Wood & Finishing Shop

Safety Plan

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Overview

An important part of your experience in woodworking will be learning to follow practices and procedures that will prevent injuries to YOURSELF and OTHERS.

Develop a good attitude toward safety. This means that you have a strong feeling toward the importance of safety and are willing to give time and attention to learning the safest way to perform your work. It means that you will be certain to work carefully and follow the rules – even when no one is watching you.

Carefully study the safety rules which follow. Your instructor may also recommend some additional rules. If you follow the rules and directions carefully, many of them will soon become safety habits that you will perform almost automatically.

Please note that experience in a wood shop does not equal good safety awareness. Most accidents occur not to beginners but from experienced workers that feel more comfortable in the shop and therefore become more casual in their approach to safety guidelines.

Safety training and shop tour, noting fire extinguishers and first aid equipment, is conducted each quarter during classes offered by shop staff.

All students must abide by individual shop rules and restrictions (i.e. hours of operation and must only work when a supervisor is present.

NEVER be afraid to ask a supervisor for help.

NEVER use a new machine without first asking for assistance from a supervisor.

Objective

The objective of this plan is to establish safe work practices for students using machine, carpenter and fabrication shops located and/or affiliated with Pace University. Safety guidelines and training requirements designed to minimize the risk of injury are provided in the plan. The plan is intended to assure that:

- Individuals are provided training and information on how to protect themselves from shop and machine hazards,
- Recommended maintenance is conducted and standard operating procedures are in place for machinery and equipment use,
- Only persons trained and knowledgeable in the use of a specific piece of equipment use that equipment, and
- All work is performed in accordance with applicable regulatory requirements.

Scope

This program has been designed to comply with Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910 Subpart O and 29 CFP 1926 Subpart I. Also included are applicable parts of related OSHA standards relating to housekeeping, means of egress, and hand and power tools.

Plan

The Shop Safety Plan establishes the minimum requirements necessary to allow for the safe use of various shops located at Pace University. Each shop shall post a copy of their access policy, hours of operation and shop safety rules and protocols.

Responsibilities

Environmental Health and Safety (EH&S)

EH&S will establish and post safety plan pertaining to the use of shops. Questions concerning plan exceptions or clarifications must be directed to EH&S for review and comment before initiating at the shop level.

EH&S will periodically conduct safety audits of all student used shops.

EH&S has final authority over all safety issues and may immediately halt any operations or procedures it considers unsafe at any time at its discretion.

Principal Investigators (PI), Instructors and Shop Supervisors

The PI and shop supervisors are responsible for enforcing the provisions of this plan including the provision of required training and personal protective equipment for students using shop equipment.

Shop supervisors must keep required machine guards in place and remove damaged equipment from service.

Shop supervisors have the authority to halt unsafe operations at any time and to restrict access to a shop to any student violating the provisions of this plan.

Shop supervisors are responsible for providing required personal protective equipment (PPE) and enforcing its correct use.

Students (Graduate and Undergraduate levels)

Any student using a Pace University shop is expected to follow all safety requirements as presented in this plan and as posted within each individual shop.

All students must receive required training prior to working with any power tools, woodworking equipment or other shop related equipment.

All students must properly use any required personal protective equipment while working in a shop.

All students must abide by any individual shop restrictions (i.e. hours of operation) and must only work in a shop when the supervisor is present.

Any injury as well as any unsafe conditions, actions or near-miss incidents must be reported to the shop supervisor.

Training Requirements

Training must be provided before a student is allowed to work in a shop.

General shop safety requirements and machine specific training is required to be provided by the shop supervisor to anyone using a student machine shop.

Required training must include the following elements:

- Information on the hazards associated with a particular machine or piece of equipment, including a knowledge base of how a piece of machinery functions so the user can anticipate risks and hazards while working.
- The necessary safety precautions that must be followed when working with a particular machine or piece of equipment including the purpose and function of any guards that are in place.

- The types and limitations of any personal protective equipment (PPE) that is required to be used in the shop.
- Limitations of the particular equipment.
- Procedures to be followed in the event of a machine malfunction or damage to the equipment.
- Procedures to be followed in the event of an emergency (i.e. injury).
- Equipment and general shop maintenance and cleaning procedures.
- Use of approved materials on tools. Never use reclaimed lumber or materials with metal hardware on tools.

All training must be documented in writing with the records maintained by the shop supervisor.

General Safety Rules

Work procedures and shop practices described are effective methods of performing given operations. Use special tools and equipment as recommended. Carefully follow all safety warnings and cautions. Note that these warnings are not exhaustive. Proceed with care and under proper supervision to minimize the risk of personal injury or injury to others. Never use any tools or machinery without first receiving training.

Most power tool accidents can be avoided. Roughly 80% of accidents are caused by workers without the right safety attitude. Never work alone. At least two people must be present when power tools are in use. No horseplay is allowed. Never work while impaired. These workers do not take safety seriously. Instead of being safe, they put everyone in danger.

BENCH ORGANIZATION

Keep your project materials carefully organized on your bench with tools located near the center. Do not pile tools on top of each other. Never allow edged or pointed tools to extend out over the edge of the bench. Close your vise when it is not in use and see that the handle is turned down. Keep drawers and cabinet doors closed.

CARRYING TOOLS

Keep sharp-edged and pointed tools turned down. Do not swing or raise your arms over your head while carrying tools. Carry only a few tools at one time, unless they are in a special holder. Do not carry sharp tools in the pocket of your clothes.

CLAMPING STOCK

Whenever possible, mount the work in a vise, clamp, or special holder. This is especially important when using chisels, gouges, or portable electric tools.

CLEANLINESS

Keep your hands clean and free of oil or grease. You will do better and safer work, and the tools and your project will stay in good condition. Keep the machine clean. Remove all tools, lumber, and unnecessary materials. Never use a tool bed as a worktable. Objects left on the machine can vibrate into revolving cutters. They can then be thrown from the machine with great force. Never clean a machine while it is running. Always use the dust collection system, if one is available. Maintain good housekeeping by regularly cleaning work areas.

CONFIDENCE

As you learn to operate a machine, you will gain confidence. Do not become too confident. Overconfidence leads to carelessness, and carelessness causes accidents. This does not mean you should be afraid of machinery; however a safe attitude is one of respect for what machines can do.

CONSIDERATION OF OTHERS

Be thoughtful and helpful toward other students in the class. Be sure that the work you are doing does not endanger someone else. Caution other students if they are violating a safety rule.

ELECTRICITY

- Before you plug in a machine, make sure the switch is in the "off" position. You do not want the machine to start unexpectedly.
- If you use an extension cord, use the correct wire size. This is determined by the length of cord and size of motor. Using a wire size that is too small will cause the tool to overheat.
- Keep all power cords away from blades and cutters while you work. Make sure the power tool is grounded. One with a double-insulated case need not be grounded. If you are unsure about this, check with your instructor.
- If anything unusual happens, turn off the machine immediately. If the machine does not sound right, turn it off immediately. As soon as it stops completely, check with your instructor. In the event that you need to switch off a tool during an operation where the tool is still in contact with a piece of material, never let go of the material; hold it still until the tool has come to a complete stop.

EYE PROTECTION

Always wear appropriate eye protection. Wear safety glasses or a face shield when doing any operation that may endanger your eyes. Be sure you have enough good light to see what you are doing without straining your eyes. Always keep your eyes on the cutting action. Concentrate on what you are doing at all times.

FIRE PROTECTION

- Re-familiarize yourself with the location of all fire alarms and fire extinguishers.
- Many finishing materials, thinners, etc. are highly flammable. Others are toxic. Because of this, it is important that these materials be used only in approved areas. Prior to use, make sure you are in a project space that allows application of such materials.
- Close cans of finishing materials and thinners immediately after use.
- Use flammable liquids in very small quantities. Be sure the container is labeled.
- Consult workers near you to determine whether any potential crossover hazards might be present.
- Dispose of oily rags and other combustible materials immediately, or store them in an approved container.

FLOOR SAFETY

The floor should be clear of scrap blocks and excessive litter/clutter. Keep projects, sawhorses, and other equipment and materials you are using out of traffic lanes. Immediately wipe up any liquids spilled on the floor. Periodically sweep up sawdust as you work to prevent slippery conditions on floors. Floor areas must be kept free of debris and other hazards that may result in slips, trips or falls.

HAIR & CLOTHING

Dress properly for your work. Remove coats and jackets. Secure or remove loose clothing that can potentially get caught in power tools or other shop appliances. It is advisable to wear a shop apron that is snugly tied. Wear close toe shoes. Keep long, loose hair restrained and securely tied back to prevent machine and tool entanglement.

INJURIES

Report all injuries, regardless of severity to your instructor and notify Pace Safety & Security. Following initial Security notification, instructors/supervisors should complete a SUPERVISORS' ACCIDENT INVESTIGATION REPORT for submittal to EH&S.

LIFTING

Protect your back muscles when lifting heavy or awkward sized objects. Have someone help you. Lift with your arm and leg muscles. Secure help with long boards, even if they are not heavy.

MATERIAL AND PROJECT STORAGE

Store and stack your project work carefully in assigned areas. If the storage is overhead, be sure the material will not fall off. Straighten the lumber rack when you remove a board. Do not leave narrow strips protruding from the end of the storage rack, especially at or near eye level.

ODORS

Be alert for any odors that might indicate overheating of the machine or stock.

SAFETY GUARDS

Make sure all safety guards are in place. Never remove a safety guard without your instructor's permission. Have your instructor check each setup before you begin working.

SECURE APPROVAL

Secure your instructor's approval for all work you plan to do in the shop. He or she is the one to decide if the work can and should be done, and will be able to suggest the best, easiest, and safest way to do it.

STANCE

Stand in a comfortable, balanced position when working with power tools. Both feet should be firmly on the floor. Try to be as relaxed as comfortable: if you are unsure about your comfort with the equipment, consult a supervisor.

SUPERVISOR ON DUTY

When the shop is open for instruction, instructors or supervisors are always on duty. During official shop hours, these supervisors are Dyson staff. When Dyson staff exit the shop, all electrical machinery is disabled: the power grid or access is turned off and inaccessible to students.

TOOL SELECTION

Select the proper size and type of tool for your work. An expert never uses a tool unless it is sharp and in good condition. Inform your instructor if tools are broken, have loose handles, or need adjustments.

USING TOOLS

- Hold a tool in the correct position while using it. Most edged tools should be held in both hands with the cutting motion away from yourself and other students.
- Be careful when using your hand or fingers as a guide to start a cut. Test the sharpness of a tool with a strip of paper or a scrap or wood.
- DO NOT USE YOUR FINGERS.
- Always keep your hands a safe distance from cutters and blades.

VISITORS

The shop is not an appropriate place for visitors. People that do not have any official reason to be in the shop should stay out unless specifically invited by the supervisor.

WATER
Never work in or around water with power tools. Water increases the chances of severe electrical shock.

WOOD

Defects in the wood can be dangerous. Check the stock carefully for knots, splits, and other defects.

WORKING SPEED
Do not "rush and tear" through your work. The good crafter knows that a steady, unhurried pace is safest and produces the best work. Allow for machinery to come to full speed before engaging any materials with the tool. Never start a piece of machinery with materials engaged.

Power Equipment Safety Rules

Modern power woodworking machines can save large amounts of time. Learning how to use them safely will be an important part of your experience in the shop. Whether or not you are permitted to use power equipment will depend on your maturity and ability, along with policies established by your instructor.

Before operating any power tool or machine you must become thoroughly familiar with the way it works and the correct procedures to follow in its use. As you learn to use a machine the correct way, you will also be learning to use it the safe way.

Study the procedures outlined below carefully. Pay close attention to the demonstrations and directions given by your instructor. Know and understand the following general safety rules that apply to power machine operation. You must also learn the specific safety rules that

apply to each machine.

General Power Safety Guidelines

- Wear appropriate clothing. Remove coats or jackets, and roll up loose sleeves.
- You must be wide awake and alert. Never operate a machine when you are tired or ill.
- Think through the operation before performing it. Know what you are going to do, and what the machine will do.
- Always be sure you have the instructor's approval to operate a machine. Your instructor knows you and the machine, and can best decide whether you are qualified to safely operate the machine.
- Machines should not be used for trivial operations, especially on small pieces of stock. Do not play with machines.
- When you are operating the machine, you are the only one to control it. Start and stop the machine yourself. If someone is helping you, be sure they understand that they are expected to know what to do and how to do it.
- Make all the necessary adjustments before turning on the machine. Some adjustments on certain machines will require the instructor's approval.
- Never remove or adjust a safety guard without the instructor's permission.
- Use approved push sticks, push blocks, feather boards, and other safety devices. Some operations may require the use of a special jig or fixture.

- Keep the machine tables and working surfaces clear of tools, stock, and project materials. Also keep the floor free of scraps and excessive litter and clutter.
- Do not allow your attention to be distracted while operating a machine. Also, be certain that you do not distract the attention of other machine operators.
- Allow the machine to reach its full operating speed before starting to feed the work.
- Never leave a machine running while unattended.
- Feed the work carefully and only as fast as the machine will easily cut.
- Maintain the MARGIN OF SAFETY specified for the machine. This is the minimum distance your hands should ever come to the cutting tool while in operation.
- If a machine is dull, out of adjustment, or not working properly, shut off the power immediately and inform the instructor.
- When you have completed an operation on a machine, shut off the power. Wait until it stops before leaving the machine or setting up another cut.
- Stay clear of machines being operated by other students. See that other students are “out of the way” when you are operating a machine.
- Do not “crowd around” or wait in line to use a machine. Ask the present operator to inform you at your work station when finished. Common standards of courtesy may slow you down, but they will make the shop a safer and more pleasant place to work.

Specific Power Equipment Safety Guidelines

To operate a machine safely, you must know more than just how to turn it on and off. You must know how to perform basic operations. You also need to know how to make simple adjustments. Above all, you must know the machine's limits. Always keep the machine at a safe, steady speed. Never use the machine for a job the machine was not designed to do.

Safety Rules for Band Saws

- Wheel guard doors must be closed, and the blade properly adjusted, before turning on the machine.
- Adjust the upper guide assembly so it is ¼ in. above the work.
- Allow the saw to reach full speed before feeding the work.
- Never turn the machine on with stock pressed against the blade.
- Never reach close to the blade or under the table while the machine is running.
- The stock must be held flat and firmly against the table.
- Do not remove stock or scraps until the blade has stopped.
- Make multiple angled cuts to achieve a cut with a tight radius.
- Feed the saw only as fast as the teeth can easily remove the wood.
- Maintain a 2 in. margin of safety.
- Plan saw cuts to avoid backing out of curves whenever possible.
- Make turns carefully and do not cut radii so small that the blade is twisted.
- Use a push stick to finish a re-sawing or ripping cut.
- Stop the machine before backing out of a long, curved cut.
- Round stock should not be cut unless mounted securely in a jig or hand screw.

- If you hear a clicking noise, turn off the machine at once. This indicates a crack in the blade. If the blade breaks, shut off the power and move away from the machine until it stops.
- Turn off the machine as soon as you have finished your work. If the machine has a brake, apply it smoothly. Do not leave the machine until it has stopped running.

Safety Rules for Drill Presses

- Check the speed setting to see that it is correct for your work. Holes over ½ in. should be bored at the lowest speed.
- Use only an approved type of bit. Bits with feed screws or those with excessive length should not be used.
- Mount the bit securely to the full depth of the chuck and in the center.
- Remove the key immediately.
- Position the table and adjust the feed stroke so there is no chance of the bit hitting the table.
- The work should be placed on a wood pad when the holes are drilled all the way through.
- Work that will be held by hand should be center punched.
- Small or irregular shaped pieces must be clamped to the table or held in some special fixture.
- Feed the bit smoothly into the work. When the hold is deep, withdraw it frequently to clear the shavings and cool the bit.
- When using special clamping setups or a hold saw or fly cutter, have your instructor inspect it before turning it on.
- Always have your instructor check setups for routing and shaping.

Safety Rules for Finishing

- Wear safety glasses when applying finishing materials.
- Wear rubber gloves, goggles, and rubber apron when applying bleaches and acids.
- Thinners and reducers such as naphtha, benzene, lacquer, thinner, and enamel reducer should be applied in a well-ventilated room. Fumes have a toxic effect.
- Store all chemicals and soiled rags in proper safe containers. Many chemicals and rags are highly flammable.
- Spraying should be performed in a well-ventilated booth or outside to reduce toxic fumes.
- Do not smoke while sanding or applying a finish. Not only does dust or vapor mixed with smoke create a hazard to your health, but it may start a fire.
- Wash your hands well after applying a finish in order to remove any toxic materials that you have handled.
- Know where the sink, shower, or eye wash station is located in the event you are burned by a finishing material.
- Provide an approved fire extinguisher in the finishing area.

Safety Rules for Jig Saws

- Be certain the blade is properly installed. It should be in a vertical position with the teeth pointing down.
- Roll the machine over by hand to see if there is clearance for the blade, and if the tension sleeve has been properly set.
- Make multiple angled cuts to achieve a cut with a tight radius.
- Check the belt guard to see that it is closed and tight.
- Keep the hold-down adjusted so the work will not be raised off the table.

- When the saw is running, do not permit your fingers to get directly in line with the blade. The work can usually be held on either side of the cutting line.

Safety Rules for Jointer

- Be sure you have the instructor's approval to operate the machine.
- Before turning on the machine, make adjustments for depth of cut and position of fence.
- Do not adjust out-feed tables or remove guard without the instructor's approval.
- The maximum cut for jointing an edge is 1/8 in.; for a flat surface, 1/16 in.
- Stock must be at least 3/8 in. thick, unless a special feather board is used.
- Feed the work so the knives will cut "with the grain." Use only new stock that is free of knots, splits, and checks.
- Keep your hands away from the cutter-head even though the guard is in position. Maintain at least a 4 in. margin of safety!
- Use a push block when planning a flat surface. Do not plane end grain unless the board is at least 12 in. wide.
- The jointer knives must be sharp. Dull knives will vibrate the stock and may cause a kickback.

Safety Rules for Laser Cutters

- Before using the laser cutter, be sure you understand the following safety rules. These rules are in place to protect both you and the laser cutter from injury.

- NEVER leave the laser running unattended. There should always be a person in the room watching the laser cutter while it is running. NO EXCEPTIONS!
- Never run the laser cutter without all the proper ventilation equipment.
- Do not continue a cut if it is creating large flames. Fire is a huge risk to the laser and its ventilation system. Stop your cut immediately and switch to a lower power setting.
- Know how to stop the machine and what to do in the case of a fire.
- To turn off the laser, simply open the lid of the laser cutter. If you want to keep the lid closed, you can press and hold the pause button.
- If there is a fire:
    - Open lid to stop the laser.
    - Put an acrylic sheet over the burning material to smother the fire (always keep a sheet of acrylic handy when cutting for this reason).
    - If you can reach it, push up the blast gate to stop air flow.
    - Use the fire extinguisher (it is located in 1203 on the left side of the studio door)
    - If you cannot put out the fire or feel that you are in danger, call the campus Security
- Check to make sure that the material you are using is in the allowed list of materials. If you aren't sure, DON'T CUT IT. Ask for help. Never cut PVC or chlorinated plastic. You should always know what material you are cutting, and chlorinated plastics should be avoided because they release chlorine gas when cut. Do not try to cut metal in the laser cutter.

- Before cutting, ensure that there is no risk of the lens housing colliding with any objects on the honeycomb table; adjust the focus accordingly.
- The laser should be safe within the confines of the machine, and cut-off automatically when the lid is open (although this should not be relied upon). The top window is safe to look through during a job, but do not attempt to interfere with these windows or the laser or in any way invent some way to look at the laser.
- Check that the lens is clean before using the laser cutter.
- As the laser cutter is used, vaporized material will collect on the lens. This material must be cleaned from the lens before further use or it will get cooked into the lens and cause the lens to crack.
- Do not tamper with the laser cutter, or any interlocks. All side panels of the laser should always be closed and locked while the machine is plugged in.
- Be familiar with the materials being cut. Ask the supervisor for clarification if needed. Use the below table as a reference, before cutting or engraving with the laser cutter:

Material	Safe to use with a laser cutter?	Can you cut it?	Can you engrave it?
Acrylic	Safe!	Yes	Yes
Wood	Safe!	Yes	Yes
Paper/Cardboard	Safe!	Yes	Difficult
Steel	Safe!	No	Yes (oxidize)

Titanium	Safe!	No	Yields a rainbow of colors depending on power.
All other metals	Safe!	No	Yes, if you use Cermark or other marking chemical.
Glass	Mostly safe, don't breathe the glass dust.	No	Yes
Nylon	Not recommended.	Discoloration, low cut quality.	Melts, doesn't engrave well.
ABS	Not recommended.	Discoloration, low cut quality.	Slight engraving marks.
Polyethylene	Not recommended.	No. Lots of melting.	Slight marks with melting.
Lexan/polycarbonate	Black smoke and awful smell. DO NOT CUT.	No	No
PVC	Creates Chlorine Gas. DO NOT CUT.	No	No
Vinyl	Toxic fumes. DO NOT CUT.	No	No
Teflon/PTFE	Toxic fumes. DO NOT CUT.	No	No
CF/Carbon Fiber	DO NOT CUT.	No	No

Safety Rules for Lathes

- Before starting the machine, be sure that spindle work has the cup center properly imbedded, tailstock and tool rest securely clamped, and proper clearance for the rotating stock.
- Before starting the machine for faceplate work, check to see that the faceplate is tight against the spindle shoulder and the tool support has proper clearance.
- Wear goggles or a face shield to protect your eyes, especially when roughing out work. The lathe should have a guard.
- Select turning speed carefully. Large diameters must be turned at the lowest speed. Always use the lowest speed to rough out work.
- Wood with knots and splits should not be turned. Glued-up stock should cure the proper amount of time – at least 24 hours.
- Keep the tool rest close to the work.
- Remove the tool rest for sanding and polishing operations.
- Use a scraping cut for all faceplate work.
- Remove both the spur and cup centers when they are not in use.
- When you stop the lathe to check your work, also check and lubricate the cup center.
- Keep the lathe tools sharp; hold them firmly and in the proper position.

Safety Rules for Planers

- Be sure you have the instructor's permission to operate the machine.
- Adjust the machine to the correct thickness of cut before turning on the power.

- Stock should be at least 12 in. long, or several inches longer than the distance between the centers of the feed rolls.
- Surface only new lumber that is free of loose knots and serious defects.
- Plane with the grain, or at a slight angle with the grain. Never attempt to plane cross grain.
- Stand to one side of the work being fed through the machine.
- Do not look into the throat of the planer while it is running.
- Do not feed stock of different thicknesses side by side through the machine, unless it is equipped with a sectional in-feed roll.
- Handle and hold the stock only in an area beyond the ends of the table.
- If the machine is not working properly, shut off the power at once and inform the instructor.

Safety Rules for Portable Circular Saws

- Stock must be supported in such a way that the kerf will not close and bind the blade during the cut or at the end of the cut.
- Thin materials should be supported on benches. Small pieces should be clamped in a vise or onto a bench top or sawhorse.
- Be careful not to cut into the bench, sawhorse, or other supporting devices.
- Adjust the depth of cut to the thickness of the stock, and add about 1/8 in.
- Check the base and angle adjustment to be sure they are tight. Plug in the cord to a grounded outlet and be sure it will not become fouled in the work.
- Always place the saw base on the stock, with the blade clear, before turning on the switch.

- During the cut, stand to one side of the cutting line.
- Large saws will have two handles. Keep both hands on them during the cutting operation. Small saws should also be guided with both hands when possible.
- Always unplug the machine to change blades or make major adjustments.
- Always use a sharp blade with plenty of set.

Safety Rules for Portable Electric Drills

- Select the correct drill or bit. Mount it securely to the full depth of the chuck.
- Either clamp a scrap piece under work to prevent splintering the underside, or drill from both sides.
- Stock to be drilled must be held in a stationary position so it cannot be moved during the operation.
- Connect the drill to a properly grounded outlet.
- Turn on the switch for a moment to see if the bit is properly centered and running true.
- With the switch off, place the point of the bit in the punched layout hole.
- Hold the drill firmly in one or both hands and at the correct drilling angle.
- Turn on the switch and feed the drill into the work. The pressure required will vary with the size of the drill and the kind of wood.
- During the operation, keep the drill aligned with the direction of the hole.
- When drilling deep holes, especially with a twist drill, withdraw the drill several times to clear the shavings.

- Follow the same precautions and procedures as when drilling holes with the drill press.

Safety Rules for Radial Arm Saws

- Stock must be held firmly on the table and against the fence for all crosscutting operations. The ends of long boards must be supported level with the table.
- Before turning on the motor be certain that all clamps and locking devices are tight and the depth of cut is correct.
- Keep the guard and anti-kickback device in position. Do not remove them without your instructor's permission.
- Always return the saw to the rear of the table after completing a crosscut or miter cut. Never remove stock from the table until the saw has been returned.
- Maintain a 6 in. margin of safety.
- Shut off the motor and wait for the blade to stop before making any adjustments.
- Be sure the blade is stopped before you leave the machine.
- Keep the table clean and free of wood scraps and excessive amounts of sawdust.
- Secure approval from your instructor before making ripping cuts or other special setups. When ripping stock it must be flat and have one straight edge to move along the fence.
- When ripping, always feed stock into the blade so that the bottom teeth are turning toward you. This will be the side opposite the anti-kickback fingers.

Safety Rules for Router

- Know and follow the general safety rules for operating power tools.

- Disconnect the power before changing router bits.
- Clamp router bits securely in the chuck. At least 1/2 inch (12 mm) of the shank should be inserted.
- Make sure the router switch is in the off position before connecting the power.
- Do not make any router cuts unless the stock is securely clamped. The router can throw loose stock with great force.
- Before you start cutting, make sure nothing is in the router's path.
- Hold the router tightly when starting the motor.
- Always feed the router against the rotation of the bit. If you feed with the rotation the bit can dig into the stock. This can cause the router to kick back or throw the stock.
- After finishing a cut, wait for the router to completely stop. Then lay the router down. The bit should point away from you.

Safety Rules for Saber Saws

- Make certain the saw is properly grounded through the electrical cord.
- Select the correct blade for your work and be sure it is properly mounted.
- Disconnect the saw to change blades or make adjustments.
- Place the base of the saw firmly on the stock before starting the cut.
- Turn on the motor before the blade contacts the work.
- Do not attempt to cut curves so sharp that the blade will be twisted. Follow procedures described for band saw operation.
- Make certain the work is well supported. Do not cut into sawhorses or other supports.

Safety Rules for Sanding Machines

- Be certain the belt or disc is correctly mounted. The belt must track in the center of the drums and platen. Do not operate the disc sander if the abrasive paper is loose.
- Check the guards and table adjustments to see that they are in the correct position and locked securely in place.
- Use the table, fence, and other guides to control the position of the work, whenever possible.
- Never sand without a table supporting the stock.
- Small or irregular-shaped pieces should be held in a hand clamp, or a special jig or fixture.
- When sanding the end grain of narrow pieces on the belt sander, always support the work against the table.
- Sand only on the side of the disc sander that is moving toward the table.
- Move work along this surface so it will not burn.
- Always use a pad or push block when sanding thin pieces on the belt sander.
- Do not use power sanders to form and shape parts when the operations could be better performed on other machines.
- Sand only clean new wood. Do not sand work that has excess glue or finish on the surface. These materials will load and foul the abrasive.

Safety Rules for Scroll Saw

- Know and follow the general safety rules for operating power tools.
- Make all setups and adjustments with the power off.

- Use the correct blade for the stock (thickness) and curve (sharpness) being cut.
- Never try to turn a small radius with a wide blade. The radius should not be more than three times the blade width.
- Clamp the blade securely in both chucks with the teeth pointing down.
- Adjust the guides so they properly support the blade.
- Adjust the hold down so that it applies light pressure to the stock.
- Rotate the motor by hand to check that all adjustments have been made properly.
- Plan cuts to avoid backing out of curves.
- Do not force the work into the blade. This can cause the blade to bend the break.
- Keep your fingers out of line with the saw.

Safety Rules for Shaper

- Whenever possible, install the cutter so the bottom of the stock is shaped.
- In this way the stock will cover most of the cutter and act as a guard.
- Make sure the cutter is locked securely to the spindle.
- Always position the left fence so that it will support the work that has passed the cutters.
- Adjust the spindle for correct height and then lock in position. Rotate the spindle by hand to make sure it clears all guards, fences, etc.
- Check the direction of rotation by snapping the switch on and off; watch as the cutters come to rest. ALWAYS FEED AGAINST

THE CUTTING EDGE (FEED THE WORK IN TO THE CUTTERS IN THE DIRECTION OPPOSITE TO CUTTER ROTATION).

- Some shapers have a reversing switch so that the spindle can be rotated either clockwise or counter clockwise.
- Examine the stock carefully before cutting to make sure it is free of defects.
- Never cut through a loose knot or stock that is cracked or split.
- Hold the stock down and against the fence with the hands on top of the material, yet out of range of the cutters.
- Use all guards, jigs, and clamping devices whenever possible.
- Always use a depth collar when shaping irregular work. Put a guide pin in the table to start the cutting.
- Do not set spring hold-down clips too tightly against the work. Use just enough tension to hold the work against the fence.

Safety Rules for Sliding Miter Saw

- Know and follow the general safety rules for operating power tools.
- Make all adjustments while the machine is turned off.
- Never reach across the path of the blade. When the machine is running, always keep your hands at least 6 inches (150 mm) from the blade.
- Keep the safety guard in position at all times.
- Wait until the blade is running full speed to start a cut.
- Never stand in line with the blade. If you push the blade with your right hand, stand to the left. If you push the blade with your left hand, stand to the right.

- Use one hand to push the saw through the stock. Use the other hand to hold the stock against the fence. Keep both hands away from the cutting line.
- Cut only one piece of wood at a time.
- Feed the blade slowly.

Safety Rules for Surfacer

- Know and follow the general safety rules for operating power tools.
- Remove all loose knots from the stock before surfacing.
- Do not surface stock shorter than the distance between the centers of the in-feed and out-feed rolls. This is usually about 12 inches (300 mm), or more.
- Never stand directly behind a board being surfaced. The stock could kick back and cause an injury.
- Never look into the surfacer while the cutter-head is rotating.
- Make sure one face is flat before you surface a board. Place the flat face against the table.
- If a board does not feed through the surfacer, turn off the power. Wait until the cutter-head stops completely. Then lower the table and remove the board.
- Keep your hands away from the areas around the feed rolls. You could easily pinch your fingers in these areas.
- Feed the stock with the grain. Otherwise, the stock can chip and break. The pieces can then be thrown from the surfacer.
- Wait for the blade to come to a complete stop before releasing the arm.

Safety Rules for Table Saws

- Be certain the blade is sharp and the right one for your work.

- The saw is equipped with a guard and a splitter. Be sure to use them.
- Set the blade so it extends about ¼ in. above the stock to be cut.
- Stand to one side of the operating blade and do not reach across it.
- Let the blade get to full speed before cutting.
- Never reach under the table to tighten locks, remove scrap or make adjustments while the saw is running.
- Never reach over or across the blade while the saw is running, even with the upper guard in place.
- Maintain a 4 in. margin of safety. E.g. clamp a small piece of stock to a larger piece to cut safely.
- Stock should be surfaced, with at least one edge jointed before being cut on the saw.
- The position of the stock must be controlled either by the fence or the miter gauge. NEVER CUT STOCK FREE HAND.
- Use only new stock that is free of knots, splits, and warp.
- Stop the saw before making adjustments to the fence or blade.
- Do not let small scrap cuttings accumulate around the saw blade. Use a push stick to move them away.
- Re-sawing and other special setups must be inspected by the instructor before power is turned on.
- Do not rip large sheets of plywood or like materials alone. At least one additional helper/aid must be used for these operations.
- The dado or any special blades should be removed from the saw after use.

- Students helping to “tail-off” the saw should not push or pull on the stock but only support it. The operator must control the feed and direction of the cut.
- As you complete your work, turn off the machine and remain until the blade has stopped. Clear the saw table and place waste cuttings in the scrap box.

Safety Rules for Wood Lathe

- Never wear loose clothing or a tie.
- Wear goggles or a face shield.
- Check the wood to make sure it has no defects that would cause it to break when turning.
- Check all glue joints before mounting the stock. A weak joint may come apart when revolving at high speeds. Make sure glued-up stock is completely dry before turning.
- Fasten stock securely between centers. Make sure the tailstock is locked before turning on the power.
- Adjust the tool rest as close to the stock as possible. Then revolve the stock by hand to make sure it clears the rest.
- Always stop the lathe before making any adjustments such as changing the position of the tool rest.
- Run all stock at the slowest speed until it is rounded.
- Hold turning tools firmly in both hands.
- Keep the tool rest as close to the work as possible. At intervals, stop the lathe and readjust.
- Make sure the stock is firmly fastened to the faceplate before turning.
- Remove the tool rest when sanding or polishing. If you don’t, your fingers may get caught between the tool rest and the stock.