Rev 9/4/2025

MakerSphere Wood Shop & Maker Space
1727 Guptil Road, Waterbury Center, VT
(No phone on premises)

Shop Protocols & Machine Safe Operating Procedures (SOP's)

General Information
Use of the MakerSphere wood shop and all machines and tools is limited to trained staff, enrolled students, and active woodshop monthly members. Members and students may use the shop only while under the supervision of a trained instructor or shop monitor (except for pro members).

Shop Safety Committee
The MakerSphere Shop Safety Committee:

- Ensures that students, members and staff are provided with all expected shop safety protocols.
- Oversees tool and equipment preventative maintenance.
- Addresses any issues regarding potential hazards in the shop.
- Manages the procedure to remove dangerous or defective equipment from service.
- Ensures shop staff and monitors meet all experience requirements.

Safety Policies

The following safety policies must be adhered to by all authorized individuals using the shop. Failure to exercise these protocols may result in termination of use privileges, removal of student from a class or termination of monthly membership, if applicable.

Personal Protection Equipment (PPE)

- Closed-toe shoes are required at all times while working in the shop.

- Hearing Protection - OSHA requires hearing conservation when noise exposure is at or above 85 decibels averaged over 8 working hours, or an 8-hour time-weighted average (TWA). Noise in the wood shop when power tools run concurrently may exceed 85 decibels. Please defer to staff or the shop monitor's judgment as to when protection is advised.

- Eye Protection must be worn while performing all tasks in the shop. Individuals may bring their own or use safety glasses available at the shop. The type of eye protection used depends on the hazards associated with the tool/task. ANSI safety glasses, face shields, welding masks, and shaded safety glasses are examples of different types of eye protection that may be required depending on the task.

- Respiratory Protection - N95 masks are recommended for all tasks that produce a level of dust which would be a danger to health. Available ventilation systems / dust collectors must be turned on as needed or directed by staff.

For PPE related to specific tools, please refer to the documented Standard Operating Procedures (SOPs) or any signage that may be posted near the tool.

MakerSphere has a zero-tolerance drug and alcohol policy. Alcoholic beverages are not permitted on the premises. Individuals who have consumed alcohol or have taken or used other substances may not use the shop. Individuals taking any medications or OTC medicines of any kind which cause drowsiness or other inhibiting effects, may not operate machines.

Shop Dress Code

- Shoes with closed toes and closed heels (no clogs) must be worn in the shop at all times.
- Long hair and braids must be pulled back/pinned up
- No loose jewelry
- No loose clothing; remove hoodies or tuck in strings

Safe Operating Procedures (SOP)

A safe operating procedure (SOP) – also known as "standard" operating procedures, is a set of step-by-step instructions compiled to show routine operations and industry-level safety protocols. These procedures help reduce miscommunication and set safety standards to ensure members are within compliance with all safety measures and industry regulations. These procedures are taught to students during tool training classes. Users are required to follow the SOP for each tool to protect themselves (the user) and others from injury. Safe and proper use of all equipment and tools is the sole responsibility of the user. Users are responsible for learning, understanding, proper use and safety protocols of all equipment/tools they operate.

General Shop Practice

Individuals using the shop are required to clean their workspace, and return all tools/equipment to their proper location.

Machine Issues

All breakage, malfunctions, or issues with equipment must be reported to MakerSphere staff immediately. Staff is responsible for documenting and reporting issues, and taking equipment out of service using the lock out / tag out procedure.

Hazards & Emergencies

Hazards, unsafe work practices, accidents or injuries must be immediately reported to the instructor, MakerSphere staff or shop steward.

Operators of all machines and equipment must use the guards and safety equipment installed by the manufacturer. When a piece of equipment is used for specialty cuts, (for example, but not limited to; dados, rabbits, tenons, etc.), that requires removal of the guards, then riving knives, etc. must be used to assure the safest procedure.

No hazardous chemicals or oil-based products may be used. MakerSphere does not operate with fire prevention receptacles to allow use of oil-based products. Only the use of water-based finishes and products are approved for use in the facility.

For All Emergencies - Call 911

Personal Injury or Medical Emergency - If personnel trained in first aid are not available, as a minimum, the attending individual should attempt to provide the following assistance:

- Do not move the victim unless absolutely necessary.
- Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids)

Fire Emergency – Call 911. Evacuate the building. If the fire is small and not spreading – trained personnel may use a fire extinguisher if appropriate to contain the fire. Occupants must remain outside until the fire department or a MakerSphere designated authority announces that it is safe to reenter.

Location of PPE & Safety Equipment – See signage in shop

- Personal Protective Equipment (PPE)
- First Aid
- Eye Wash Station
- Fire Aids - fire blanket, fire extinguishers

Dealing with Injuries
Bloodborne Pathogen Procedure - Bloodborne pathogens, such as bacteria and viruses, are present in blood and body fluids and can cause disease in humans. The bloodborne pathogens of primary concern are hepatitis B, hepatitis C and HIV. These and other bloodborne pathogens are spread primarily through: Direct contact - Infected blood or body fluid from one person enters another person's body at a vulnerable entry site, such as infected blood splashing in the eye. Indirect contact - A person's skin touches an object that contains the blood or body fluid of an infected person, such as picking up soiled dressings contaminated with an infected person's blood or body fluid.

Follow standard precautions to help prevent the spread of bloodborne pathogens and other diseases whenever there is a risk of exposure to blood or other body fluids. Treat all blood and other body fluids as if they are infectious. Use personal protective equipment (PPE) such as gloves, masks, and eyewear when in direct or indirect contact with blood or body fluids. Dispose of all hazardous materials in an appropriate manner. Maintain personal hygiene by washing hands.

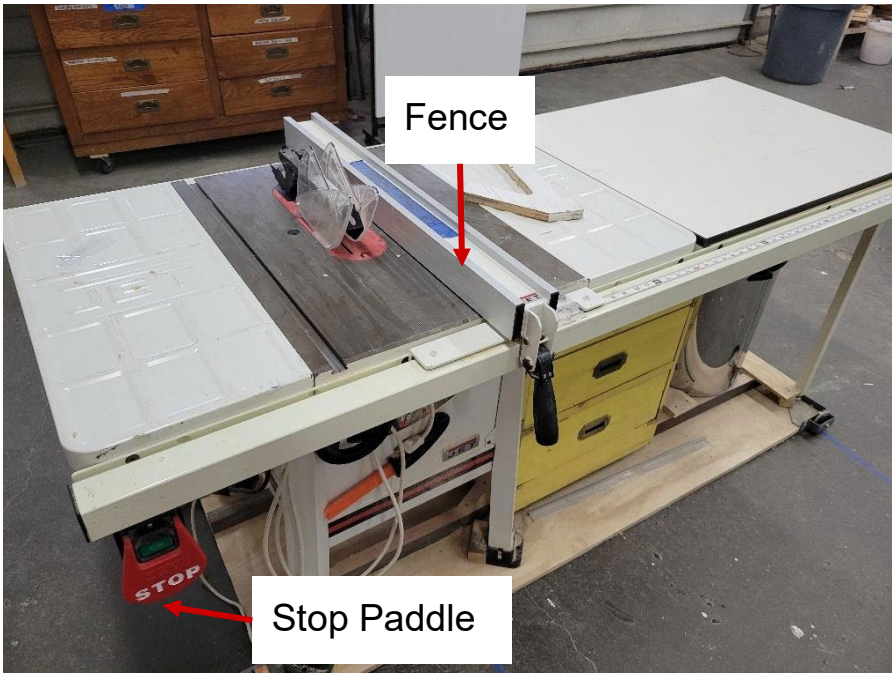
The following pages include SOP’s for each machine in the shop. Please review these procedures and seek assistance from a staff member if you have any questions.

Machine Safe Operating Procedures (SOP's)

Following are the safe operating procedures for each machine including:

- Table Saw
- Jointer
- Planer
- Miter Saw
- Band Saw
- Drill Press
- Hand Held Router
- Router Table
- Disc & Disc Belt Sanders
- Oscillating Spindle Sander
- Nail Guns

TABLE SAW



Although the table saw is one of the most useful machines in the wood shop, it is also one of the most dangerous. It can be used to accurately rip and crosscut lumber and sheet goods. The table saw can also be used for special operations including cutting dadoes and rabbets and for resawing. With the use of special jigs, joinery like tenons and box joints can be made. In addition, the blade can be tilted for cutting bevels and miters.

The table saw uses 10” diameter blades and tilts left (that is, away from the fence).

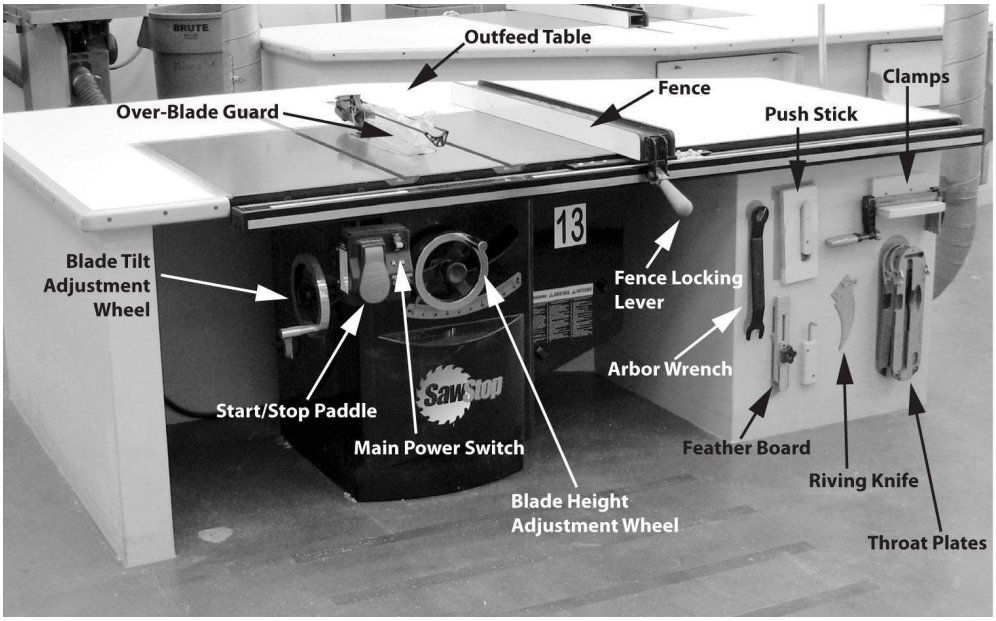


Table Saw – continued

To start the blade, pull the red START/STOP PADDLE at the bottom. Push it in to stop the saw; the saw can also be turned off by gently bumping the paddle with your knee.
Do not use the table saw until you have been through the MakerSphere table saw safety presentation and are personally checked out in its use by your instructor. You must be checked out each semester regardless of whether you have been checked out earlier.

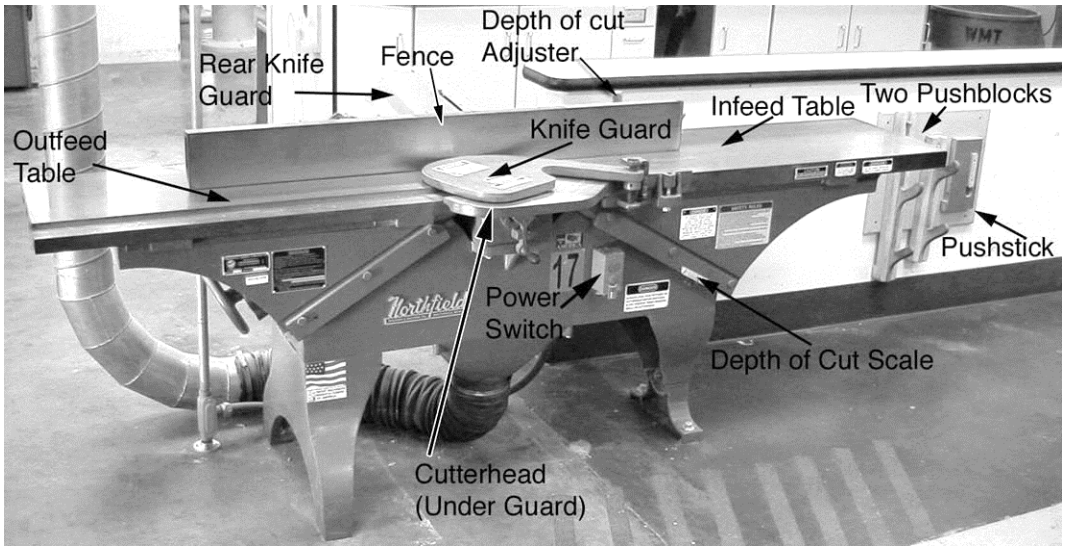
1. The number one cause of injuries on the table saw is kickback. Kickback occurs when the operator loses control of the material being cut and it is thrown from the machine with great force.
2. The guard is equipped with dogs to prevent kickback, a riving knife to prevent kickback, a plastic shield to prevent pieces from projecting toward the user. These safety devices are to be used when regular operation of the table saw is needed. If a special set-up is needed, such as a dado or rabbet, then the user must communicate with the instructor/monitor and replace the guard with the riving knife for that operation only.
3. When cutting, the saw blade should project ¼ - ⅜" above the stock or enough to clear the gullets of the blade.
4. The fence is used to guide ripping operations. The miter gauge or sled is used to guide crosscut operations. Always hold the work firmly against the fence, sled, or miter gauge and NEVER use both the miter gauge and the rip fence for the same operation.
5. During a rip cut, once the material has moved away from your left hand, move your left hand off the table. Do not drag your hand across the table and never reach over the blade.
6. You must use a push stick when ripping pieces that are 6" or less in width, the distance between the fence and the blade.
7. Cutting workpieces shorter than 10" in length is a special setup; get permission from the instructor prior to cutting.
8. When ripping stock, the piece between the fence and blade must be controlled and pushed past the blade and riving knife all the way off the throat plate. Failure to do so may result in a kickback.
9. When you are ripping stock, the scrap must fall to the outside (non-bound side) of the blade (not between the blade and fence). Lowering stock directly down over the saw blade is dangerous and is never allowed.
10. Procedures involving raising the blade into the work are special setups. Permission and instructions must be obtained from your instructor prior to performing this type of work.
11. The riving knife must always be in place behind the blade except when the instructor has authorized its removal for special set-ups.
12. Make adjustments or measurements at the blade only when the power switch is off, and the blade is at a complete stop.
13. The main power switch should be placed in the off position when you leave the saw.
14. Freehand cutting, ripping, or cross cutting without using the fence, sled, or miter gauge is ABSOLUTELY FORBIDDEN in all circumstances.
15. Do not reach or pass wood over the saw blade any time the blade is spinning.

Table Saw – continued

16. When helping someone to tail-off (supporting the work hanging off the back of the saw table), your only purpose is to support the stock from below. Only the operator pushes the stock through the saw.
17. Make sure the blade is stopped and completely lowered when clearing scraps from the table.
18. The instructor must approve all special setups and dado blade installations before the power is turned on.
19. Use a special setup with V-block or sled when cutting cylindrical stock to help keep it from spinning.
20. If you need to stop the saw in the middle of a cut, stop what you are doing without moving your hands/removing pressure from the workpiece and turn off the saw by gently bumping the red START/STOP PADDLE with your knee.
21. Backing the stock away from the blade while the saw is running is forbidden. If it is necessary to remove a workpiece, always stop the saw first.
22. The piece between the blade and the fence or a stop must always be under the operator's control. If uncontrolled, it can bind and cause a serious kickback.
23. If the fence is used at the same time as the miter gauge, the miter gauge must be between the fence and the blade. This is a special setup.
24. When you are crosscutting a number of pieces to the same length using the miter gauge, clamp a clearance block to the rip fence well ahead of the saw blade, before the direct line of the red throat plate, to prevent the cut piece from being pinched between the blade and fence.
25. Stock edges or faces that contact the table, miter gauge or fence, must be straight and flat.
26. Seek assistance and direction from your instructor before milling materials with defects such as splits, warps and knots.
27. Changing the saw blade for non-standard operations is a special setup. After installing any blade, it must be checked by the instructor.
28. Using the dado set is a special setup. The dado blades must be installed and properly adjusted. If the dado stack is over ½" thick, the arbor washer should not be used.
29. Special setups are situations that require more than usual attention or care during the procedure. Prior to performing a special setup operation, you must request permission from the instructor.
30. *A **Special Setup*** on the table saw is defined as but not limited to any of the following:
    - The throat plate is removed to set up to make the cut
    - The riving knife is removed for the cut
    - Cutting stock less than 10" long (may need to be cut by the instructor)
    - Using any jig or fixture other than a sled
    - Using the rip or crosscut fence in an unconventional way (i.e., rip with fence left of blade or crosscut fence being on the leading edge of a crosscut, special jig or fixture)

JOINTER

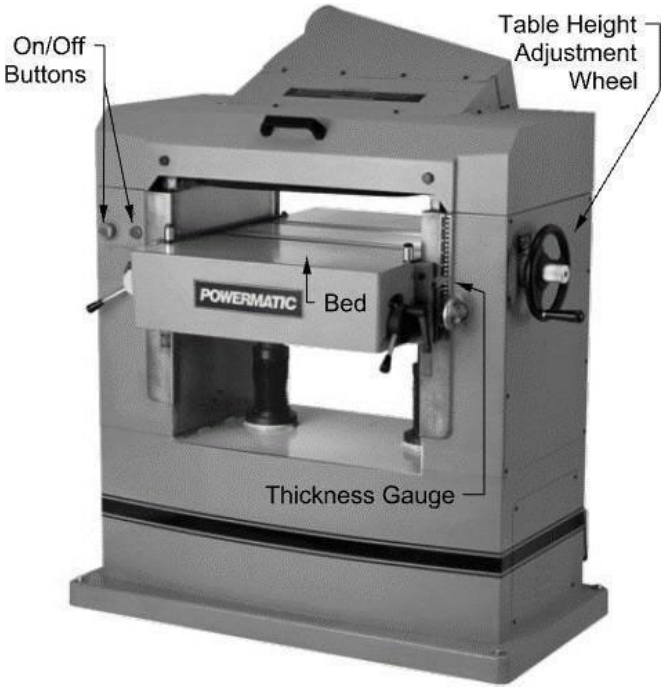
The jointer is primarily used for flattening the face of a board and straightening and squaring the edges of a board. In special circumstances, it may also be used for rabbeting, beveling and tapering. The stock is placed on the infeed table and pushed, with the aid of a push-stick or pushblock, over the cutterhead and onto the outfeed table. The fence is used to help guide the stock. The length of the cutterhead, which defines the size of a jointer, indicates the widest board that can be surfaced.



Jointer - continued

1. Ensure that the guard is over the knives at all times while the jointer is being operated.
2. The most stable side of the stock should be toward the table, often it is the most concave face.
3. Adjust the depth of cut before turning on the power. For most cuts, the jointer should be set for 1/32”.
4. The maximum depth of cut is 1/16”.
5. The minimum length of stock for jointing is 14”.
6. Keep all body parts at least 6” from the cutterhead. Never place your hand directly on the piece being jointed within 6” of the cutterhead.
7. Use a push stick or push block when face-jointing flat pieces of stock or for edge-jointing any piece lower than the height of the fence.
8. Never joint the face of stock less than 3/8” thick.
9. Push the stock clear of the cutterhead and make sure the guard has returned over the throat and knives before picking up stock.
10. To avoid rocking of the stock during cutting, always place the concave or most stable side of the stock on the table.
11. The outfeed table must be at the same level as the knives and is NEVER to be adjusted by a student.
12. Never joint end grain. It is a dangerous practice, especially on narrow pieces, and the jointer tends to splinter the work at the end of the cut.
13. Examine stock for loose knots and splits and avoid cutting these if possible.
14. Operations involving “stop cuts” or “drop cuts” require that the stock be held in place by a stop or clamp. The instructor must approve these special setups.
15. Never attempt to run a piece of wood across the jointer until the machine is running at full speed.
16. Your instructor must check special setups on the jointer for special operations such as rabbeting, beveling, chamfering, or tapering.
17. Use only clean, dry lumber on the jointer.
18. On stock that is severely warped, rough rip using the band saw to make the material narrower and/or rough crosscut using the miter saw to make the material shorter. This eliminates much of the warp. Then joint the faces as usual.
19. Material must be pushed through the jointer and never pulled.
20. Place most of the pressure down on your workpiece on the infeed portion of the table and less as has passed over the cutterhead and onto the outfeed table.

PLANER



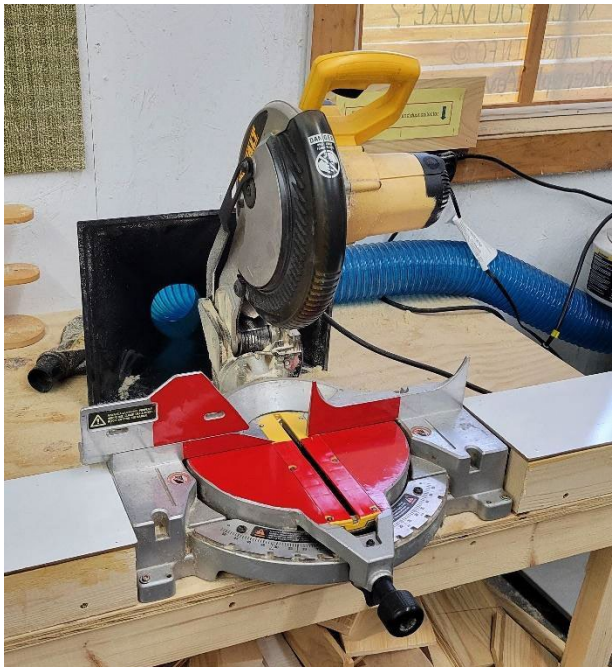
The planer is used to smooth lumber to an even thickness. After flattening one side of a board on the jointer, the board is run through the planer with the flat side down on the table, which supports the board and acts as a reference surface. The cutterhead, located above the workpiece, then smoothes the opposite face and makes it parallel to the jointed face. The width of the cutterhead, which defines the size of a planer, indicates the widest board that can be surfaced.

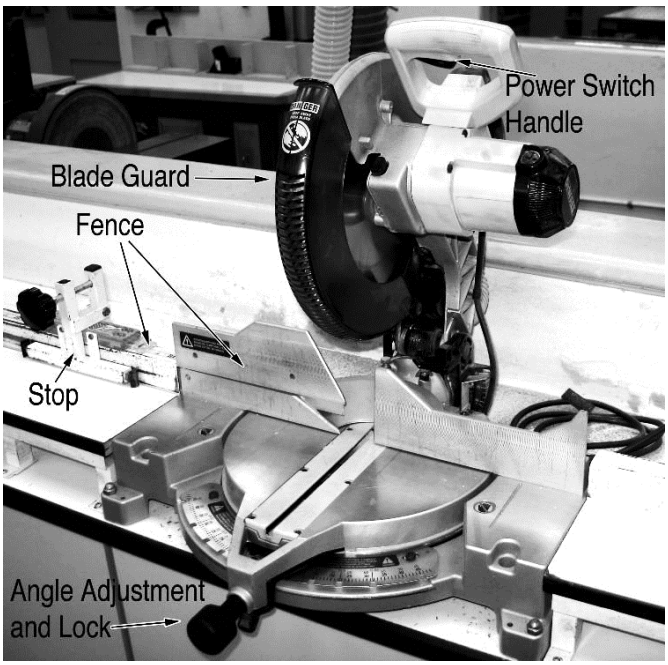
1. Do not remove more than 1/16” of wood in one pass (1/2 turn of the table height adjustment wheel).
2. Adjust the initial depth of cut to the thickest part of the board.
3. The stock must be longer than the distance between the infeed and outfeed rollers. The minimum length of stock for planing is 12”.
4. Do not plane stock less than 1/4” thick. In certain cases, the planer can be used if the stock is run through on a backer board or sled. This is a special setup, so check with your instructor.
5. Never put your hands into the planer.
6. If a board needs to be realigned on the table after being gripped by the cutterhead, use care to keep your fingers clear of the table and feed rollers.
7. Never change the depth of cut after stock has been started through the planer.
8. Do not plane stock with large cracks or loose knots.
9. Always plane wood with the grain, never across or perpendicular to the grain; the planer will shred the wood.

Planer - continued

10. Always ensure that the machine has reached full speed before inserting the wood in the machine.
11. Plane pieces of varying thickness in progressive order, starting with the thickest first.
12. Because of the possibility of flying particles, do not look into the planer while the machine is running. Eye protection and hearing protection should be worn while operating this machine.
13. Only the location of walls and other equipment surrounding the planer limit the maximum length of stock that can be surfaced or planed.
14. A planer will produce two flat, parallel faces only when the surface that was put on the table was flat and smooth to begin with. Planing a warped board will only produce a warped board of even thickness.
15. Kickbacks are infrequent but possible on a planer.
16. Only the instructor may adjust the speed of the planer's feed rollers.
17. If the stock gets stuck in the planer, do the following, in this order:

MITER SAW





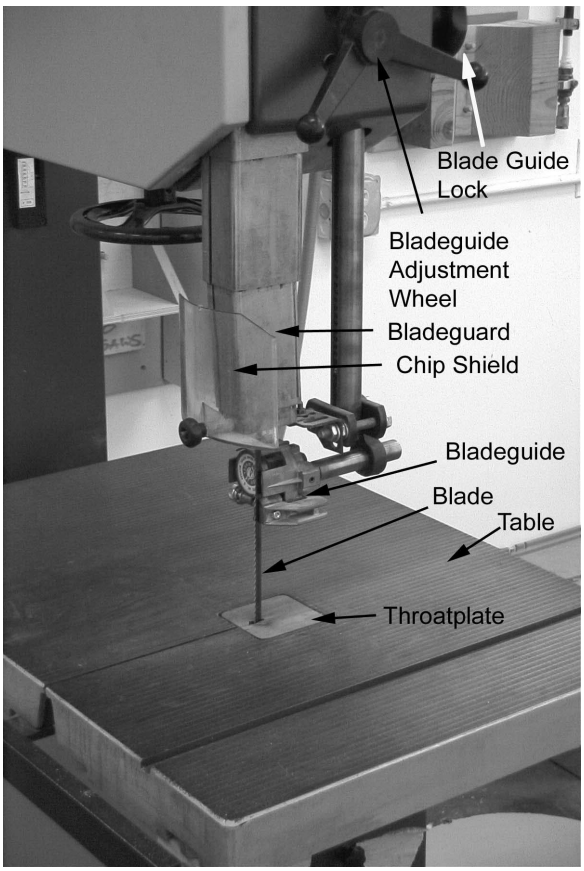
The miter or chop saw is the best tool in the lab for accurately crosscutting surfaced lumber to length. It is extremely useful for making all cuts from 90° to ±45°. The miter saw is one of the most dangerous machines in the lab. Use care in its operation.

1. Keep protective guards in place at all times.
2. Remove scraps and other foreign items from the machine before operating the saw.
3. Make sure the piece to be cut is firmly against the table and fence before cutting. Any gaps between the stock and the table or especially the fence, will result in dangerous kickback.
4. Allow the blade to reach full speed before cutting.
5. Do not force the tool into the work.
6. Never hold the piece to be cut in a manner that causes your arms to cross. The majority of all cuts are made on the miter saw with the material held with the left hand on the left side of the saw while the right hand operates the machine.
7. Always maintain a 6” margin of safety between all body parts and the blade. This means keeping your hold down hand, left, out of the red danger zone.
8. Remove chips, scraps and cutoffs only after the blade is at a complete stop.
9. After placing the stock securely on the saw table and aligning the cut, pull the trigger. After the blade comes to full speed, lower the blade into the work at a moderate speed. When the cut is complete, release the trigger and allow the blade to come to a complete stop before returning it to the upright position.

Miter Saw - continued

10. Use a stick or other hold down device when needed to secure short material without putting your hand in danger.
11. The operator should hold the workpiece in place, rather than the off-fall, for all cuts.
12. NEVER use the chop saw to cut rough material.
13. Never have the blade between your left hand holding the stock down and another hold down on the right side of the blade. Having the blade between two holds can cause binding and result in kickback.
14. Never cut something that is round or cylindrical because the blade will spin the stock out of your hand and cause kickback.
15. Never cut stock that is not held firmly against the fence and the table, warped, cupped, or twisted stock will result in shifts and kickback during the cut.

BAND SAW

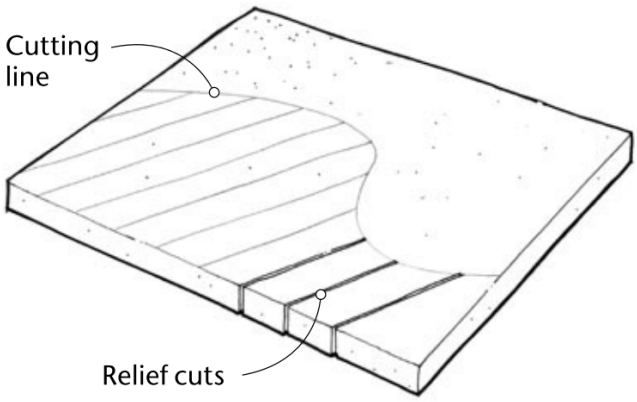


The band saw is almost indispensable for making curved cuts and resawing (cutting wood to make it thinner). The blade is a thin loop (band) of steel, typically ¼ to ½ inch wide. The blade runs over wheels above and below a table, allowing wood to be cut where the blade is traveling downward through the table. The size of a band saw is determined by the diameter of the wheels, which roughly indicates the largest piece that can fit between the blade and the body of the saw. The band saw is the fastest cutting saw in the woodworking lab. It is a rough cutting and shaping tool not intended for finish cuts.

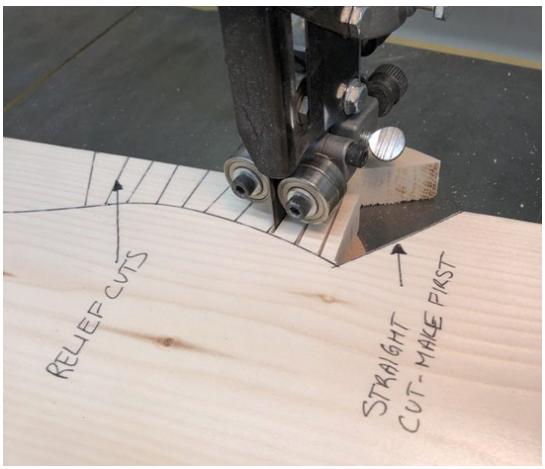
1. Adjust the upper guide and guard to about ¼" above the stock with the machine at a full stop.
2. Allow the saw to reach full speed before starting to feed your work.
3. Plan cuts carefully; lay out and make relief cuts before cutting long curves and curves of small radii. Plan work so that all cuts will be made in the forward direction.

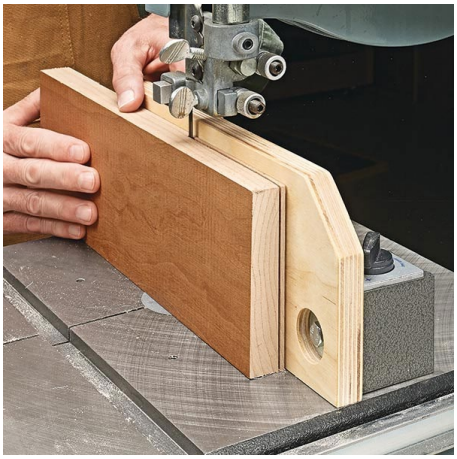
Band Saw - continued

4. If the stock **binds or pinches** the blade, do not attempt to back the stock out. Shut the power off and remove the stock after the machine stops. Backing the material out while the machine is running could **pull the blade off the wheels.**
5. When removing scrap material from the band saw table, always be aware of the blade. Use a piece of scrap stock to remove scrap pieces; do not use your hands.
6. Keep the floor areas surrounding the saw clear of scraps.
7. If the blade breaks, stand clear and shut off the power if possible. Keep others clear until the machine stops completely and notify the instructor.



8. Never adjust the saw while it is running.
9. Do not place your fingers close to the saw blade when cutting stock. Always maintain a 4" margin of safety. Keep your hands clear of the red danger zone painted on the throat plate and further.
10. Use a push stick when operation near the blade is necessary. Another option for cutting very small stock would be to use a wooden clamp to hold your stock and then hold the clamp so you're clear of the blade, but do not secure the clamp in a way that pinches the blade at all.
11. If it is necessary to back the material out of a long cut, turn the power off and wait for the blade to stop. Seek assistance from the instructor if the material does not freely come out.
12. To stop the band saw make sure the power is off then apply gentle pressure on the **brake pedal** until the blade stops. Leave the machine only **after the blade has stopped moving** completely.
13. Your instructor should approve all resawing and other **special setups**.

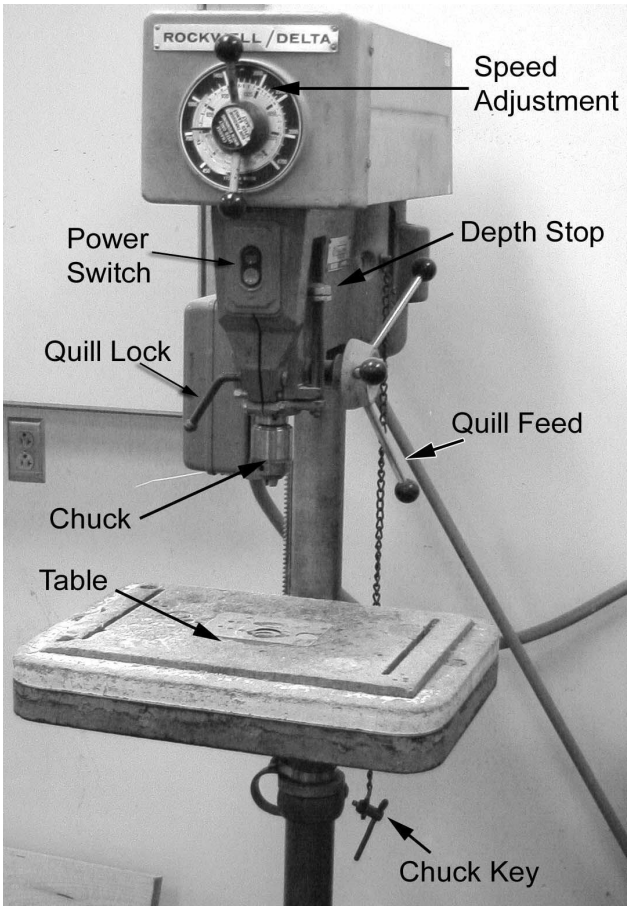




Band Saw – continued

14. Use a push stick when resawing.
15. When resawing, the edge of the stock on the table must be straight and the face of the stock against the resaw fence must be flat.
16. Keep upper and lower doors closed and all guards in place.
17. Use a push stick or guide for cuts that would place your hands near the saw blade.
18. Cutting cylindrical or irregular stock on the band saw may be done only with a special jig, such as a V-block (special setup).
19. Never stand or allow others to stand to the right of the band saw when it is running.
20. If you hear a clicking noise, turn off the saw at once. This indicates a crack or kink in the blade as it passes through the guide.

DRILL PRESS



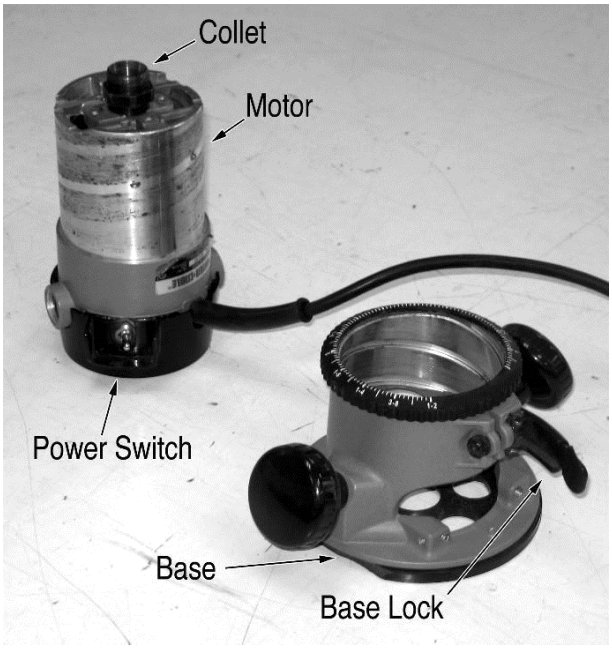
The drill press is an excellent machine for drilling accurate holes and is invaluable when drilling large holes. It consists of a motor/head assembly, chuck, and work table. Any uses other than drilling holes are special setups and must be approved by the instructor.

1. The procedure of changing spindle speed varies from drill press to drill press. Check with your instructor prior to making speed adjustments.
2. Be certain that the table and head of the drill press are secure.
3. Select the proper drill bit for the job and avoid dull bits.
4. Insert the drill bit in the chuck properly and tighten it securely with the chuck key then remove the key from the chuck before starting the drill press. If the chuck key is not removed, it will be thrown out from the chuck at a tremendous speed when the power is turned on.
5. Always use a sacrificial table or scrap stock on the metal table to ensure safe drilling operations
6. Use clamps or a drill vise whenever necessary to secure small or odd shaped work firmly.
7. Larger bits should be run at slower speeds and smaller bits at higher speeds. This keeps the cutting edge of the bit at a reasonable speed.
8. Keep hands away from the rotating spindle.

Drill Press - continued

9. Operate the feed lever so that drill cuts at a consistent feed rate into work.
10. Ease up on feed pressure when the bit begins to break through the work.
11. Back the bit out often to clear chips from the hole especially with harder woods. Not clearing the hole of the wood chips could result in burning and burnishing of the bit and stock. It will also cause premature dulling and destruction of the bit.
12. When boring to a given depth, use the depth adjustment nut or feature.
13. Stop the drill press before removing your work.
14. If work comes loose and is seized by the drill press, shut off the power immediately if you can do so without endangering yourself. If it is impossible to shut off the power, move away from the machine and move others away. Notify the instructor immediately.

HAND-HELD ROUTER



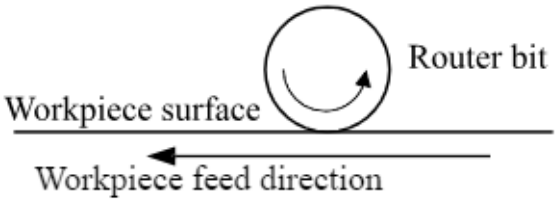
The router is a simple, relatively safe, portable electric tool. It is extremely versatile; its use is limited only by the imagination of the operator. The router consists mainly of two parts; a motor with a collet mounted on one end of the motor shaft and a base that holds the motor. A bit or cutter is mounted in the collet and protrudes below the surface of the base to do the cutting. The depth of the cut can be adjusted by moving the motor up or down inside the base and locking it at the desired depth setting. Routers run at speeds up to about 22,000 rpm.

There are two basic types of routers, fixed-base and plunge. With a fixed base router, the motor is adjusted in the base for a given depth of cut and locked in place. With a plunge router, the motor can be slid up and down within the base while the motor is running.

1. Use only bits that are specially designed for operation in high-speed routers.
2. Always unplug the router before changing bits or making adjustments other than the depth of cut.
3. Do not bottom out the shank of the router bit in the collet. When possible, insert the bit to its maximum depth, and then withdraw it about 1/8” before tightening the collet.
4. Make sure the bit is firmly secured in the collet before starting work. A loose bit will work its way out of the collet, damaging your work and/or injuring you.
5. Make sure the router motor is tight in the router base before power is turned on.
6. When starting the router, make sure the bit is not in contact with anything and the base is down on the material to be cut.
7. Do not start routers while holding them up in the air.

Hand-Held Router - Continued

8. Hold the router firmly when turning on the power to withstand the starting torque of the router motor.
9. Keep hands and loose clothing away from revolving bits and cutters.
10. Operate the router in the proper direction. If only one side of the bit is being used, move the work **against** cutter rotation. If the bit is cutting on both sides, feed the router so that the bit pushes the work towards the fence (when applicable).

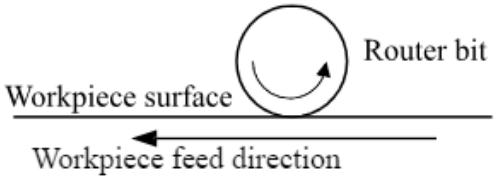


11. Use slower speeds for larger bits.
12. Do not overload or bog down the speed of the motor.
13. Several light cuts are better than one heavy cut.
14. Always make sure the bit is sharp; if unsure, check with the instructor.
15. Always secure or clamp the work so that it cannot move during routing.
16. When using multi-piece router bits, ensure all nuts and bearings are tightened properly.
17. Large panel-cutting bits should not be used in a hand-held router.
18. Due to the physics of routing, dados and rabbets in solid wood are best achieved using a table saw. Dados and rabbets in manufactured material such as plywood, particleboard, and MDF are better achieved using a router.

ROUTER TABLE

One way to increase a router's usefulness is to mount the base to the underside of a table. The bit then protrudes up through the table and the piece being routed is moved past the bit. This configuration makes for a very stable and controllable routing process and is the desired configuration whenever possible. Using the router table is not possible, however, for large workpieces or for those that cannot be moved to the router table. The procedures for using a router at the router table are similar to those for a hand-held router, with the following additional information.

1. Move the workpiece in the proper direction. If only one side of the bit is being used, move the work against cutter rotation. If the bit is cutting on both sides, feed the work so that the bit pushes the work towards the fence (when applicable).



2. Use slower router speeds for longer bits. This is especially important at the router table, since large bits are more likely to be used here.
3. On the Bench Dog router lifts: Do not change router bits without first removing the throat plate.
4. Use the throat plate that leaves the smallest opening around the router bit.
5. When routing small or narrow pieces, use a backer board and/or a pushstick to ensure proper support, along with a fence with a small or no opening.

DISC and DISC BELT SANDERS

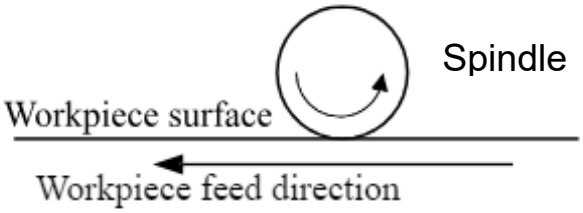
The disc sander consists of a reference table and a circular plate mounted to a motor shaft. A cloth or paper-backed abrasive disc is cemented to the plate. The diameter of the disc indicates the size of the machine, commonly 12”. The combination sander includes a vertical belt sander as part of the machine.

1. Hold the work securely.
2. On the disc sander, always sand on the downward-traveling side of the disc which is labeled as the left side of the disc and not in the red danger zone.
3. Do not sand stock that puts your fingers within 2” of the abrasive.
4. Apply moderate pressure to the stock against the abrasive and keep it moving. Excessive pressure can overheat and damage the abrasive and burn or burnish your work..
5. Be sure the work is held firmly against the table.
6. Use the disc/belt sanders only for sanding straight edges or outside (convex) curves.
7. On the disc sander, make sure the disc is secured properly. Notify the instructor if the disc is loose or worn.
8. On the belt sander, make sure the belt is tracking properly. Notify the instructor if the belt is loose or worn.

OSCILLATING SPINDLE SANDER

The spindle sander is used to sand inside (concave) curves. The spindle rotates while simultaneously oscillating up and down. This helps keep the abrasive from loading up and overheating, which would happen if the spindle did not move up and down. Various spindle sizes can be used on the machine to accommodate different work radii.

1. Always use the largest spindle possible for the radius being sanded. Using a smaller spindle makes it more difficult to get a smooth curve, takes longer, and results in excessive abrasive wear.
2. Always feed against or into the direction of the spindle rotation.
3. Avoid excessive pressure on the spindle. Too much pressure generates heat and will quickly damage the abrasive.



4. Use the throat plate that leaves the smallest opening around the spindle.

Oscillating Spindle Sander - continued

5. Hand-tighten the spindles only. Do not use wrenches to tighten spindles; this can result in the spindle becoming stuck in the collet.
6. Make sure to use the best fit sized washer to secure the spindles. Always return the washers to their storage location on a hook on the wall.
7. Every component of the spindle sander has a home on the tool rack. Do not leave spindles, throat plates, or wrenches lying around; return them to their proper location in the tool rack.
8. Notify the instructor if the spindle abrasives are excessively worn.

NAIL GUNS

Nail guns are compressed-air-operated devices used to drive nails quickly and efficiently. They also increase accuracy over using a hammer, since the gun does not require pounding on the workpiece. Nail guns are made in a variety of sizes. In the MakerSphere wood lab 18-gauge brad nailers are available. Each shoots a specific diameter, 18 gauge, of nail in a range of lengths.
Operating a nail gun requires the user to press the gun against the workpiece, thereby depressing the nose guard. The gun is then actuated by pulling the trigger.

1. Safety glasses must be worn when operating a nail gun.
2. Always point the nail gun away from any person or body parts.
3. Except when ready to actuate the nail gun, keep your finger off the trigger.
4. Ensure the nose guard is working properly, and if it is not, report the problem to the instructor.
5. When operating the nail gun, make sure your hand or other body parts are not in front of or to the side of the fastener's path. Nails have been especially known to hit hard objects, like knots or difficult grain, and shoot out the side of a workpiece.
6. Use extra caution when driving a fastener close to an edge to prevent the fastener from splitting the work, flying away, or hitting your hand.
7. Do not attempt to angle a nail into the work surface more than about 10°; more than that may cause the fastener to ricochet off the work.
8. Pull the trigger lightly. A heavy pull may result in the gun driving two nails.
9. Before loading or unloading nails into the magazine, make sure the magazine is completely empty, then load the fasteners. Failure to do so may result in misfire, damage to the tool, or a fastener too long for the job.

Lock Out / Tag Out Procedure

The lock out / tag out procedure is to be done by MakerSphere staff or shop stewards ONLY.

Any machine malfunction, damage, or breakage should initiate the lock out / tag out process below. This procedure is used to remove a dangerous tool or machine out of service until it can be inspected, repaired, and returned to the service.

When to use the lock out / tag out procedure:

- A user reports an issue with a machine
- A machine is damaged, malfunctions or becomes broken
- A user gets injured on a tool or machine
- Something sounds odd or its typical way of functioning has changed

Step 1: Shut down machine
This can be accomplished through normal stopping procedures such as pushing the STOP button, flipping the switch to the OFF position or closing a valve. Orderly shutdowns are necessary to avoid additional hazards caused due to stopping abruptly.

Step 2: Identify problems or hazards
If a machine needs maintenance or servicing, these issues typically include:

- Energy type (electrical, mechanical, hydraulic, thermal, pneumatic)
- Physical hazards
- Methods that are causing issue
- Sounds or sights that are causing concern

Step 3: Unplug the machine and apply the proper lock out / tag out devices
This step prevents accidental startup for a potentially problematic machine. It's accomplished in two steps: Lock out and tag out. This step requires isolating the machine or equipment from its source by using energy-isolating devices. Energy-isolating devices should physically prevent the machine from running. ON/OFF and STOP buttons **do not** qualify as energy-isolating devices - the power cord for the tool or machine must be isolated so no one can energize it.

Use the lock out device that is appropriate for the machine being taken out of service. See below examples.

On tools and machines with household plugs; use the Do Not Operate TAG **<u>through the hole</u>** in the plug with the **<u>zip tie</u>**.

BANDSAW

Lock the plug to the machine with the shackle and keyed lock then adding the tag with problem information.

Lock out

A lock out device keeps the machine in a SAFE / OFF position. Safety padlocks then prevent the removal of the energy-isolating device to ensure the machine cannot be started by accident until it is fixed. For household plugs, use the zip tie tag out option.

Tag out

Tag out refers to using a tagging device on a machine hanging on the tool or piece of equipment that is taken out of service. It should be securely fastened to the isolating device to indicate the equipment may not be operated until the tag is removed and the machine is fixed. Essentially, it warns others not to restore energy. The tag should include the reason for the lock out as well as the name of the person who applied it, so that any questions may be directed to the individual.

Step 4: Log & Report

Whenever a lock out/tag out procedure is initiated, this must be:

- Logged into the binder provided AND
- Details must be reported using the Lock out/Tag out form. **The form must be completed immediately at time of tag out. Please do not wait!** It is extremely important that MakerSphere receive notification immediately, through submission of this form, so that the issue can be addressed in a timely manner.

Use the QR code below to access the form.