following questions based on the information you have just discussed.*

1. What are growth cells?
2. What is an annual ring?
3. How can the age of a tree be worked out?
4. Sketch a sawn tree trunk and show the five main features that can be seen on the surface.
5. What does the term 'conversion' mean?



## Assignment 2(cont)

*Answer the following questions based on the information you have just discussed.*

6. Draw two examples of common methods of converting tree trunks.
  
  
  
  
  
  
  
  
  
  
7. Identify which method of 'conversion' can result in 'cupping' and give a sketch of what this will look like.
  
  
  
  
  
  
  
  
  
  
8. Give reasons why timber must be 'seasoned' before being used.
  
  
  
  
  
  
  
  
  
  
9. What are the two most popular methods of 'seasoning'?
  
  
  
  
  
  
  
  
  
  
10. Which of the two will season timber quicker?



## Information Sheet 4:    Forms of supply

Timber is supplied in various forms. The type of timber which you would purchase is based on what the timber is to be used for.

- ***Baulk timber***

A baulk is a piece of timber which is roughly squared before it is fully converted. Its dimensions are at least 115x110mm



- ***Plank***

A softwood plank is a piece of timber which is more than 275mm in width and between 50 and 100mm thick. A hardwood plank can be any width and more than 50mm thick.



- ***Deal***

Deal is a term applied to softwoods 250mm to 280mm in width and from 50 to 100mm thick.



- ***Batten***

Battens are cut from softwood only. Their widths range from 100mm to 200mm and their thicknesses from 50mm to 100mm.



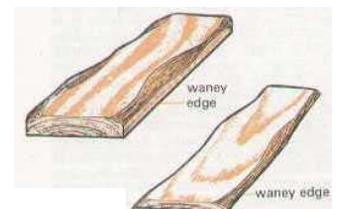
- ***Square section***

As the name implies, this timber is cut square. The size ranges from 25mm to 125mm square.



- ***Waney edge***

A waney edge board is one where the sawn section retains part of the bark. Waney edge boards have little commercial value. But they make attractive fencing and garden furniture.



## Information Sheet 4a: Man-made Boards

### *Forms of supply:*

*The following are types of manufactured material supplied as large, flat boards. These boards are also called Man-Made Boards and are produced in factories and supplied in Standard Sizes.*

*A full size board measures 2240x1220mm.*

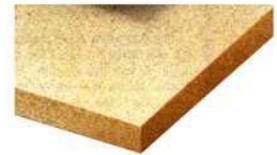
### ■ ***Plywood***

Made from thin layers, or plies, of material glued together at with each grain direction at 90° to the one next to it. This makes plywood extremely stable and flat. There are always an odd number of plies which ensures the outer layers always have the grain running in the same direction.



### ■ ***Medium Density Fibreboard (MDF)***

Made from fine wood fibres, compressed and glued together. When in use it is normally covered by a plastic or wood veneer.



### ■ ***Blockboard***

Made by gluing strips of softwood together, edge to edge, and surfacing both sides with a veneer.

Each adjoining piece of softwood is glued to oppose the grain of the one next to it. This has the effect of preventing warping and twisting of the board.



### ■ ***Chipboard***

Made from wood chippings or waste wood chippings glued together. The surface is coated with smaller chippings glued and compressed to make the finished surface.



### ■ ***Hardboard***

Made by mixing wood pulp with water. The water is removed and the pulp is compressed and glued at a temperature of 200°C. It is smooth on one side and rough on the other.



## Information Sheet 4b: Man-made Boards

*Forms of supply:*

*The following are types of manufactured material supplied as large, flat boards. These boards are also called Man-Made Boards and are produced in factories and supplied in Standard Sizes.*

*A full size board measures 2240x1220mm.*

### Table 3: **Man-Made Boards**

<u>Name</u>	<u>Properties</u>	<u>Uses</u>	<u>Cost</u>
<i>Plywood</i>	Strong in all directions due to each layer (ply) being laid at right angle to the previous layer. Very stable but will warp when wet.	Table tops, worktops, drawer bottoms, cabinet backs, lightweight box construction, small boats.	Medium
<i>Medium Density Fibreboard</i>	Does not warp easily, cuts and planes well without splitting, needs a finish.	Table tops, work tops, interior joinery.	Medium
<i>Blockboard</i>	Does not warp easily, very strong, rigid and heavy. Edge finishing is difficult.	High quality furniture, stage flooring, fire doors	High
<i>Chipboard</i>	Heavy. Can warp easily, difficult to join pieces together. Needs a finish.	Plastic coated furniture, partitions, worktops.	Low
<i>Hardboard</i>	Not very strong, warps easily and needs a finish.	Door panels, drawer bottoms, cabinet backs.	low



# Information Sheet 5

## *Tools and their use.*

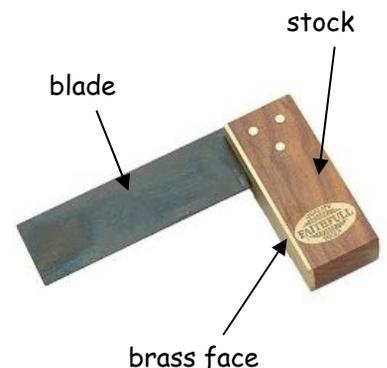
*This section will show you the tools you will be using as well as their name and correct use. You are required to learn and memorise this information for use in the workshop and for examination purposes.*

### ■ **Try Square**

The woodworkers try-square is composed of two main parts - the stock and the blade. The blade is made from hardened and tempered steel which makes it resistant to damage.

The stock is usually made from rosewood. A brass face is added to the stock to ensure a straight edge.

The try-square is pushed against the straight edge of a piece of wood and a marking knife is then used to mark a straight line across the material.



### ■ **Tenon Saw**

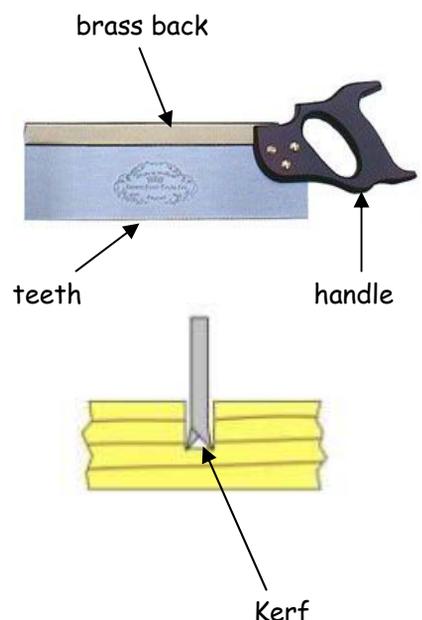
Back Saws get their name from the steel or brass back (labelled on the diagram). The heavy back gives the saw its weight which is useful when sawing wood. The weight of the saw along with the forward sawing motion allows the saw to cut through woods relatively easily.

The two main types are the tenon saw and the dovetail saw.

TENON SAW : for general sawing and cutting mortise and tenon joints.

DOVETAILED SAW : for cutting joints such as dovetails

The saw cut left after using the saw is known as a KERF.



# Information Sheet 5a

## Tools and their use.

This section will show you the tools you will be using as well as their name and correct use. You are required to learn and memorise this information for use in the workshop and for examination purposes.

### ■ **Bevel Edged Chisel**

A chisel is a tool with a characteristically shaped cutting edge of blade on its end, for carving or cutting a hard material such as wood, stone, or metal.

BEVEL edged chisels are slightly undercut making them easy to push into corners. They are normally used for finishing dovetail joints.

**Safety** is always a priority when using chisels.

THE MATERIAL BEING CUT SHOULD BE HELD FIRMLY IN A VICE OR CLAMPED TO A BENCH TOP. FURTHERMORE, KEEP BOTH YOUR HANDS BEHIND THE CUTTING EDGE AT ALL TIMES.



BEVEL EDGE CHISEL REACHES INTO THE CORNER OF A DOVETAIL JOINT

### ■ **Wooden Mallet**

A wooden mallet is a striking tool normally used in combination with a chisel. The chisel is held in place in one hand and the mallet is used to strike the handle to provide the cutting action.

It is normally made of a hardwood (generally beech because of its properties).



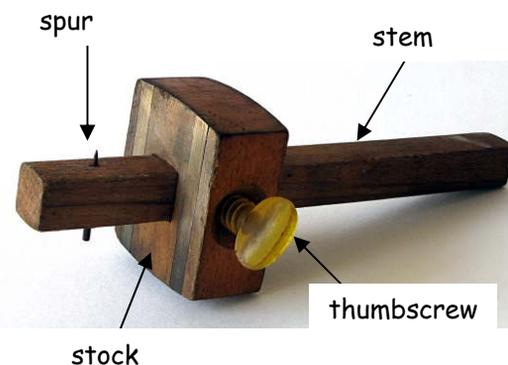
### ■ **Marking Gauge**

A marking gauge is used to mark a line parallel to a straight edge. The stem and stock are made from beech and the thumbscrew from clear yellow plastic.

The gauge has a sharp point called a spur which scribes the line into the wood.

The stock of the marking gauge is pressed firmly against a straight edge of the wood and pushed carefully along it. A little pressure is applied to the spur, too much pressure and the spur digs into the wood.

It is a good idea to lightly scribe a line along the surface first and then repeat the process two or three times until an accurate scribed line can be seen.



# Information Sheet 5b

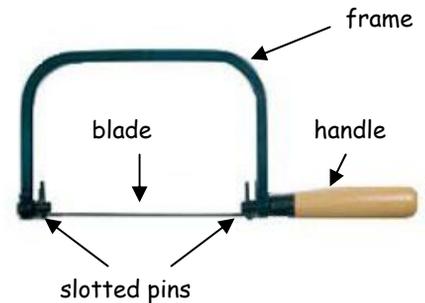
## Tools and their use.

This section will show you the tools you will be using as well as their name and correct use. You are required to learn and memorise this information for use in the workshop and for examination purposes.

### ■ **Coping Saw**

Coping saws are used for cutting a range of woods and are very useful for cutting unusual shapes or curves.

The blade is 150mm in length and at each end there is a pin that holds the blade to the frame. To fit a new blade the handle is loosened to take the tension out of the blade. The blade fits into two slotted pins on the frame of the coping saw and the handle is tightened to tension the blade.



### ■ **PVA Glue**

Polyvinyl Acetate (PVA) is probably the most common type of glue used in a school workshop. It is a white water based liquid adhesive.

It is easy to apply, non-staining, strong and attains its maximum strength after 12 hours.



### ■ **G-Clamp**

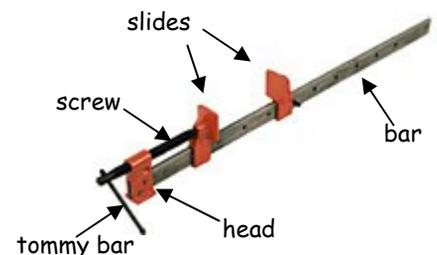
G Cramps are an essential tool in the workshop and they come in a range of sizes and are generally used for clamping work securely to a surface/workbench top. They can also be used to hold parts together whilst glue is drying.



### ■ **Sash Cramp**

Sash clamps are used to clamp work together when it is glued. They vary in size and are normally used in pairs. The lengths are normally from 460mm to 1370mm. The bar is made from cold drawn mild steel and the head and slides are made from malleable iron.

When in use, the sash clamp is placed below the work to be glued / assembled. The slides are arranged on either side and scrap wood is placed between each face and the work. This protects the work when the thread is tightened.



# Information Sheet 5c

## *Tools and their use.*

*This section will show you the tools you will be using as well as their name and correct use. You are required to learn and memorise this information for use in the workshop and for examination purposes.*

- ***Pin Punch***

This is used to drive the head of small pins below the surface of the wood. The hollowed point of the punch is placed over the head of the pin and the head of the punch is hit with a hammer.



- ***Cross Pein Hammer***

The most useful hammer in the workshop is the cross pein, where the pein can be used for starting panel pins. Handles are normally wood, usually Ash.



- ***Panel Pin***

Panel pins are very thin and light. They are used to fix different pieces of wood together. They are usually made from mild steel.



- ***Hand Router (router plane, grannys tooth)***

The hand router is used to clean out and level off the bottom of trench joints e.g. a housing joint. It is a finishing tool and should only be used after all of the rough work has been completed.



# Information Sheet 5d

## Tools and their use.

This section will show you the tools you will be using as well as their name and correct use. You are required to learn and memorise this information for use in the workshop and for examination purposes.

### ■ The Pillar Drill

The pillar drill gets its name from the fact that it has a central pillar where the table moves up and down for different jobs.

It is designed to hold different types of bits with a round shank up to a diameter of 13mm.

The drill can be either floor or bench mounted depending on the size of the pillar.

**Safety Note:** Drill bit should be secure, workpiece securely held, guards in position and goggles worn.



### ■ The Twist Drill Bit

This type of drill can drill holes in wood, metal or plastic. The bit is generally made from High Speed Steel and the most common diameters are from 1mm to 13mm.



### ■ Chuck Key

The chuck key is used to tighten and loosen the Jacobs chuck on the pillar drill when changing bits.

**Safety Note:** It is essential to remove the chuck key from the chuck before switching the drill on.



### ■ Disc Sander

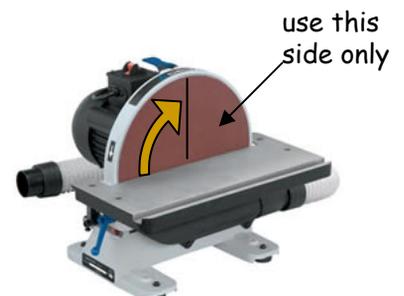
This machine is used to sand End Grain or to bring material down to a finish line.

It should only be used to remove small amounts of material after removal of the majority of the waste material by sawing.

Only the right hand side of the disc should be used as this side provides the down force to your work to keep it on the table. The other side should be guarded.

A fence should also be used unless you are sanding a curve.

All safety rules for machines should be observed when using this machine.



# Information Sheet 6

## *Carcase woodwork joints*

*This section will show you the possible woodwork joints you will be using as well as their name and correct use. You are required to learn and memorise this information for use in the workshop and for examination purposes.*

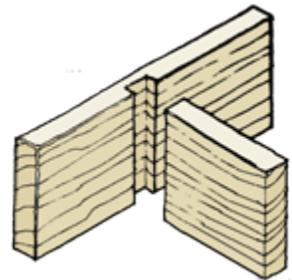
### ■ ***Through Housing Joint***

This is a relatively simple joint to produce. It is most suitable when the two pieces of wood to be joined are the same thickness.

It is ideal for fitting shelves to side partitions.

As can be seen from the sketch a slot is cut all the way across the material. This means that the edge of the joint can be seen.

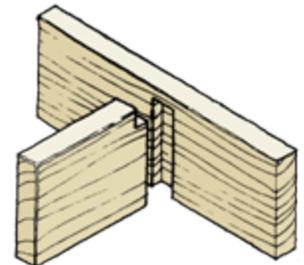
This is sometimes undesirable, therefore a similar type of joint can be used to hide the join.



### ■ ***Stopped Housing Joint***

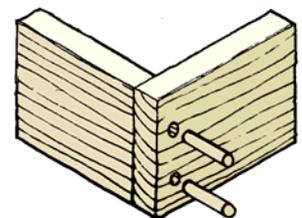
This is similar to the Through Housing Joint but does not allow the joint to be shown at the front.

Instead of cutting the slot all the way across the material the joint is stopped short of the front edge.



### ■ ***Dowel Joint***

A dowel joint can be used as an alternative to other joints where a high level of strength is not required.



# Information Sheet 7

## *Planes and their use.*

*This section will show you the different types of plane you could use as well as their name and correct use. You are required to learn and memorise this information for use in the workshop and for examination purposes.*

### ■ **Jack Plane**

This is used for a wide variety of work.

It is used to remove marks left by saws, to bring timber down to size, to make timber flat and square and for all other planing operations.

It is usually around 400mm in length.



### ■ **Smoothing Plane**

This is used to remove slight irregularities by taking thin shavings from the surface of a piece of wood.

It is also used to clean up surfaces in preparation for glass papering, staining, polishing etc.

It is usually around 230mm in length.



### ■ **Trying Plane (jointer plane)**

The use of the trying plane is essential when large pieces of wood are to be planed accurately.

The trying plane is longer than the Jack plane which enables it to bridge depressions in the wood and to remove shavings from high spots only, so producing a very accurate finish.

It is usually around 600mm in length.



# Information Sheet 8

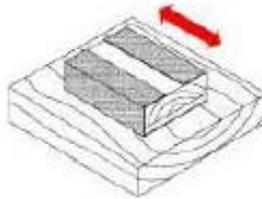
## Finishing wood

This section will give you information on how to best finish a piece of wood for your model **BEFORE** the gluing up process takes place. You are required to learn and memorise this information for use in the workshop and for examination purposes.

### ■ Sandpaper

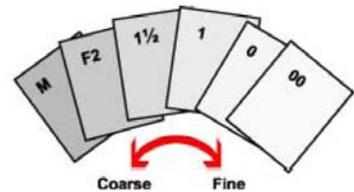
This is used after the construction process is completed to remove any blemishes and pencil marks.

Sanding should always be done in the direction of the grain to ensure a smooth finish. If you do not then you will leave scratch marks across the grain of the material which will have to be sanded off correctly.



To get the best finish on your project then the sanding process is as follows:

- sand the wood with rough sandpaper
- Wet the wood to raise the grain
- Sand with finer sandpaper
- Repeat the process with progressively finer pieces of sandpaper



### ■ Sanding Cork

Whenever you are sanding by hand, the sandpaper should always be wrapped around a sanding cork to maintain the flat surface of the material.



### ■ Orbital Sander

This machine is used to sand large flat surfaces. It is quicker than using sandpaper and a sanding cork.

The pad is vibrated in a rotary motion and pressure is applied on the top of the sander to allow the sandpaper to sand the material



# Information Sheet 8a

## Finishing wood

This section will give you information on how to best finish a piece of wood for your model **AFTER** the gluing up process takes place. You are required to learn and memorise this information for use in the workshop and for examination purposes.

### ■ **Paint/Varnish brush**

A paint/varnish brush is used to apply the required finish coat to a model, either paint or varnish.



### ■ **Varnish**

Where the natural grain of the wood is preferred to be seen, then varnish can be applied to the model.

There are many different types of varnish but in general only two are used in the workshop.

**Polyurethane varnish** - this is a spirit based varnish and brushes must be cleaned with white spirit

**Acrylic varnish** - this is a water based varnish and brushes should be washed thoroughly with warm water.

After a coat of varnish has dried then it should be rubbed down with either fine grade sandpaper or steel wool in preparation for another coat.

When sufficient coats of varnish have been applied, usually 2-3, then wax polish is applied to the wood using steel wool. This should be rubbed in thoroughly and then buffed to a smooth finish using a soft cloth.

Following these steps will ensure a high quality finish and an attractive model at the end of the process.



### ■ **Paint**

Paint can be applied to a wooden product where the natural grain is not required to be seen.

In general this requires an undercoat to seal the wood and then 1-2 coats of well applied paint to finish the model.

Unless a water based paint has been used the brush should be cleaned using white spirit.

