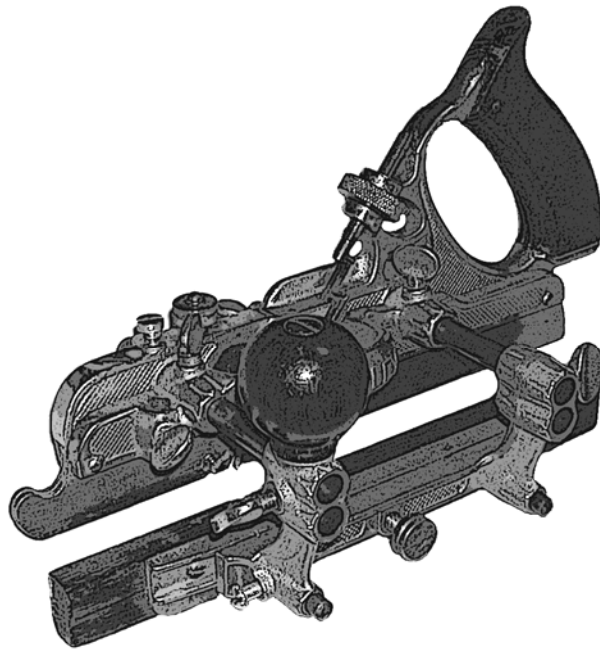


**MONTANA STATE UNIVERSITY
SCHOOL OF ARCHITECTURE
WOOD SHOP SAFETY MANUAL**



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Policies and Procedures

1. Eye Protection

- Eye protection must be worn at all times in the shop facilities.
- Failure to wear eye protection may result in loss of shop privileges.

2. Shop Orientation and Safety Requirements

- Shop orientation precludes any shop use.
- Successful completion of the safety course precludes shop use.
- Demonstration of proficiency of select pieces of shop equipment precludes shop use.
- Shop users must sign and date a copy of the Shop Users Safety Agreement form.
- Individuals must receive additional instruction for machines not included in the standard orientation.

3. Injury-Causing Accidents

In the event of an injury-causing accident, the following procedures must be followed:

- Notify the shop supervisor immediately! Shop personnel will follow established procedures.
- All personal injury accidents require a meeting between the injured person and the shop manager before shop privileges will resume. The purpose is to determine the cause of the accident for the prevention of future accidents.

4. Non-injury Accidents

In the event of accidents resulting in machine damage, material "kick-backs," jamming, or other unsafe events, the following procedure must be followed:

- A meeting is required between the person involved in the accident and the shop manager before shop privileges resume.

5. Shop Occupancy Requirements

In order to maintain a safe shop environment strict user limits are enforced.

- No more than 16 students can be in the wood shop any given time. It is your responsibility to make sure that you don't exceed that number.
- You must sign in and sign out every time you use the shop. There is a sign up sheet by the front door.

6. Cleaning of Shop Facilities

- Each student is personally responsible for clean up and tool return.
- Each machine and work area should be cleaned immediately after use.
- The last person to use a machine is responsible for cleaning the machine and surrounding work area.
- Each student is required to assist in a general clean up of the shop at the end of the day, or when deemed necessary by shop supervisory personnel.
- Students failing in their clean-up responsibilities:
 1. First offense: Warning.
 2. Second offense: Loss of shop privilege for 48 hours.
 3. Third offense: Loss of shop privilege until meeting with shop manager.

8. General Shop Hours

- Shop hours will be posted by the main shop entrance.

General Shop Safety Rules

1. Shop is open during posted hours. Check for schedule changes during finals period and holidays.
2. **Do not enter the shop while under the influence of mind-altering drugs or alcohol.**
3. Every person is required to wear eye protection in the shop as required by OSHA.
4. Tie back long hair when operating machinery.
5. Remove all rings, wristwatches and necklaces before operating machinery.
6. Do not wear sandals or open toe shoes while working in the shop.
7. Loose clothing should be restrained - tuck in shirttails, etc.
8. All accidents, even if very small, must be reported to your instructor/shop manager or the staff person on duty.
9. A safe attitude will protect you and others. Think - practice and develop safe working habits.
10. Respect the rights and property of other students. Be thoughtful and helpful towards others in the shop.
11. Horseplay, running, yelling and/or fighting is absolutely forbidden in the shop.
12. Make sure machines are in the “**off**” position and motion has stopped, before leaving them.
13. All safety guards must be kept in place while operating equipment. If a guard or safety device is an impediment to safe operation of a machine seek help.
14. Use equipment for its intended use. If in doubt, ask for help.
15. No one should use equipment until he or she has received proper and safe instruction and feels comfortable with its operation.
16. **Never make an adjustment to knobs or handles marked with red tape.**
17. If you have made an adjustment on a piece of equipment, return it to its normal position after you are done.
18. Do not use broken or damaged equipment; report immediately to manager.
19. Do not attempt repairs to any equipment that is broken. Notify shop manager or student assistants for help.
20. Make sure machine's work surface is unobstructed and clean before use.
21. Always keep your eyes on your fingers, listen to the sound of the machine and nose keen to the smell of smoke.
22. Never talk to someone operating a machine.
23. Operator should never talk to someone while operating a machine.
24. **Clean up your mess!** Wipe up all spilled liquids. Pick up your materials. Put away tools. Sweep up any loose debris.
25. Dispose of solvents, finishes, chemicals, and other hazardous materials of any kind in the red fireproof cans.
26. Return all tools to their proper storage place after using.
27. Ask for Shop Managers approval before storing materials or projects in shop.
28. **Absolutely no tools out of the shop!**
29. Do not use plaster or any cement based material on any power machines.
30. Headphones are prohibited in the shop.
35. These rules are meant to protect you from injury; please obey them.
36. The mission of the shop is to provide a safe and reliable facility for the pursuit of higher understanding as it applies to the nature of materials and the possibilities and limitations of the tools and techniques used to shape them.

Handheld Portable Power Tools

Random Orbit Sanders

Belt sanders

Hand Drills

Routers

Jigsaw

Circular Saw

General Safety for Handheld power tools

- ***Eye protection is required when using these tools.***
- ***Do not talk with observers while operating these tools.***
- Keep work area clear of other tools and materials.
- Use the right tool for the job.
- Do not abuse the electric cords.
- Keep hands clear of tool's cutting path.
- Secure work to bench when using electric hand tools.
- Do not over reach with electric hand tools.
- Make all adjustments on the tool with the power cord unplugged.
- Remove wrenches and check keys after adjusting.
- Do not carry plugged in tools with finger on power switch.
- Use only grounded extension cords.
- Keep guards in place and working properly.
- Keep hands away from the cutting portions of tools.
- Seek help if you are unsure of tool operating procedures.
- Unplug, clean and put away tools when finished working.
- Let the tool's bits and the blades do the work. Do not force tools into the material.



Random Orbit Sanders

Electric Random Orbit Sanders are used for final finish sanding and may be used on wood or wood composite material and some plastic materials.

Safety and Use

- ***Eye protection is required when using these tools.***
- ***Sandpaper disc must be attached to bottom of sander before using.***
- ***Be sure switch is “OFF” before plugging in.***
- Do not talk with observers while operating these tools.
- Use appropriate sandpaper disc for sander and for work to be performed. Ask attendant for assistance if needed.
- Start sander on material to be sanded. Hold sander firmly.
- When pausing or stopping sanding operation lift sander off material and hold away from any surfaces until disc coasts to a complete stop.
- Sander should “float” on top of material. Do not bear down on sander or push sander into material.
- The use of a dust mask is encouraged when using this tool.



Belt Sander

Belt sanders are used for flattening and smoothing material in preparation of final sanding. With the appropriate belts they will quickly remove large amounts of material or smooth a surface for further sanding with other sanders.

Safety and use

- **Eye protection is required when using this tool.**
- **Do not talk with observers while operating this tool.**
- **Be sure switch is “OFF” before plugging in.**
- The use of a dust mask is encouraged when using this tool.
- Loose clothing, hair and or jewelry should be removed, tucked back and or restrained.
- Use appropriate sandpaper belt for sander and for work to be performed ask attendant for assistance if you are not sure which belt to use.
- Sandpaper belt must be attached to sander before using.
- Always keep finger or exposed flesh away from sanding belt.
- Start sander on material to be sanded.
- When pausing or stopping sanding operation allow sander to decelerate by slowly releasing trigger switch, wait for sander to come to a complete stop.
- Sander should “float” on top of material. Do not bear down on sander or push sander into material.



Drills

Drills have a variety of uses; drilling holes, driving screws and fasteners, sanding with abrasive accessories, etc. They are very versatile because of the large number of accessories available.

Safety and Use

- ***Eye protection is required when using these tools.***
- ***Do not talk with observers while operating these tools.***
- Loose clothing, hair and or jewelry should be removed, tucked back and or restrained.
- Use appropriate drill bit or accessory for work to be performed. Ask attendant for assistance if you are not sure which bit or accessory to use.
- Check forward/reverse switch before drilling or driving screws. Switch should be in forward position for drilling or driving screws and reverse for removing screws.
- Adjust clutch to appropriate setting for work being performed. Ask for assistance if you are not sure which setting to use.
- Always keep finger or exposed flesh away from drill bit or accessory.
- Avoid dropping or bumping drill off tables and ledges. Be mindful and keep drill away from the edge of work benches or elevated surfaces.
- When drilling holes use a piece of scrap under material being drilled to protect workbenches and to minimize tear out on material.



Jigsaw

This tool is generally used for pattern cutting into materials with the maximum thickness of 2”.

Safety and Use

- ***Eye protection is required at all times when using this tool.***
- ***Do not talk with observers while operating this tool.***
- Restrain loose clothing, tie back long hair, remove or restrain loose jewelry.
- Keep fingers away from line of cut
- Always securely clamp or hold material in position.
- Use appropriate blade for material to be cut. Ask for help from shop staff.
- Find a clear area to work with this tool and secure the material
- When cutting on material on bench-tops be aware of where bench surface is. Avoid cutting bench-top.
- Area underneath line of cut should be free of any obstructions.
- Line up front edge of blade with line of cut.
- Never start Jigsaw with front edge of blade pressed up against material.
- Keep jigsaw base flat on material when in use.
- Never use a bent blade.



Circular Saw

The Circular Saw is used for making straight cuts. With the appropriate blade various materials may be cut such as: wood and wood composites, Paper or fiber based materials, plastics and masonry type materials. Like all tools that utilize a moving blade care and caution should be used when operating this tool.

Safety

- ***Eye protection is required at all times when using this tool.***
- ***Do not talk with observers while operating this tool.***
- The use of a dust mask is encouraged when using this tool.
- The use of hearing protection is encouraged when using this tool.
- ***Keep fingers away from line of cut when operating this tool.***
- ***Keep fingers away from line of cut in front of and in back of saw.***

Procedure for using Circular Saw

- Use appropriate blade for material to be cut. Ask for help from shop staff.
- Do not attempt to change blade or blade settings. Ask for assistance if needed.
- Find a clear area to work with this tool and secure the material with clamps if needed
- Avoid binding the blade in line of cut by supporting work properly using either method:
 - a. Material should be fully supported on both sides of cut line (large pieces).
 - b. Material may be supported on only one side of cut with waste falling away (shorter pieces)
- When cutting on material on bench-tops be aware of where bench surface is. Avoid cutting into bench-top.
- Area underneath line of cut should be free of any obstructions.
- Line up front edge of blade with line of cut.
- Never start saw with front edge of blade pressed up against material.
- Keep saw base flat on material when in use.



Routers

The routers, shown above, are some of the most useful tools in the woodworking field. Different cutters may be used to provide a variety of cutting and shaping operations such as - slotting, mortising, dadoing, grooving, rabbeting, corner-rounding, beading, dovetailing, veining, inlay work, etc.

Safety

- ***Eye protection is required when using these tools.***
- ***Do not talk with observers while operating these tools.***
- ***Be sure switch is "OFF" before plugging in.***
- The use of hearing protection is encouraged when using this tool.
- The use of a dust mask is encouraged when using this tool.
- Loose clothing, hair and or jewelry should be removed, tucked back and or restrained.
- Select proper bit for work to be done.
- Always be sure the collet nut is securely tightened to prevent the router bit from slipping during use.
- Make certain that the work piece is rigidly held in desired position and free of obstructions and always hold the router firmly and against the work, using both hands.
- Remove material in increments (successive passes) if cut will exceed 1/8" in width or depth of cut. Keep cutting pressure constant. Do not force tool into cut.
- Never adjust depth of cut while motor is running.
- Be sure cord is free and will not "hang up" during routing operations.
- Keep hands clear of cutter when motor is running to prevent personal injury.
- Maintain firm grip on router when starting motor to resist starting torque. Allow motor to come to full speed before contacting work piece.
- Be sure motor has completely stopped before setting machine down.

Typical procedure for using router

Before using your router, consider the kind and total amount of material to be removed. Depending on the material, it may be necessary to make more than one cut to avoid overloading the motor. Before beginning the cut on the actual work piece, it is advisable to make a sample cut on a piece of scrap lumber. This will show exactly how the cut will look as well as enable you to check dimensions. Always be sure the work is rigidly clamped or otherwise secured before making a cut. Generally speaking, when working on a bench, the work piece should be held on the bench by wood clamps. When routing edges, the router should be held firmly down and against the work by both guiding knobs. Since the cutter rotates clockwise (when viewing router from top), more efficient cutting will be obtained if the router is moved from left to right as you stand facing the work. When working on the inside of a template, move router in a clockwise direction. When working on the outside of a template, move the router in a counter clockwise direction. The speed and depth of cut will depend largely on the type of material being worked upon. Keep the cutting pressure constant, but do not crowd the router so the motor speed slows excessively. It may be necessary on exceptionally hard woods or problem materials to make more than one pass at various settings to get the desired depth of cut. When making cuts on all four edges of the work piece, it is advisable to have the first cut on the end of the piece across the grain. Thus, if chipping occurs at the end of a cut, it will be removed when making the next cut parallel with the grain.



Router Table

The Router Table is simply a handheld router mounted on a fixed plate, inverted and mounted in a cabinet or stand. The shop has a variety of router bits that can be used to shape and groove material. As with any machine in the shop certain precautions and procedures should be followed when operating this machine.

Safety

- **Eye protection is required when using this machine.**
- **Do not talk with observers while operating this machine.**
- **Be sure switch is "OFF" before plugging in. The router is hooked up to a switch on the front of the table. Always be sure to unplug the router when changing bits.**
- Do not attempt to remove too much material in a single pass. Raise bit in 1/8th inch increments or adjust fence in 1/8" increments.
- **Always feed material from the right side of the bit to the left side of the bit.**
- **Never position material between bit and fence or use the back side of bit.**
- Fingers should always be at a safe comfortable distance from bit, and never closer than 2" from bit. Seek attendant assistance when working on small pieces.
- Material to be routed should be flat and free of and free of any debris (nails, screws, knots, bark).
- Always hold material firmly but not forcefully against fence or bearing if using bearing bits.

Procedure for operating router table

1. Select desired router bit (Seek attendant assistance).
2. Unplug router from power strip.
3. Seek attendant assistance for help installing bits.
4. Adjust height of bit or depth of fence so no more than 1/8" in depth or width will be removed per pass.
5. Turn on router.
6. Hold material steady against fence or bearing and begin feeding material from right to left.
7. Repeat step 4-6 as many times as needed until desired width or depth of cut is obtained.

Stationary Woodworking Machines

Band Saw

Sliding Compound Miter Saw

Table Saw

Jointer

Planer

Disc Sander

Oscillating Spindle Sander

Drill Press



Woodcutting Band saw

The Band Saw can be used to cut all kinds of wood and some types of plastics. Before using these pieces of equipment please read and make sure you understand the following safety rules.

Design Function

1. Cutting freehand curves.
2. Ripping stock into thin strips.
3. Cross cutting or ripping stock.
4. Cutting circles.
5. Cutting wood and some plastics.

Safety

- **Eye protection is required when using these machines.**
- **Do not talk with observers while operating these machines.**
- **Always maintain a 3" margin of safety** (Keep hands and body parts away from line of cut).
- Make all adjustments with the power off.
- **Do not expose more than 1/2" of blade between material and bottom of upper guide.**
- Allow saw to reach full speed before beginning cut.
- Hold stock flat on table top.

- Do not cut stock that does not have a flat surface. (i.e. do not attempt to cut spherical objects.)
- Feed stock only as fast as teeth will remove material.
- Avoid backing out of cuts when possible.
- Plan relief cuts in advance – think first.
- Do not make turns too tight – listen for blade twisting.
- If “clicking” noise is heard, **SHUT OFF POWER – BLADE MAY BE DAMAGED.**
- Stop machine and blade before removing scrap pieces.
- Operate the machine from front side (side with doors). Avoid standing to side of machine.
- Ask for help when cutting long or wide or difficult to handle pieces.
- Saw is for use in cutting wood and some other soft materials (ask shop attendant).
- Keep hands and body parts away from line of cut.

Absolutely no metal cutting is allowed on these Band Saws.

Procedure for using Band Saw

1. Inspect material. It should be flat and free of debris (dirt, nails, screws, etc.)
2. Check blade pitch. Use proper blade for various cuts (ask shop attendant).
3. ***Adjust upper guide to within 1/2” above surface of material.***
4. For straight cuts set up fence (see attendant for assistance).
5. Turn on saw. Machine should run smoothly with a consistent buzz, report strange noises to shop attendant.
6. Feed material while standing directly in front of blade. Avoid standing to side of blade.
7. Keep hands and body parts away from line of cut. Sometimes the blade may “jump” through the material. This happens sometimes when the blade cuts through a portion of the material that may have a lesser density, thus offering less resistance to cutting. The blade will actually speed up and cut at a greater velocity. If you are near the end of a cut and your fingers are in the line of cut injury could occur.
8. Begin feeding material into blade. Use enough pressure to feed material through blade at a slow consistent speed. If material smokes or burns report it to shop attendant.
9. If you need to pull material out of blade do so with caution. If blade gets stuck in saw kerf and pulls out of guides, turn off machine and seek help from shop attendant.
10. For angled cuts check with shop attendant for help.



Sliding Compound Miter Saw

The Sliding Compound miter saw can 90-degree crosscuts as well as compound angles in wood material. It cuts quickly with a fair degree of accuracy. For greater accuracy the table saw equipped with the crosscut box is suggested.

Safety

- **Protective eyewear should always be worn when operating this machine.**
- **Do not talk with observers while operating this machine.**
- Cut only wood and wood based material with this saw.
- **Material should be flat and straight. Do not attempt to cut bowed or twisted boards with this machine. This could cause a kickback.**
- Hands and finger should be kept a minimum of 8" from blade.
- **Do not cut pieces less than 12" with this saw.**
- Do not operate saw with hands crossed. I.E., Left hand should always stay to the left of saw and used for holding material and right hand should always be used to operate saw switch.

Procedure for crosscutting

1. Adjust bevel angle and miter angle to desired settings (seek attendant assistance).
2. Adjust adjustable fence to clear blade guard travel (seek attendant assistance).
3. Hold material firmly and flatly against fence and table.
4. Pull saw carriage out past material.
5. Squeeze trigger handle to start saw.
6. Allow blade to reach full speed before lowering saw into material.
7. Lower saw blade into material with a slow steady rate of feed.
8. Push saw carriage through material and back towards fence.
9. If material starts to bind against blade, lift saw from material and take several shallow passes until cut is complete.
10. Allow blade to come to a complete stop before raising blade.



Table saw

The 10" Table saw is a frequently used piece of equipment. It can be used to cut solid wood, composite wood products such as plywood and particleboard and some types of plastics. Two table saws in the woodshop are configured primarily for ripping wood (cutting with the grain of the wood) and a third is setup exclusively for 90 degree crosscuts (cutting perpendicular to the grain of the wood). The table saws in the shop have powerful motors and special care should be taken whenever operating any of the table saws.

Safety

- **Protective eyewear should always be worn when operating this machine.**
- **Hearing Protection is recommended while using these machines.**
- **Do not talk with observers while operating these machines.**
- **Seek shop attendant approval before using these machines.**
- Material to be cut on table saws should be flat and straight on at least two adjacent surfaces. Free of dirt, loose knots and splits.
- Be sure to check for any metal objects embedded in the wood (nails, screws, staples, etc.)
- Use a push stick whenever cutting pieces less than 6" wide.
- Do not rip material greater than 2" thick on this machine.
- If guards need to be removed please ask shop attendant for help.
- **DO NOT LET GO OF MATERIAL UNTIL COMPLETELY PAST BLADE.**
- Avoid standing directly in-line with blade. If possible stand off to the side of blade.

Procedure for ripping material on table saw

1. Inspect material. It should be flat and straight, free of loose knots, dirt, or metal objects.
2. Use appropriate blade for material being cut. Seek attendant's help if needed.
3. Adjust blade tilt if needed, use appropriate throat plate for beveled cuts. Seek attendant's assistance if needed.
4. To adjust fence to desired width, lift large handled knob upwards and slide fence bar towards or away from saw blade.

5. Guards should be kept in place. But can be removed if they interfere with passage of material through blade (By shop attendant only).
6. Lock down fence by pushing large handled knob downwards.
7. Have push stick ready for use if there is less than six inches between fences and saw blade.
8. Remove dust shield if it interferes with passage of push stick (Usually about 3" width).
9. Remove Splitter if it interferes with passage of push stick (Usually about 1 3/4").
10. Turn on saw.
9. Place material flat on table saw surface and tight against fence.
10. With steady even pressure and moderate speed push material into blade.
11. As material moves through blade continue holding material tight against fence and flat against table.
12. Minimize saw marks and burning by not pausing during the sawing process.
13. When end of board approaches reach for push stick if needed (Material less than 6" wide).
14. When reaching for push stick, do not let go of material at any time. Switch hands as necessary to reach for push stick.

Procedure for cross cutting on the table saw with crosscut sled

1. Material should have at least one flat and straight face and at least one flat and straight edge.
2. Place sled and auxiliary table on saw.
3. Place material on the sled so it sits tightly against the rear fence.
4. Make sure material is away from blade. Start saw.
5. With one hand holding material firmly in place, use other hand to push the sled through saw blade.
6. As soon as material has passed completely through blade pull the sled back to the original starting position.
7. Turn off saw. Wait for blade to completely stop before reaching for material.

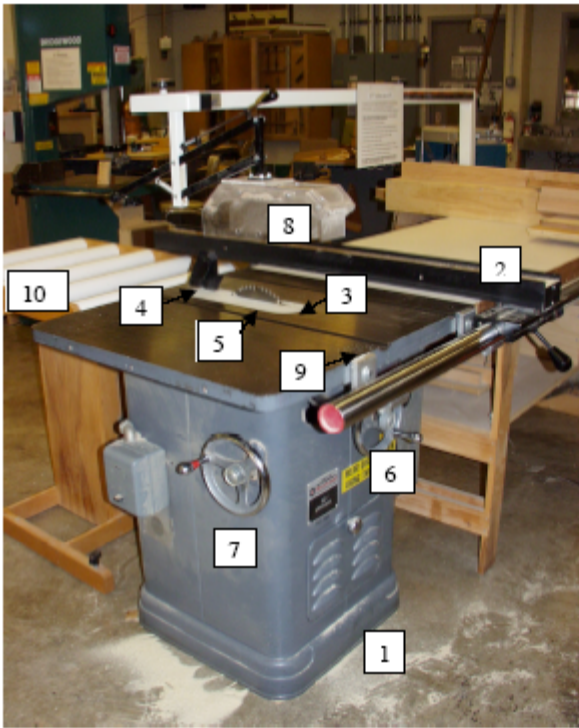
Procedure for cross cutting on the table saw with miter gauge

NEVER USE TABLESAW FENCE IN CONJUNCTION WITH MITER GAUGE.

(I.E. DO NOT USE FENCE AS A STOP).

1. Material should have at least one flat and straight face and at least one flat and straight edge.
2. Place miter gauge into the slot in the table saw (bar on the miter gauge should be pointing away from front of saw).
3. Line up the mark on the material with the edge of the blade. (Blade should be to the waste side of the cut).
4. Make sure material is away from blade. Start saw.
5. Hold material tight to miter gauge and with steady speed push it and material through blade.
6. While still holding material and miter gauge pull back to starting position. Remove scrap after blade has completely stopped.

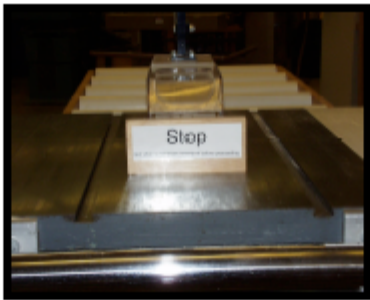
Additional Table Saw Safety



- 1. Front of saw
- 2. Rip fence
- 3. Throat plate
- 4. Splitter and anti-kickback
- 5. Blade
- 6. Blade height adjustment
- 7. Blade angle adjustment
- 8. Dust shield
- 9. Miter slot
- 10. Roller stand

Table saw Nomenclature

All Table Saw use must always be approved by shop supervisor before proceeding.



Never reach over the saw blade.



Wrong

About Kickback

One of the biggest hazards associated with Table Saw use (aside from the risk of being cut) is the potential for material that is being cut to bind and be thrown back toward the operator. This is known as kickback. Kickbacks may vary in intensity—anywhere from a mild backwards push, to a violent hurling of the material. Almost all kickback is caused by operator error – either not properly controlling the material through the cut or attempting to cut inappropriate or defective material. Many of the safety rules that follow are designed to minimize the risk of kick-back. Please know and follow these safety rules for the protection of yourself and others.

All material to be cut must be flat and have a straight edge to ride against the rip fence or the miter gauge. Material should always be held firmly on table surface and the rip fence or miter gauge.



Correct



Wrong

Please Note: Some guards may have been removed for clarity in some of the following photos. Guards must always be in place when practical.

Always use the rip fence, the miter gauge or other stable material supporting jig.
Never attempt a freehand cut with a Table Saw. (A cut using only hands to guide material.)



Correct



Wrong

Table Saw blade height should be adjusted so that top of blade projects 1/8" to 1/4" above surface of material being cut.



Correct



Wrong

Do not over-extend reach over the saw.



Correct



Wrong

Always push the material between the blade and the rip-fence completely beyond the blade and the splitter guard before letting go.



Correct



Wrong

Always use a push stick to rip narrow stock (Generally material less than 6" wide).



Correct



Wrong

Never place hands or fingers in path of saw blade.



Correct



Wrong

Always push the portion of material that travels between the rip fence and the saw blade.



Correct



Wrong

Use left hand to push material against rip fence. Use right hand to push material through blade. As material passes through blade and end of material approaches throat plate do not use left hand to push material against rip fence.



Correct



Wrong

Never cut narrow stock to length using the rip fence. Always use the miter gauge or other saws setup specifically for cross-cutting.



Correct



Wrong



Jointer

The Jointer is a primary piece of woodworking equipment. It is used to make wood material flat and square in preparation for other machining procedures. Safe and proper use and good technique are essential for accurate and consistent performance.

Safety

- **Protective eyewear should always be worn when operating these machines.**
- **Do not talk with observers while operating these machines.**
- **For safety reasons material should be at least 12" long and 3" wide and at least 1/2" thick.**
- **Never attempt to joint end grain on this machine.**
- **Never reach down to pick up a board that jams on the out-feed bed.**
- For best performance cuts should be limited to 1/16" maximum in hardwoods and 1/8" maximum in softwoods.
- Ask for shop attendant's assistance for help changing depth of cut settings.
- It is easier to flatten shorter lengths of material. Cut longer boards to rough length before flattening.
- **When flattening material less than 1" thick use a push board to hold material down.**

Procedure for flattening a board:

Seldom does a board come from a lumberyard or sawmill truly flat or square. More often than not boards will have a warp, twist or bow or a combination of all of these things. A jointer can remove these undesirable qualities and leave the material in a more workable condition.

1. Inspect material. It should be clean and free of debris; dirt, nails, screws and loose knots.
2. Check settings on machine. Depth of cut should be 1/16" or less for hardwoods or 1/8" or less for softwoods.
3. Turn the machine on.
4. If material is bowed or cupped place it on the in-feed table with the cup or bowed side down. **If material gets caught on out-feed bed do not reach down to free material. Hold**

material in place and turn off machine. Remove material after machine has stopped completely.

5. Apply downward pressure to the leading end of the board and a combination of downward and forward pressure on back end of board.

BE SURE FINGER TIPS ARE ABOVE SURFACE OF MATERIAL AND ARE AT LEAST 2" ABOVE CUTTER KNIVES.

6. Begin feeding material through cutter knives. As material passes over cutter knives gradually shift more downward pressure to back end of board. Material should pass over knives with relatively little vibration and with a moderate noise level. Noisy cuts or cuts that generate a lot of vibration indicate dull knives. Report this to shop attendant.

7. Repeat steps 5 and 6 until material is flat on one side.

Procedure for jointing the edge of a board

Once the face of a board has been flattened an edge that is straight and 90 degrees to the face can be obtained.

1. Inspect material. It should be clean and free of debris; dirt, nails, screws and loose knots.

2. Check settings on machine. Depth of cut should be 1/16" or less for hardwoods or 1/8" or less for softwoods.

3. Make sure dust collector is on.

4. Turn the machine on.

5. Place the flat face of the board against the fence. Apply pressure at the leading end of the board and press it flat against the fence. At the back end of the board use your other hand to begin pushing the board.

6. As the material passes over the cutter head use one hand to keep the board against the fence and tight to the bed. Allow the board to slide past as the other hand pushes the material. Ask for help if you don't understand this procedure.

7. Repeat steps 6 and 7 until the edge is square to the face and straight along the length. Use a square to check for square.

Additional Jointer Safety

Proper stance and posture are important when operating any of the shops Jointers. Feet should be firmly placed and body weight should be evenly distributed. Fingers should never touch the table surfaces when processing material.



Never reach down to free material that gets stuck on out-feed bed while machine is on and running.



Correct. Hands and fingers should be above the surface of the material.



Incorrect. Hands and fingers should never touch the table surface.

The jointer is for flattening and straightening the face or edge of a board. Never attempt to surface the ends of a board (End-Grain).



Correct. The jointer is for flattening the edge or face of a board.



Incorrect. Do not use the jointer to flatten, smooth or straighten the end of a board (end-grain).



Planer

24" Planer

The 24" Planer is ideally suited for planing large boards of solid wood. It can be used to plane rough sawn wood or wood that has been previously flattened.

PLANERS DO NOT FLATTEN BOARDS. If there is a bow, cup or twist in a board the planer will not remedy these characteristics. A planer will merely smooth the face of a board and plane it to a consistent thickness. The planers in the woodshop are vital pieces of equipment and crucial to the completion of many projects. Be gentle with these machines and read the operating procedures carefully.

Safety

- **Do not stand directly behind machine when operating.**
- **Do not look into machine while it is on and operating.**
- **Protective eyewear should always be worn when operating this machine.**
- **Use Hearing protection when operating this machine.**
- **Do not talk with observers while operating this machine.**
- Do not stand directly behind machine when operating.
- Do not attempt to remove too much material per pass (more than 1/16" / pass).
- Always measure thickness of board at several points along the length.
- For the first pass set the machine according to the thickest part of the board.
- Do not adjust feed rate crank unless machine is running.
- Material to be surfaced should be at least 16" long.
- If needed see attendant for assistance with this machine.

Procedure for planing boards

1. Check board for maximum thickness.
2. Turn on machine (Green button).
3. Make sure dust collector is on.
4. Use hand crank on side of machine to raise/ lower bed in small increments.
5. Feed board into machine.
6. Raise bed for next pass.
 - a) For boards 6" and under turn crank handle clockwise maximum 1/2 crank / pass.
 - b) For boards 6" and over turn crank handle clockwise maximum 1/4 crank / pass.



Disc Sander

The 12" Disc Sander can be used to do rough sanding work on straight edges and on convex curved surfaces. As with all power sanders care must be taken not to remove too much material at once.

Safety

- **Protective eyewear should always be worn when operating this machine**
- **Do not talk with observers while operating this machine.**
- **Use of a dust mask is recommended while using this machine.**
- Long hair should be tied back and restrained.
- Loose clothing should be restrained or removed. Roll up sleeves.
- Be sure to wear eye protection.
- To keep material from "jumping" sand only to the right of center.
- Do not force material into disc.
- Material to be sanded should be flat on at least one face.
- Disc Sander is for use on wood only. Do not attempt to sand plastic, metal, plaster or rubber.
- If disc appears to be clogged or dirty ask shop attendant for assistance.

Procedures for Sanding:

- Turn on Sander.
- Place flattened surface of material on table to the right of center of disc.
- Hold material firmly and gently move it into spinning disc.
- Move material steadily back and forth across right half of disc.
- Turn off machine when finished and allow disc to coast to a stop.
- **Do not sand items with wet or soft glue.**



Oscillating Spindle Sander

The Oscillating Spindle Sander is most useful for sanding concave surfaces. The spindle rotates and oscillates simultaneously leaving a smooth surface on the material being sanded.

Safety

- **Protective eyewear should always be worn when operating this machine.**
- **Do not talk with observers while operating this machine.**
- Long hair should be tied back and restrained.
- Loose clothing should be restrained or removed. Roll up sleeves.
- Do not force material into spindle.
- Material to be sanded should be flat on at least one face.
- This sander is for use on wood only. Do not attempt to sand plastic, metal, plaster or rubber.
- If spindle appears to be clogged or dirty ask shop attendant for assistance.

Procedure for sanding

- Hold the material flatly and firmly on the table away from the spindle.
- Ease the material into the spindle, move the material from side to side around the spindle to obtain a smooth even surface.
- **Do not sand material with wet or soft glue.**



Drill Press

The Drill press can cut holes in wood, metal and plastics depending on the type of drill bit installed. The shop has a variety of basic drill bits and a small collection of specialty bits. Please follow the operating directions carefully for this machine.

Safety

- **Protective eyewear should always be worn when operating this machine.**
- **Do not talk with observers while operating this machine.**
- General Rule: The Larger the bit the slower the speed. Ask shop attendant for help changing speed.
- Always remove chuck key before starting drill press.
- Make adjustments with power off.
- Securely lock bits into chuck by tightening all three holes.
- Be sure to use scrap beneath material to be drilled.
- Avoid drilling into drill press table top.
- Drill only wood, plastics, mild steel, aluminum, brass with the drill press.
- **Always clamp down metal or plastic material.**
- Hold material to be drilled securely. For small pieces use a drill press vise or clamp.
- Do not drill length of hole in one plunge. Take several small plunges.
- Shut off power, remove bit and clean drill press and surrounding area when done.