

Makerspace Wood Workshop induction - Handbook

Topics

Safety References:

Safety and Health at the Wood Workshop via the International Labour Organisation:

<https://www.youtube.com/watch?v=ZeF6kfm4nIA>

Ask yourself: How will I do the work? Do I know enough to ensure I will not be hurt?

Health and Safety in the Woodworking Industry:

<http://www.hse.gov.uk/woodworking/>

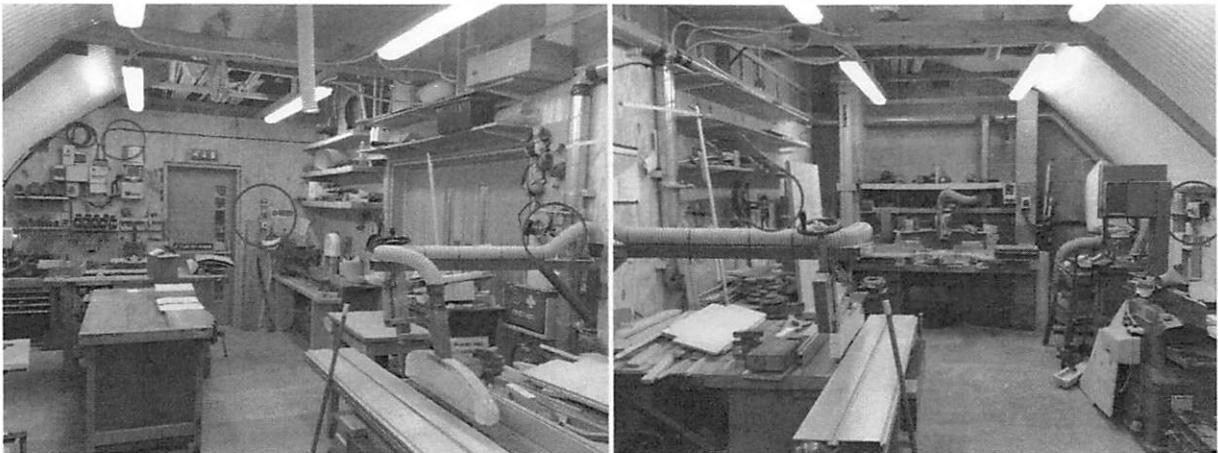
Why are we here?

- We all want to make things out of wood!
- Most people are probably capable of wielding a hand tool, or turning a power tool on and making it cut something. Congratulations - you know enough to damage the Makerspace equipment, and potentially seriously injure yourself or someone else in the process.
- This induction process will show you how to use tools correctly and safely - that protects you, other people in the space, and the equipment - and will also improve the quality of what you make!
- Imagine the wood workshop as a professional building site - we aim to follow as many H&S laws and best practices as we can. If you are being wilfully negligent and cause damage or injury, you could be committing a crime - nobody wants this to happen. Equally, if you get injured (especially through your own actions), you are not covered by any Makerspace insurance. Use the space at your own risk.
- Feeling a bit negative all of a sudden? Remember the first bullet - we all want to make things! Always feel free to ask questions and seek out help.

Health and Safety

- Never use a tool you have not been inducted on
- Been inducted, but can't really remember? Never use a tool if you feel unsure - we all forget things. Ask for a reminder from a woodtech or experienced user.
- **In an emergency, dial 999, ask for an ambulance, and give the Makerspace full address:**
Arch 1129, 41 Norwood Road, London. SE24 9AJ
- REMEMBER:
 - Don't become a casualty! Be aware of dangers when approaching.
 - Shout for help.
 - Get the casualty sat on the floor as fast as possible.
 - Compression - press cleanest material to hand onto a wound

- Don't remove anything lodged in a wound - it could be plugging a damaged artery. Pack clean material around it - don't push it in further.
- Raise the wound above the head and heart.
- **NO LONE WORKING WITH POWERED TOOLS**
 - Only hand tools may be used when you are alone in the Makerspace
 - No-one is permitted to use any powered tool if you are alone in the space - this is in case you injure yourself, and no one is around to help. You can be the only person in the workshop, but someone else must be inside the Makerspace arch at all times. The other person doesn't need to be a member - so you can bring a friend to keep an eye on you!
- **Power Cut Buttons**



The workshop has **five** emergency power buttons

- Push in any of them to kill all power except the lights
- Twist in the direction of the arrows until it pops out to restore power
- Not just for emergency use - last person to leave, push in the switch by the door!
- To get the power going, you may need to check a few switches to find the one that needs releasing
- If you see anyone doing/about to do something dangerous, then hit a switch to kill the power. It doesn't matter whether they are more experienced than you - if you are concerned, kill the power and talk to them. The rule is, you never complain if someone kills your power - it's because someone is concerned for the safety of you, someone else, or the equipment!
- If you are concerned about dangerous/aggressive/dismissive behaviour - tell a trustee or a woodtech - you're doing everyone a favour.
- NEVER approach/touch/shout at someone who is already midway through a power-tool cut - it's safer to kill the power then talk to them.



First Aid Kits

- There is a first aid kit inside the door to the workshop
- If you've used anything, flag it with [someone] and make sure it gets replenished.

- Keep it under wraps
 - Any long hair should be well tied back or covered
 - If you have any ooe or dangling clothing - eg. drawstrings on hoods - tuck them firmly inside, remove them, or remove the piece of clothing.
 - Any lanyards, necklaces, loose bracelets, dangling jewelry, ties, bandanas or neckerchiefs should be removed.
 - Don't risk having anything on which could drag your body parts into a tool!

- Air filter
 - If the power is on, you should hear the extraction system working - if not, tell the woodtechs.

- Be clean and tidy
 - Always aim to leave the space cleaner than you found it!
 - Make sure the space is clean before you start, and after you finish - if someone leaves the space a state, and you don't want to talk to them about it - inform the woodtechs

- There are brushes and pans by the door - and the yellow hoover can be used for sawdust.
- If you are creating a lot of sawdust with your work, don't wait until the end of the job to clean - take a break and sweep up. One spark on a bed of dry sawdust could burn down the Makerspace!
- There is a green wheelie bin specifically marked for wood and sawdust only - anything in here is fair game, and you can use, or take for burning at home.
- There are normal bins for other rubbish and waste



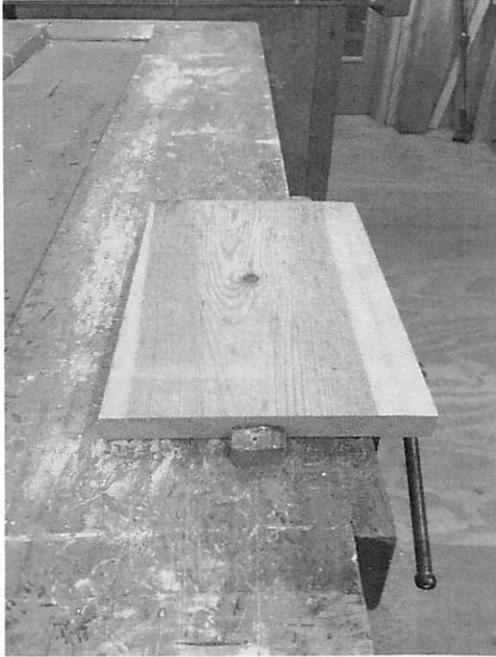
The workbench and its well

Bench etiquette

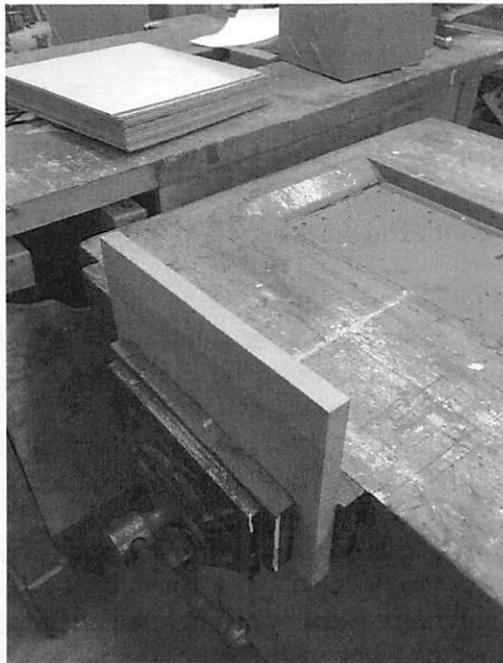
- The workbench has a "well" - the wide turquoise channel running down the middle. This is to make it hard for things to roll or drop off the bench:
 - i. If it's small and rolls, you don't want to lose it
 - ii. If it's sharp or heavy or valuable, you don't want to damage it - or you - or someone else

Always put tools and loose bits and pieces in the well!
 - Give yourself enough space for the job, but don't hog every surface to the detriment of other members. Do one thing at a time, or if you really need a lot of room - come during quieter hours, or ask on Discourse if people are planning to use the workshop at a particular time
- "I just cannae hold it, Jim" (Scotty fails woodwork 101)

- You shouldn't use any hand-held tools on a piece of wood that isn't securely held in place by one of the following methods:



iii. Held onto a bench-hook by the pressure of your weight



iv. Held in a bench vice

Remember you can put the end of a bench-hook in the vice!



- v. Securely clamped to workbench
- o Bench hooks
 - vi. Good for holding a small piece of wood you need to cut with a saw.
 - vii. The bench-hook is (eventually) disposable - it can be "sacrificial" - it doesn't matter if you cut into.
 - viii. **Never be cutting into the workbench itself!**
- o Bench vice
 - ix. Can apply 4 or 5 tons of pressure
 - x. When turning the handle, remember - leftie-loosey, righty-tighty!
 - xi. Push the small metal lever towards the centre of the vice to allow you to slide the vice in and out without lots of turning!
 - xii. Don't over-tighten or under-tighten - your piece should be held firmly enough that you can't wiggle it free when pulling hard, but you shouldn't be straining to do it up or undo.
 - xiii. Remember, if there is space below your piece and above the rails supporting the vice, then it could slip downwards if you are applying pressure from above with a tool - and unexpected movement is dangerous! To stop this happening, consider putting a piece of scrap wood in the empty space - then put the piece you are working with on top of that before tightening the vice.

- Clamps



- xiv. Come in all shapes and sizes
- xv. “Sliding” plastic jawed ones are quicker and easier to attach and release, and won’t mark your wood - but they aren’t that strong.
- xvi. Some of our sliders have very long “arms” - you won’t often need much of that length for clamping. If possible, try to have the arms pointing downwards out of harm's way, rather than upwards - where someone could lose an eye or get impaled. If you have to have an arm pointing into space, then make the end of it very visible to avoid accidents - think polystyrene cup, ball of paper, tinsel, sticking a warning sign to it, etc.
- xvii. Metal “C-clamps” are very strong, but take longer to tighten and release by twisting - and they will mark the surface of your wood. Make sure there is always a sacrificial offcut between the ends of the C-clamp (also called G-Clamp!) and your wood - preferably not too thick - 10-20mm is good.
- xviii. As with the bench vice, don’t over-tighten! Remember - you can always add more clamps...
- xix. It’s often easier to have C-clamp screw thread pointing up, rather than down, so you can see what you’re doing when tightening!
- Bonus tip - near each bench vice is a wooden bar which can be tapped up from underneath using a wooden mallet - this pushes the other end of the bar above the workbench surface, which can be useful as a way to stop materials sliding off the workbench when planing!

- PPE - Personal Protection Equipment



Plastic goggles and masks are located in the red drawer

- Eyes

- Plastic goggles and glasses hang near the door and live in the red metal drawer unit under the mitre saw at the far end of the workshop
- You should wear these when using any powered tool, with the possible exception of the sanders and planer.
- You can wear them any time you want to!
- There is a full face shield by the lathe if required.



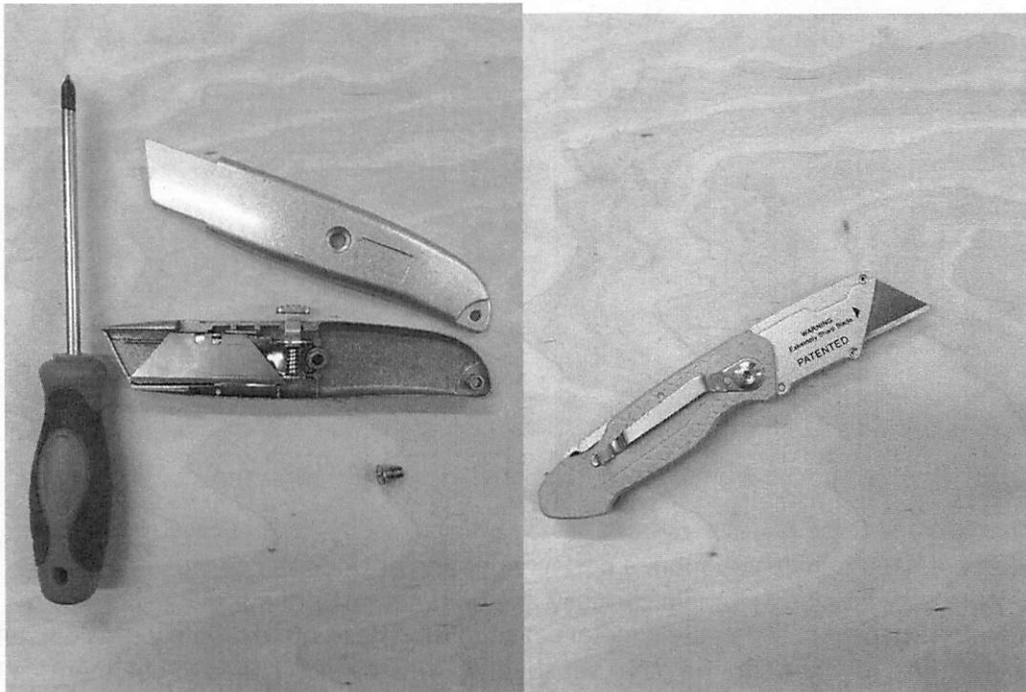
- Ears
 - Ear defenders live next to the main door
 - Where ear defenders any time the noise is painful to you, or when you know you will be making a loud noise for an extended period - eg. electric planing, jigsaw, any of the larger power tools.
 - Don't use where you do not need them though - you want to be able to hear what's going on around you.
 - Remember that hearing damage is cumulative
 - If you have ringing ears/tinnitus after working in the workshop, then you needed ear defenders
 - If the tool is making more noise than you expected - or a noise that sounds unpleasant rather than loud - maybe you're using it wrong or it's broken. Stop and ask for advice.
- Breathing
 - Masks can be found with goggles and glasses in the red metal drawer unit under the mitre saw at the far end of the workshop
 - If you're using one of the disposable masks, and you are happy to re-use it another time - then write your name in it!
 - Don't share masks
 - If you need many, consider buying your own - they are cheap, and often stocked in decently sized supermarkets
 - Masks should be worn when doing any quantity of sanding, or work that generate a lot of fine particles - especially with hardwood or MDF, as these can be toxic. Ask for advice if unsure.
- Toes
 - Try not to drop things!

- Don't be a hero/martyr - if you drop something heavy or sharp, it's better the tool get damaged than you - don't try to catch with a foot.
 - Wear sensible, comfortable shoes that cover the whole foot - no sandals or heels!
 - Wear the sturdiest shoes you have - especially around the toes. Steel toe-caps are ideal.
 - Fingers
 - Gloves of all kinds are a BAD thing in the wood workshop
 - They reduce your sensitivity to the material you are holding, and could get caught in a tool, dragging your hand into danger
 - Consider barrier cream, and plasters on any cuts.
 - You aren't a real woodworker until you've acquired a few grazes in the workshop! Note that said "grazes" - "not "scars" or "prosthesis".
- Stop - it's glue drying time! (by MC Claw-hammer)
 - Sometimes you'll need to leave a project clamped together whilst glue dries - the drying time should be on the container. Make sure you label your piece with your name, contact details, and the "expiry time" after which your piece will be dry - then other members will know when it's safe to retrieve clamps they might need.
 - Make sure it is not a hazard - no clamps sticking out in to walkways, not blocking fire exits, no sharp corners exposed etc.
 - You should add this to Discourse if it's particularly large.
 - Make sure you can get back to your piece at the expiry time.
 - If your project needs to be left in the space for any length of time whilst you aren't there - remember you need to ask permission on Discourse BEFORE bringing you materials on site.
 - Remember - if your project is damaged/thrown away/re-purposed because you didn't label it or return it promptly - then that's your fault!
 - Equally - seen a nice bit of wood in the space that you'd like to use? Wondering if you can use it?
 - xx. Check if it has any labels on it
 - xxi. Check if anyone has written their name on the wood in pencil
 - xxii. Post a photo on Discourse and ask if it's fair game

1. Hand Tools

- Never oil hand tools!
- Remember - measure twice, cut once
- Blunt tools are dangerous - as more force is required you do more damage to the tools, there is more risk of materials splintering or breaking up, and you might overbalance or over-reach. A sharp tool is a safe tool - if used correctly.

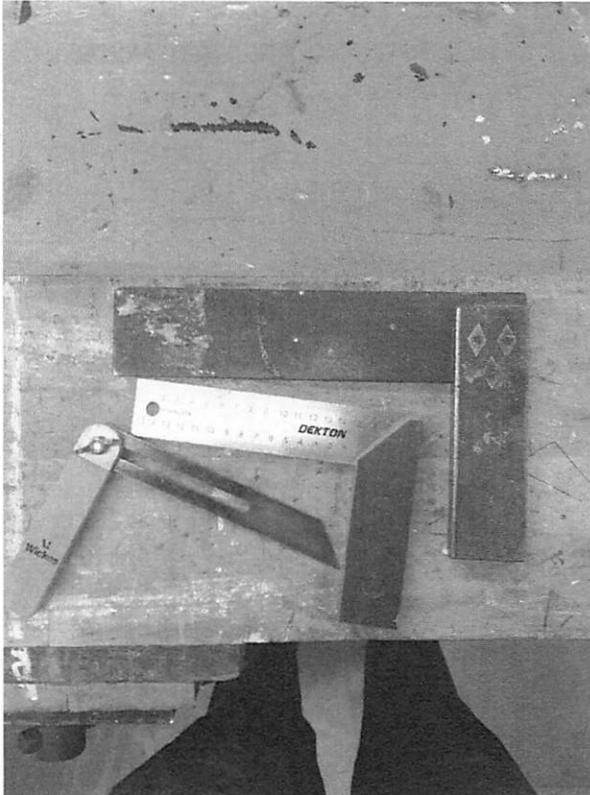
Stanley Knife — In KNIVES SECTION



Retractable Knives

- Can have a fixed blade - when not in use this should be embedded in a piece of cork for safety
- Can have a retractable blade which slides back into the body
- If you change the blade, wrap the old one in tape so it has no sharp edges - dispose in normal bin... until we have a sharps bin.
- If you use a stanley knife to firmly mark the line of a saw cut, then this will keep the edge of the cut much neater and less-frayed.

Set square



- These are used to help you mark a perfect right-angle
- They are very precious - handle carefully and do not drop or damage.
- Note - the space has two entirely metal set squares. These are extremely precious and are only used for checking the other set squares. You shouldn't need to use them - stick to the wooden-handled ones!
- How to use:
 - Mark a point on the edge where you need to cut
 - Press the thicker handle firmly against the flat edge, and line the metal arm up with the mark.
 - You can now use a pencil or blade to mark your right angle for cutting!
 - If you think it isn't quite square you can check two ways
 - i. Use the metal ones to check against
 - ii. Use on an edge that you know is straight and draw a line at a right angle from both directions. It should be the same, if not, it's not square! ([see here for a video explaining this](#))

Saws



L-to-R: Hand Saw, Tenon Saw, and Coping Saws

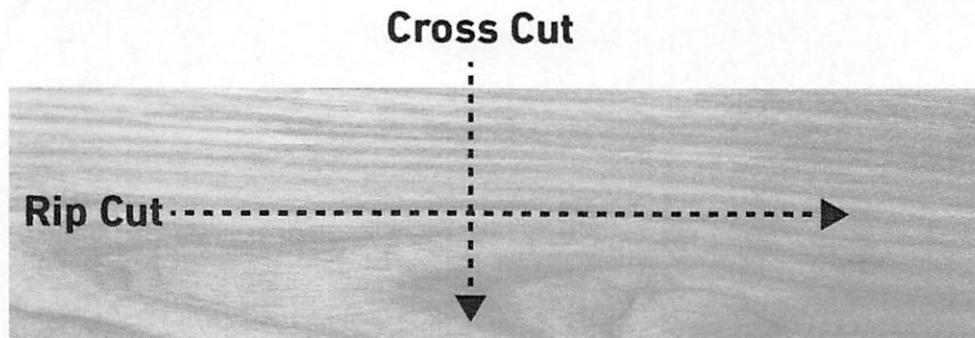
What type of saws do we have?

- Hand saw
 - The classic long, tapering saw
 - This is a good all-rounder, but not the most precise tool
- Tenon saw
 - Rectangular blade
 - Blade tends to be shorter, firmer, and better for making precise, straight cuts where precision is more important
- Coping saw
 - Can be used for very precise or curved cuts
 - Removable blade means you can to cut a section from inside a piece of wood by drilling a hole, threading the blade through, and re-attaching to the saw.
 - Narrower blade are better for tighter corners, whereas deeper blades help you keep a straighter line

My, what beautiful teeth you have...

- Push-me-pull-you
 - Most of our saws are European, meaning they cut on the push stroke, but not when you pull back
- Set
 - Look along the teeth of your saw - they are angled from side-to-side a certain amount - the amount/style of the angling is called the "set".
 - The wider the set (the more pointy-out-sideways the teeth), the more easily the saw can clear out the particles of wood as it cuts through. This can make it quicker and easier, but give you a rougher finish.
 - The narrower the set, the less easily the saw will remove particles - you may need to clear out by pausing and blowing - but you'll get a cleaner finish.
 - Having more, smaller teeth per inch along the blade will also make your cut neater, but again the teeth will find it harder to clear particles

- Crosscut vs. Ripcut

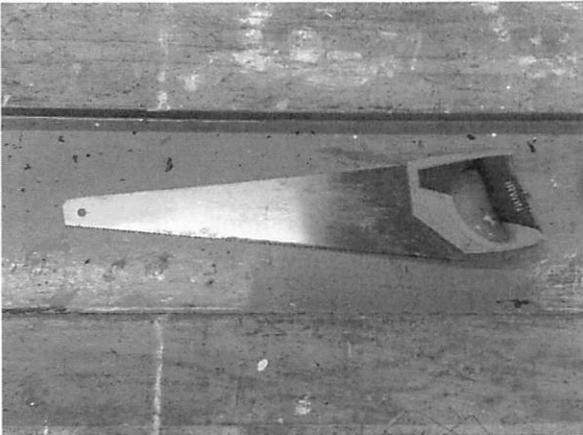


<http://woodworking.stackexchange.com/questions/307/what-is-the-difference-between-a-rip-cut-and-a-cross-cut>

- Rip cut = a cut along the grain of the wood.
- Cross cut = a cut across the grain of the wood.
- Remember that wood is a very compact mass of stringy fibres, all running in the same direction - this is the grain - when the tree was living wood, moisture flowed up these fibres from the roots out to the leaves
- Look closely at the teeth on your saw - the front edge, that is cutting into the wood - it should either be flat, or bevelled alternately from side to side
- If a flat edge is cutting into the wood, a bit like a series of tiny chisels, then it is a Rip cut saw. This means it is designed to cut quickly along the grain, mostly pushing *between* the fibres, and tearing out a thin passage. It will give a very messy finish if you cut across the grain, as it doesn't cut *through* the fibres very well.
- If a bevelled edge is cutting into the wood, then it is a Cross cut saw. The bevels act like a series of tiny knives, neatly doing the hard work of cutting *through* the wood fibres. This means it gives a very neat finish when going across the grain, but as it's therefore less efficient at tearing out material - so if you cut along the grain it will work fine, but take you a lot longer than a rip saw!
- Some saws have special teeth designs to make them good at cutting both ways

Some of our saws look fancier than others...

Most of the space saws fall into one of two categories:



Plastic-handled hard-point saws

- Have hardened teeth, which are very sharp when new, but can't be sharpened, so gradually wear with use until the saw is no longer usable
- Can be used on any sort of wood - including MDF, chipboard, second-hand wood and just before the end of their life, plasterboard. However, the sharpest saws shouldn't be used on the more abrasive materials, use a more worn one for MDF and plasterboard.
- Relatively cheap
- These are the best saws for beginners



Boxwood handled re-sharpenable steel saws

- These have softer steel teeth - which means they are re-sharpenable, but also easier to blunt (especially through mis-use). They are much more solid, high-quality construction, so they are better for very precise, professional carpentry and cabinet making.
- Should not be used on MDF, as it is an abrasive material and will quickly blunt the saw.
- These are a valuable professional's tool which can last a lifetime

- As a beginner, you won't need these! When you've got some experience, ask a woodtech to show you how to use them properly,

How to use:

- Make sure your material is securely clamped or held in a bench hook
- Mark the full length of your cut - if you don't need to go all the way through your material, remember to mark the depth you need to cut to.
- Using a stanley knife to mark your cut.
- Stand with your feet shoulder width apart, looking in the direction you want to cut.
- Hold the saw with you index finger pointing down the blade
- Place the teeth nearest the handle of the saw on your mark, at a corner/edge
- Use your non-sawing hand to hold the material firmly, with the heel of your hand against the blade, to help hold it in place as you start
- Make sure your elbow is loose and straight, so the saw is like an extension of your forearm. You want to keep your forearm moving smoothly in a straight line.
- Make an initial short, slow, backward stroke - just a few inches. Put the saw back to your starting position, and repeat a few times to make a small initial opening in the material, enough to guide the blade.
- Now move your non-sawing hand an inch or so further away from the cut
- Begin making longer, smooth strokes - remember that your saw cuts properly when you push, not when you pull

Using a Mitre Box

- A mitre box is used to cut at specific angles - usually 0, 30, 45 and 60 degrees.
- Place your piece in the box and clamp, hold to box as necessary.
- Place the saw through the appropriate angled slots
- Start sawing, making sure you don't pull the end of the saw out of the mitre box wall.
- As you get close to the bottom of the mitre box, remove your work from the box so not to damage it - you will have essentially created enough of your own mitre cut in the wood to finish off accurately.

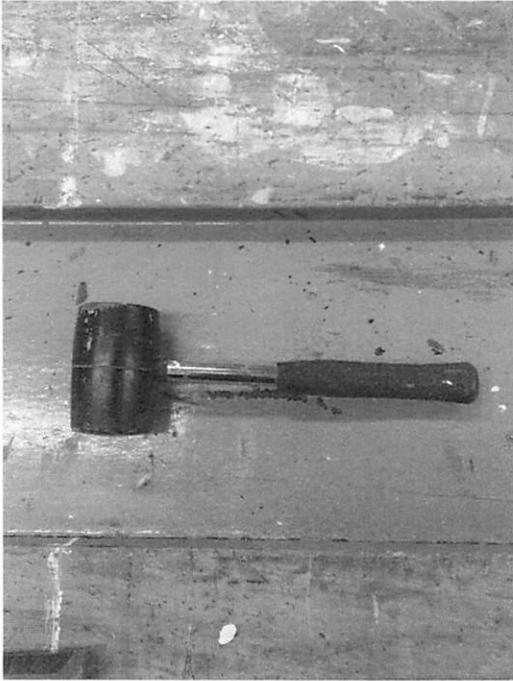
Hammers and Mallets

What's the difference?



Hammer

- Has a metal head
- Has very few applications in woodworking - the main one being to use the back of a claw hammer (two claws which meet at a point near the shaft) to lever nails from reclaimed wood
- Should not be used to hit another tool for any reason - you have been warned



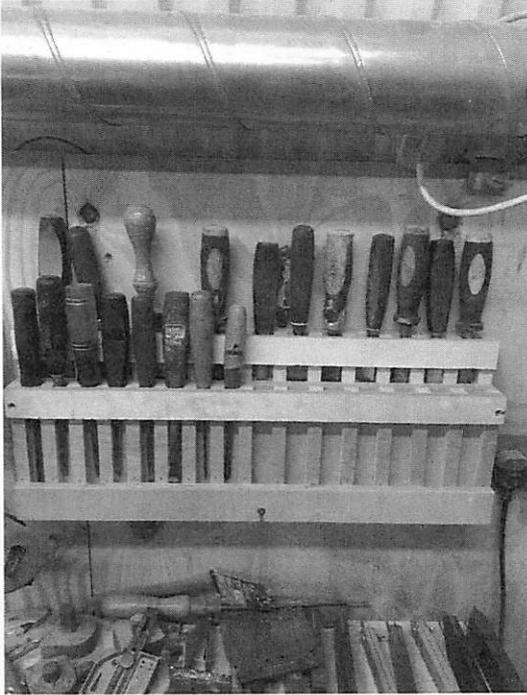
Mallet

- Has a rubber or wooden head
- These are used for striking chisels and for moving pieces of a project into place

Chisels and Gouges

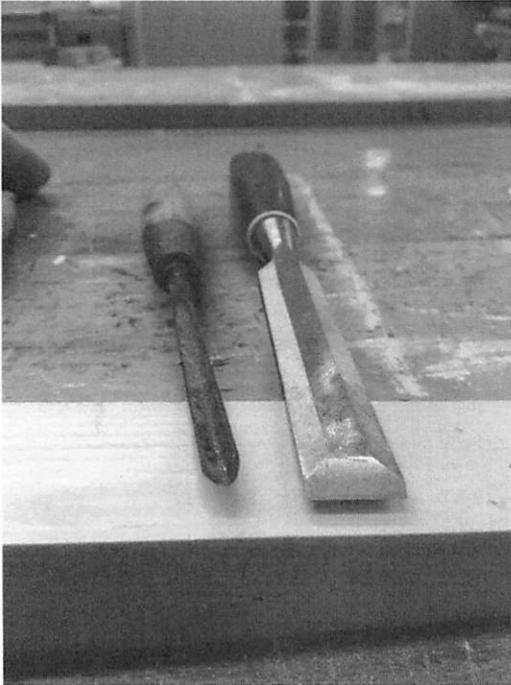
- Chisels and Gouges should be sharp enough to remove the hair from your arm
- They have a sharp pointy end that's used to remove wood, and a handle which you can hold and then hit with a mallet to drive the sharp tip into your material
- Make sure you take control and ownership of your tool - be firm and confident
- Don't hit your hand when striking the tool with your mallet!
- Don't hit too hard - you'll damage the end of your tool, and also your material
- Don't hit too softly - you'll never make any progress!
- Never hit a makerspace chisel or gouge with a metal hammer

c/v chisel gouge



Chisel

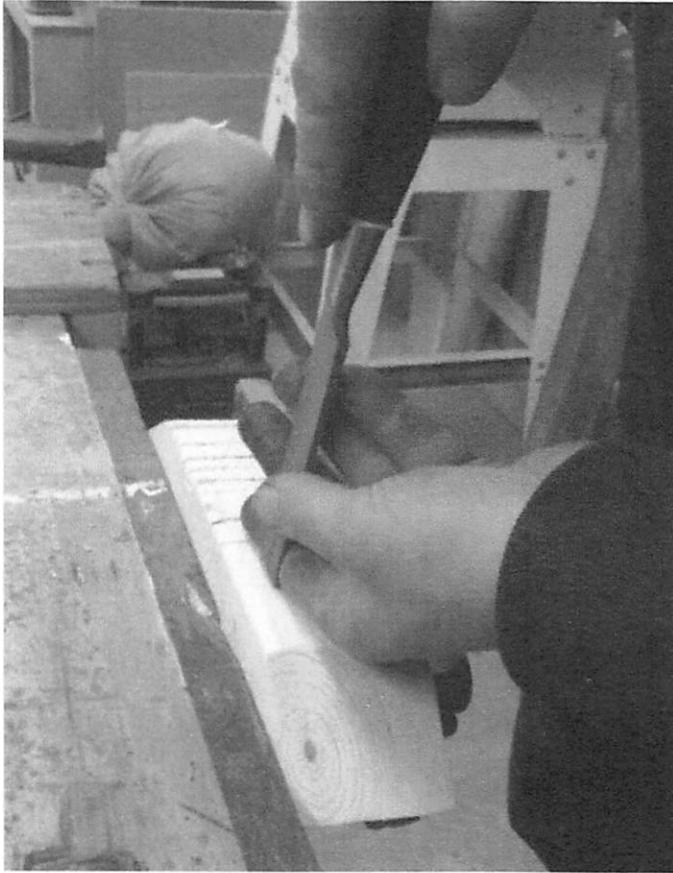
- The end of the blade is straight
- Used to remove small precise areas of wood when making joints or recessing hinges
- One side of the chisel will be perfectly flat, the other will be angled/bevelled along the tip to form a sharp blade.
- When



L-to-R: Gouge, Chisel

Gouge

- The end of the blade is curved or V-shaped
- Used in wood carving and sculpture making



- How to use:
 - First, mark out the wood you need to remove
 - Make sure your feet are firmly planted shoulder width apart.
 - Place the tip of the chisel on one of your marks - the flat side of the blade should be on the side of the wood that should be kept - the bevelled edge should be against the wood to be removed
 - With the chisel perfectly straight, press down firmly, and tap the end gently with a mallet - you shouldn't go more than a couple of millimetres
 - Now move the chisel tip so that it's a few millimetres into the wood to be removed, tilt the chisel at 45 degrees, with the bevelled edge up (and flat side down) - press/gently tap on the chisel, so that you remove a small sliver of wood. This is called "relieving the cut"
 - Repeat this process all round the area you need to remove on one face of the material
 - You can now repeat the process a few times so that you have slightly cut down to create the new edges you want. You can now use the chisel and mallet to start removing excess wood - either by working with the same 45 degree slant, or cutting straight into the wood from another side.
 - Repeat this process until you've removed all the wood you need to. As you gain experience, you'll be able to remove more wood, more quickly, without damaging your material!



- Sharpening
 - Sharpening is an art form - and if done incorrectly can do damage to the tool - if in doubt, ask a woodtech!
 - You sharpen any tool by rubbing it correctly against an abrasive material - note that the abrasive material must be stronger than the tool you want to sharpen!
 - The space has yellow-plastic-backed diamond stones - these are kept near the door to the workshop.
 - Remember these are industrial sharpening diamonds - they will seriously mark any rings or jewelry you are wearing!
 - You'll need a cup of water to lubricate the diamond stone
 - Place the stone on a solid surface such as a workbench, and thoroughly wet - rub water all over the surface
 - Place your chisel on the diamond stone, with the flat side upwards
 - Lift the handle of the chisel until you feel the bevelled edge is now completely flat against the face of the diamond stone
 - Grip the chisel firmly, with your thumb pressing the tip into the diamond stone
 - Now stroke firmly back, keeping the angle of the chisel exactly the same as you move - so that the bevelled edge of the chisel stays perfectly in contact with the stone
 - Make several firm strokes like this - always at the right angle!
 - Now, turn the chisel over, so that the flat side is downwards - but not yet touching the stone!
 - Pivot the chisel so that the metal nearest the handle is touching the end of the diamond stone, and the sharp tip is pointing up slightly - now lower the tip until the back of the chisel is perfectly flat on the diamond stone.
 - Ensuring that the chisel is perfectly flat, make several firm strokes back
 - Feel the tip of the chisel (carefully) with a finger tip - it should be razor sharp. You may need to repeat the sharpening process several times to get a good sharp edge.

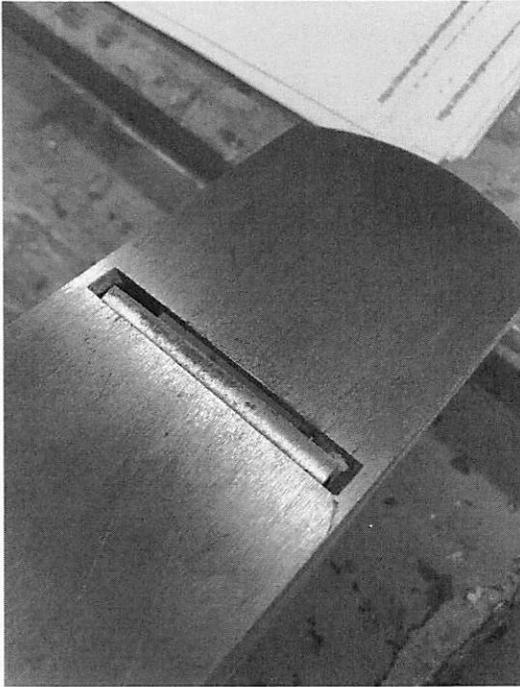
- If you think you are doing something wrong, or the tool seems to be getting less sharp, then stop and ask a woodtech!

Plane



Never rest the plane directly flat on the surface as this can damage the blade.

- The plane has a wide blade extending slightly below its base (or “sole”) - allowing it to shave a very thin layer off your material with each stroke. The foot helps even out imperfections in the surface of your material, and helps you get a smooth, flat finish
- Never put a plane flat on a surface in such a way that it's resting on its blade - either lay it on its side, or prop up the front or back.
- Keep planes away from nails, screws, or anything else embedded in your material - hitting these will ruin the blade
- Never try to plane MDF (its abrasive) or secondhand wood (can have nails, staples and other dodgy stuff in) - these will ruin the blades pretty quick.
- A plane with a longer foot will help keep the surface flatter, whilst a shorter foot is more maneuverable and can be used on smaller pieces or to get into awkward corners

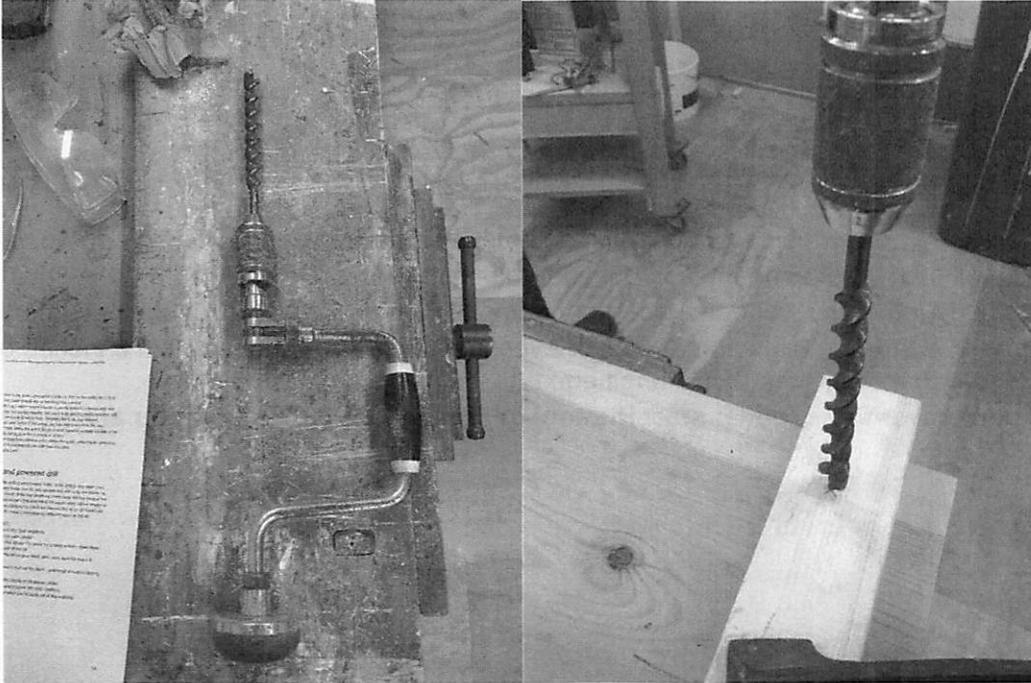


- Setting the blade:
 - Screws on the back end of the blade can be used to push it further out underneath the foot, or pull it back in.
 - Make sure the blade is even - that it extends the same amount on both ends!
 - Exposing more blade will remove more material with each stroke, but be very hard to push, and risks damaging the plane, your material, or a person.
 - Exposing less blade will take a thinner shaving of material with each stroke, and be far easier to push - especially on an initially rough surface
 - You want the shaving to be thin enough to unroll and read this text through!



- How to use:
 - Make sure your material is held in such a way that it can't move in the direction of your planing strokes. Depending on the size of your piece, it may be impractical to stop it moving in any direction - so beware of lateral movement.
 - Make sure that you have plenty of space beyond the end of your material into which the plane can move as you finish your stroke
 - Set the blade so that is projecting the right amount - around 1 millimetre
 - Place the toe of the plane (the part of the foot in front of the blade) flat on your material - the blade should not be touching your material
 - Get yourself in a position where you can push the plane from behind with your elbow pointing out straight behind. You want to be pushing mainly forwards, with just enough pressure down to keep the plane firmly on your material
 - Make sure you are "behind" the plane, not hunched over it from the side.
 - Make firm strokes along the entire length of your material, keeping the sole of the plane perfectly flat against the material at all time.
 - Make sure you keep the pressure even across the width of the blade - otherwise you'll shave more material off one side than the other
 - Planing takes practice!

Brace and Bit - hand powered drill



- Ideal for drilling very precise holes, or for drilling very large holes.
- The space brace and bit only accepts bits with a square shank - ie. there are four claws in the chuck of the tool which securely clamp the four faces of the drill bit shank. Note that most modern bits and those for electric drills will be hexagonal (6-sided) - which are securely clamped by the three claws in the chuck of those tools.
- See the power tools section for more information on different types of drill bit
- How to use:
 - Mark the centre of where your hole should be
 - Find the appropriate bit for your needs!
 - Insert the bit and tighten the chuck by turning until the claws have securely clamped the shank of the bit
 - Carefully place the tip of the bit on your mark, and make sure the brace is perfectly upright.
 - Press down firmly on the brace, but not too hard - your hand should be directly over the bit
 - With your other hand, turn the handle in clockwise circles
 - This will make surprisingly quick progress into your material.
 - You can turn anti-clockwise to wind the bit back out of the material

2. Power Tools

- Always keep power tools unplugged when not in use for any period of time - do not leave cable trailing - wrap up neatly and put your tool in a well!
- If you need to do any work to a tool - for example changing a bit/blade, or clearing any material which is jamming something, or even just putting your hand within 6 inches of the blade- make sure the tool is unplugged
- **With all power tools, never start the tool in contact with the wood you are working.**

Drills and Drivers



- Drill
 - The space has battery-powered drills, with multiple torque settings and a keyless chuck
 - Using the correct bit and torque setting for your material will allow you to drill a hole quickly and easily
 - Adjust the torque by twisting the numbered section of the drill nose
 - iii. Lower torque means higher speed, but lower strength - suitable for smaller holes in softwoods
 - iv. Higher torque means lower speed, but higher strength - suitable for larger holes, and harder materials - including metal and masonry

- The keyless chuck allows you to twist the tip of the nose to firmly grip or release the bit



On left: Driver (notice the lack of torque control), on right: Drill

- Driver
 - The space has battery-powered drivers - they look very like the drill, but are a bit smaller and have no chuck..
 - Have lower speed but much higher torque than the drill
 - Won't drill holes, but is ideal for driving screws or bolts
 - "Impact driver" - meaning it uses a flyweight which frequently spins to drag the bit round - as the resistance becomes higher, this generates a more jerky motion with extremely high torque - this results in a loud clicking sound, similar to a screw-head being stripped
 - Beware - this very high torque could do your wrist serious damage if you don't control it properly
 - The screw driver bits will wear out - meaning they don't grip your screw head properly, and will strip them more easily. Take note of what bit it is, inform the woodtechs, and throw the bit away - it is useless.
- Electric screwdriver
 - Small, non-percussive version of the driver
 - Useful for screwing or unscrewing small and medium screws
 - Not very powerful!
- Different bits for different materials:



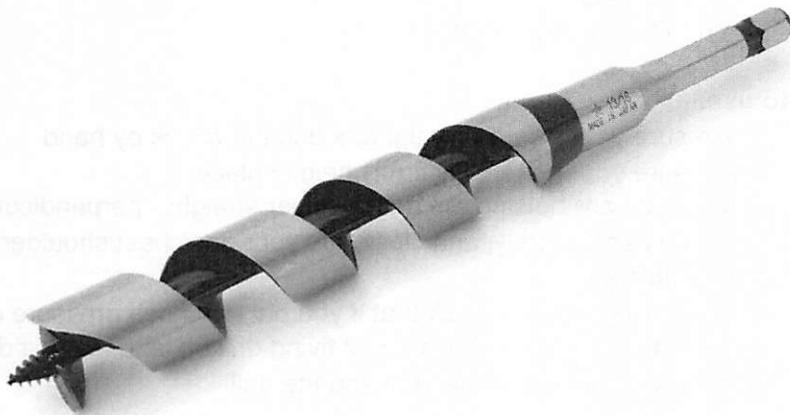
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- HSS (high-speed steel) bits
 - v. Conical tip
 - vi. Suitable for all woods, MDF, metals and plastics
- Wood bits
 - vii. Similar shape to a HSS bit, but have a central tip
 - viii. Used in wood only - not MDF



- Spade bits
 - ix. Flat bit, with two cutting tips and a central tip
 - x. Good for wider holes
 - xi. Used in wood only - not MDF



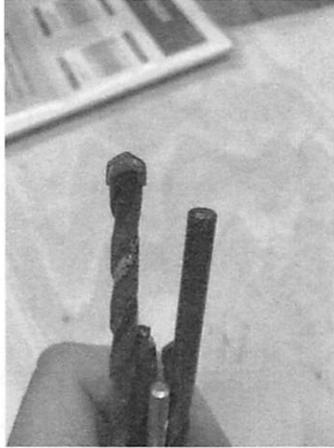
- Forstner bit
 - xii. Large circular bit with teeth around most of its cylindrical end and two radial arms
 - xiii. Good for drilling wider holes
 - xiv. Used in wood only - not MDF



-
- Auger bit
 - xv. Looks similar to a HSS bit, with a small screw thread on the end
 - xvi. Digs extremely fast and deep - be careful!
 - xvii. Particularly useful in a brace and bit



- Hole cutter
 - xviii. Entirely cylindrical bit with teeth all the way around the end
 - xix. Used for very large holes



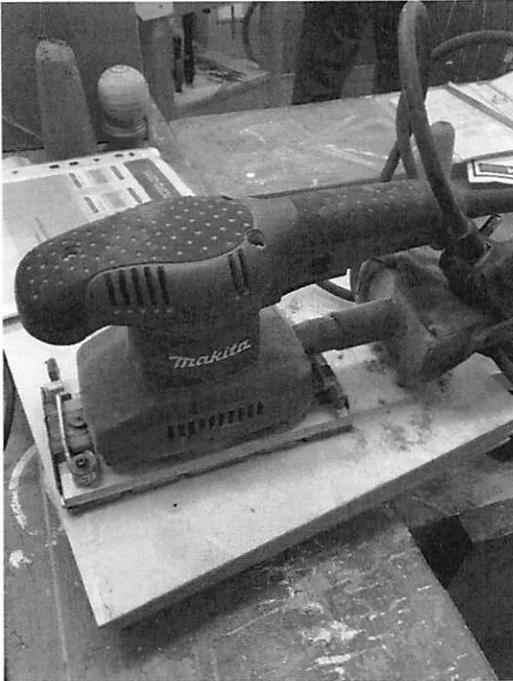
- Masonry bit
 - xx. Looks similar to a HSS bit, but has two large tips made of Tungsten carbide
 - xxi. Do not use in metal!

- **How to use:**

- Make sure your bit is firmly tightened in the chuck by hand
- Make sure your material is firmly held in place
- Ensure you are holding the drill or driver straight - perpendicular to your material
- Hold the handle firmly, and close into your ribs/chest/shoulder (depending on where drilling)
- When drilling there is a risk that if you put too much pressure on the bit, it will break - this may mean splinters or flying drill bit, and leave a dangerous sharp end sticking out of the material and the drill!

Sanders

- Before you use a sander - check the dust bag, and empty it if necessary



- Orbital sander
 - The least dangerous power tool in the space!
 - Make sure the sandpaper is correctly clipped to the sander foot.
 - When changing the sandpaper, use the piece you are removing to help you measure the new piece you are going to tear.
 - Never use a blade to cut sandpaper - you will ruin the blade!
 - Measure the amount of sandpaper you need, and fold it firmly both ways - you should then be able to tear it easily
 - The orbital sander has a plastic face plate, which pierces the sandpaper in the correct places for the extraction system. Make sure you use it to make the holes in a new piece of sandpaper!



Belt sander:

- Fast and dangerous!
- Spins a roll of sandpaper quickly between two cylinders, separated by a flat metal foot
- If you let go of it whilst it's running, it will drive off across the room! Could cause serious damage and injury
- Equally, make sure your material is firmly clamped before beginning

- **How to use:**
 - xxii. Make sure the sander is running before you touch it to the material
 - xxiii. Keep the foot flat on the material, and keep the sander moving - don't put much downward pressure on it at all - it isn't necessary.

- **How to replace the belt:**
 - xxiv. Unclip the band and remove it and dispose of
 - xxv. Put a new band in place, and use the small side wheel to make sure it is perfectly straight - otherwise the belt will either run off the sander, or into the mechanism!

Electric Planer



- Similar to a hand plane - but rather than have a fixed blade which you move over the material, there is a spinning cylinder holding a blade
- The cylinder can be raised or lowered to cut more or less material - there is a twistable handle with 0.25 millimetre stops
- Use in the same way as a hand plane - but less force will be required - push forward steadily, but not downwards. Keep it flat, place the toe on the material but not the blade, power it up and then move across the material.
- The blade continues spinning for some seconds after the power is killed - do not let it come into contact with any unintended surfaces - or any part of your body!
- Remember to attach the waste bag before using.

Jigsaw



- As with a hand saw, there are many different blades - usually the blade type/suitable materials are printed on the blade itself
- You can use a jigsaw to cut either straight or curved lines
- Look at the depth of metal blade from the teeth to the long flat edge
 - The deeper the blade, the better the jigsaw is at straight lines - it won't turn well
 - The narrower the blade, the better the jigsaw is at following curves - but don't try to turn too much or you'll break the blade
- Make sure the blade length is appropriate for your work - the piece you are cutting will have to be thinner than the length of exposed blade when it is at its shortest.
- Most blades cut on the upstroke, meaning that it is the top of the surface which is likely to be slightly damaged and left with scruffy edges. Accordingly, you should put your material face down if the finish is important to you!
- Has a "pendulum motion" - meaning the blade swings slightly back on the downstroke, and forwards on the up stroke. This enables the cut material to be cleared more easily, so you can cut more quickly in thick material - but it will give a rougher finish. You can't do tight curves with pendulum motion on.
- Ensure your material is supported at both sides, and won't bend or fall as you cut - this would mean the material "gripped" the blade, and could damage the tool, the material, or you!
- With the tool unplugged, pull the blade to its lowest point - the distance from the flat metal foot to the tip of the blade is the thickest material you can cut - but realistically you should make sure there is 1 centimetre or so of blade beneath your material at all times
- Need to cut a section from the centre of a piece of material? Remember that you can drill a pilot hole a little wider than the blade, then insert the jigsaw into it to start cutting a larger shape

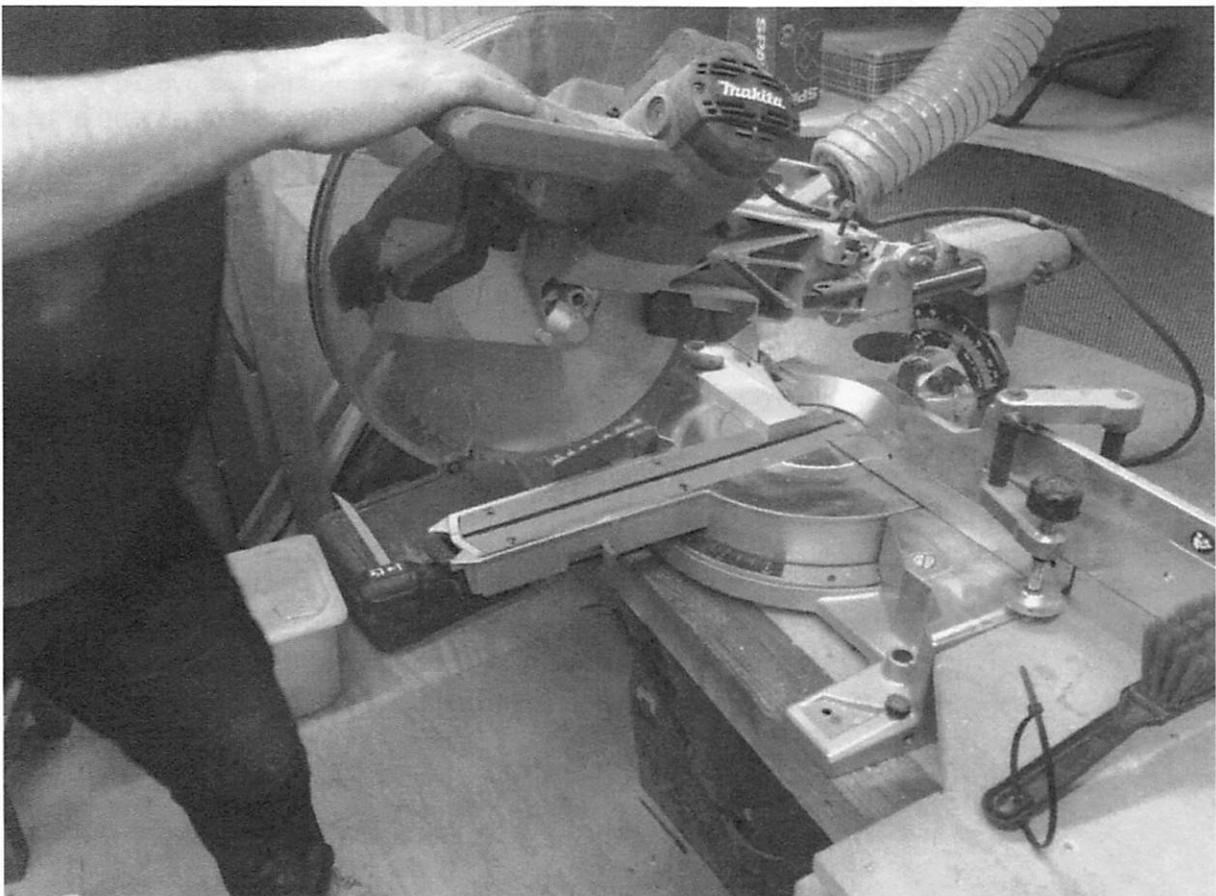
- **Changing the blade:**
 - Turn the jigsaw upside down
 - Where the blade meets the body of the tool, there is a small lever which allows you to pull the blade free
 - To insert the new blade, pull the lever again, and slide the new blade in place. Make sure the blade is in the groove on the metal guide wheels
 - Make sure the teeth are pointing forwards, not backwards

- **How to use:**
 - Mark your cut line
 - If trying to do a long straight cut, make sure you have set up a solid “fence” which you can keep the jigsaw pressed against as you cut
 - Place the flat forward edge of the jigsaw guide on your material - don't touch the blade to the material
 - Place your feet firmly
 - Check there is never anything under the path of the blade which you might damage - particularly body parts
 - Lean over the jigsaw so you can look down the blade and see where it's cutting
 - Keep one handle on the top, holding the trigger -wrap your other hand around the front of the jigsaw body, to help you guide the blade
 - Power up the jigsaw and gently press the blade against the material - make sure you hit your mark!
 - Press firmly forward, but not too hard - if the tool is struggling, you are pushing too hard.
 - Slow down as you come to a corner or curve!
 - To remove the blade mid-cut, release the power and wait for the blade to stop completely before removing from the material

3. Bench Tools

- These tools are all inherently dangerous! Operate with caution. Do not put your hands anywhere near their working if they are powered. You have been warned.
- Always wear eye protection.
- Again, don't start the tool in contact with the wood.

Mitre Saw



- The mitre saw has a fast spinning blade, which can be pulled out on runners to make longer cuts, and can be adjusted along two dimensions to cut precise angles.
- The standard blade is for cutting wood of all kinds - however other blades can be used for other materials - check with a woodtech if you are unsure or need the blade changing
- Because of its power, the saw can kick very powerfully and fire sharp materials fast and hard in unexpected directions.
- You cannot safely cut a piece of wood shorter than a foot long on the mitre saw

- There are several dimensions the saw can move in - ensure that you have limited its range of movement to be as small as possible whilst still allowing you to make the cut you want. See below for details

- Air gap/bowed wood
 - Never have an air gap under your material where the blade cuts into it - ie. your material must lie totally flat on the bed of the machine
 - This is because the saw will push down on the material as it cuts - and that will cause the cut sides of the material to clamp down on the spinning blade. There is no way to overstate how dangerous that is with a tool this powerful.
 - If you have a slightly bowed piece, then it is ok to have the ends raising up a little, so long as the piece under the blade is flat against the bed - this is because as the wood is cut, it will pull away from the blade rather than clamp onto it.
 - Remember - you want a saucer, not a lid! So important that your wood not twist as you cut - so again, make sure you have a flat edge against the rear fence

- Setting up the saw:
 - The default setting for the mitre saw is a straight 90 degree cut
 - If you move it to a different position - please reset it for the benefit of the next user!
 - Remember - limit any movement you don't need, in case the saw kicks back!
 - If you have adjusted the cutting position - run the blade through its full motion (without power) to make sure it does not foul any guards. It is possible to adjust the saw as necessary by low to foul the guards, which is why these are adjustable! Adjusting, sliding and retightening the appropriate sections - remember to reset afterwards!

 - You can affect the saw's movement in 4 ways:
 - xxvi. Depth stop
 - This stops the blade coming all the way down, so that you do not cut all the way through a piece of wood
 - This allows you to simulate some of the basic effects of a router
 - Pull out the small black stop, and adjust the screw to give you the right blade depth
 - xxvii. Limit sliding action
 - The saw is capable of extending forwards around one foot, enabling larger pieces of material to be cut.
 - If you are only cutting a small piece, and a simple pivot, or shorter slide, is adequate, you can lock the slides
 - The lower slide is locked by pushing in the catch on the side of the arm containing the blade track
 - The upper slide is locked up tightening a tri-winged nut on the side of the saw
 - xxviii. Pivot around the vertical
 - Grasp the black handle poking at your crotch

- Push in and twist anti-clockwise to release the main lock
- You can now press the black thumb plate and pivot the saw around the vertical
- There is a guide marked in degrees
- If you have released the thumbplate, then the saw will automatically stop at certain common angles, but you can adjust to whatever angle you want if you keep the thumbplate pressed down.
- Once you have chose your angle, twist the black handle clockwise until it locks
- Note - if possible, set up your cut so the the saw is pushed out to the right as you look at it - this means that if your material comes loose, and begins to spin, it does not draw your hand into the path of the blade - instead it will push the material and your hand out to the left.

xxix. Roll around the horizontal

- By default, the blade cuts vertically, but you can adjust this to a wide range of angles
 - To tilt the saw to the left, loosen the large v-shaped black handle at the very back and base of the machine
 - There is a gauge marked in degrees, and the saw will stop at perfectly upright
 - There are automatic stops at common angles - these are controlled by a small stiff switch on the right hand side of the base - if you don't want one of the specified angles, then leave it unlocked.
 - If you wish to tilt the saw to the right, first tilt it to the left, then press the round black button on the left hand side of the base. Keep the button pressed down as you move the saw back up and over to the right
 - To tighten at the right angle, re-tighten the v-shaped black handle at the very back and base of the machine
- **Safety guard**
 - This should always fully enclose the blade when it's in the resting position. If it doesn't, then it has jammed or developed a fault.
 - If this happens, disconnect the power, and inspect the mechanism, to see if it has been jammed by wood shavings/offcuts. If so, clear it carefully, and make sure the guard now works as normal.
 - If the guard is stuck in the "open" position - ie. not enclosing the blade - then the saw is not safe to use. Disconnect the power, alert the woodtechs, and label the machine clearly for other space users
 - **Get your material firmly in place**
 - There is a movable clamp attached to the mitre saw fence, though holding in place by hand is also fine - as long as you press firmly

- Make sure you have flat edges flush to the rear fence and bed of the mitre saw - if necessary see notes above about bowed wood
- There are clear marks on the saw detailing how far your hands should be from the blade. Remember that as your hands are further from the blade than with some other tools, you may need to hold that much more firmly!
- **Extraction**
 - Ensure the extraction pipe to the mitre saw enclosure is opened
 - Ensure that the extraction pipes to any other tools (that aren't in use) are closed, to maximise suction
 - Press the green switch on the extractor itself - it is noisy, so only run when you need to.
- **How to use:**
 - Make sure you are stood comfortably, and that no part of your body, or anything that shouldn't be cut, is in the way of the blade's path.
 - Check the saw has the correct blade
 - Check the saw is set up correctly for your cut - that the angles are correct. Check this even if you haven't adjusted, in case they have not been left at 90 degrees.
 - Double-check that the saw is securely locked to the required angle, and not balancing.
 - Release the blade guard, and run the saw through its full path of motion, to make sure it is all clear.
 - Switch on the extraction!
 - Hold or clamp your workpiece securely - note that you should never put your hands within 6 inches of the blade at any time when it is running and the guard is not in place.
 - 3 stages to engage!
 - xxx. Hold the handle firmly, and use your index finger to release the blade guard by pressing the lever towards the blade
 - xxxi. Press down the thumb switch which unlocks the trigger
 - xxxii. Squeeze the palm trigger to turn on and start the blade
 - Pull the blade out, then down, then push the blade slowly forwards through your material.
 - Once the material is completely cut, keep the power running as you remove the blade - only release once the blade is free of the wood.
 - Move the saw back to its base position, and check the guard has come back down and the blade stopped moving before you move your hands within 6 inches of the blade or cutting track