

# DAVIS SENIOR HIGH SCHOOL AGRICULTURE DEPARTMENT INTRODUCTION

## **A. Safety**

It is a known fact that safety education has contributed tremendously to the prevention of accidents. Rules and regulations, in themselves do not prevent accidents, but they do create safe work habits that make you aware of dangers in your work. Good safety habits are learned daily. The choice of your future safety is up to you. Form safe work habits now.

## **B. General Safety Procedures**

- *Safe attitudes:* Shops and laboratories are working areas. Tricks, games, and horseplay are not allowed at any time.
- *Safe environment:* Work areas must have proper power, ventilation and illumination. Aisles must be open and clear. The work area should be neat and clean. The use of temporary extension cords, fans, and heaters is discouraged. Keep tools in a safe place. Sharp tools should be pointed away from the user. Clean sharp tools separately, do not mix them with other tools in the sink. Clean up any water, grease or oil spilled on the floor. Use a brush to clean off the benches, do not use your hands! Do not leave bench drawers, cabinet drawers or locker doors open. Safety devices, finger guards and blade locking devices on paper cutters should be used. REPORT ALL INJURIES TO THE INSTRUCTOR.

## **C. Eye, Ear, & Nose Protection**

Use eye protection (face shield and goggles) when working in an area where hazardous conditions exist, such as when grinding or working with caustic substances. Hearing protection should be used where excessive noise will be experienced. Those suffering from breathing related issues should plan for proper protective breathing equipment it will not be provided.

## **D. Clothing**

You must wear safe clothing when working in a shop or lab. Fasten or remove loose clothing before operating any machine. Roll up long sleeves above the elbow. Long hair must be tied back. Do not carry sharp, pointed tools or materials in your clothing. Wear protective clothing when working with chemicals. Wear appropriate closed toe shoes.

## **E. Instructor's Approval**

All projects must be approved by the instructor. Do not operate any machine until you have been instructed on how to use it safely. WHEN IN DOUBT, ASK THE

INSTRUCTOR. Do not attempt to repair any piece of shop equipment unless you have permission. No materials or equipment may be removed from the classroom without specific permission and supervision from the instructor.

## **F. Injury**

### **REPORT ALL INJURIES TO THE INSTRUCTORS.**

When lifting heavy objects, keep your arms and back straight. Bend your knees and lift with your leg muscles.

Do not lift heavy objects alone.

Never place screws, nuts or other materials in your mouth.

Use handrails while going up or coming down stairs.

Watch where you are walking.

## **G. Fire**

Know the locations of fire extinguishers, fire exits and fire drill posters.

Know the fire bell/alarm system.

In case of a fire, sound the fire alarm and call for help.

## **H. Infectious Disease**

Practice good personal hygiene and wash hands frequently.

Use latex gloves when contact is likely with human fluids. Fluids should be cleaned by using a 1:10 solution of bleach to water.

Report any spills to your instructor.

Staying home when you are ill until a fever has returned to normal for 24 hours will prevent others from becoming ill.

## **I. Additional Shop Reminders**

**a.** Safety Glasses are your responsibility! Failing to come prepared is preparing to fail. Z87.1 min must be on the glasses.

**b.** One FFA activity per month is required.

**c.** Grades are earned not given.

**d.** You must pass the safety test with a minimum of 100 %.

**e.** YOU MUST HAVE COVER-ALLS & SAFETY GLASSES TO WORK IN SHOP EFFECTIVE 8/28/07!!!!

# GENERAL SAFETY INSTRUCTIONS

Rule 1: "Horse play" or practical jokes will not be tolerated at any time in the shop.

Expl: You may cause a student to be thrown against a machine causing an injury.

Rule 2: Boards with nails sticking through them should not be left on the floor.

Expl: Injury could result.

Rule 3: Report all injuries to the instructor immediately.

Expl: In order to receive first aid and let the instructor determine the severity of the injury.

Rule 4: Materials and scraps left on the floor may cause a serious injury.

Expl: Someone might trip or slip because of materials left on the floor.

Rule 5: No **unnecessary** whistling or yelling is allowed in the shop.

Expl: Whistling or yelling will distract the attention of others and may cause an accident.

Rule 6: There will be no running in the shop.

Expl: Running in shop is the cause of many accidents by slipping and falling against a machine or fellow classmate.

Rule 7: No objects will be thrown in shop.

Expl: It is dangerous to throw objects in shop because someone may be hit.

Rule 8: Do not talk to a person who is operating a machine.

Expl: Talking to an operator will distract his attention from the machine.

Rule 9: Stay out of safety zones around the machines while they are in operation.

Expl: Safety zones are to prevent more than one person near a machine. More than this is the cause of serious accidents.

Rule 10: If you find anything wrong with the tools or equipment, report it to the instructor immediately.

Expl: Damaged tools or equipment can cause accidents and reporting these gives the instructor the chance to repair or replace them.

Rule 11: Get special permission from the teacher before having someone help you use a machine.

Expl: Most machines are designed for one-person operation. If the helper is not taught properly he/she may cause someone to get hurt.

Rule 12: You must have received proper operating instructions and have passed the safety test before operating any machine.

Expl: This shows that students have exhibited competence in operating the equipment and understand the safety rules.

Rule 13: You must inform the instructor when you are going to work in the shop and when operating the power tools.

Expl: It is the teacher's job to supervise your work and be aware of what is happening in the shop so that your project is completed safely. Also, he can tell from the sound of the machine if something is wrong, and with prompt action an accident may be avoided.

Rule 14: Work or stock should not be placed in vises, clamps or stored so that it sticks out into the aisles.

Expl: Work that is stored or placed in a vise so that it interferes with normal movement is dangerous as someone may trip.

- Rule 15: Long pieces of wood or metal should be carried by two or more students. Carry it slowly and carefully.  
Expl: Long lengths of lumber and metal are difficult to control and could be the cause of an accident when not handled properly.
- Rule 16: A face shield must be worn when drilling, chiseling or hack-sawing overhead and also when using the abrasive cut off saw.  
Expl: This will protect your eyes and face.
- Rule 17: When using a ladder the top two steps are not to be used.  
Expl: It is very difficult to remain stable when standing on these steps.
- Rule 18: Extinguish oil fires with proper materials or proper type of extinguisher.  
Expl: Use sand, dirt or foam, CO2 or Halon fire extinguishers. Do not use water as it spreads the fire. Oil floats on top of water.
- Rule 19: Oily or greasy rags must be placed in suitable metal containers.  
Expl: Oily or greasy rags often cause spontaneous combustion.
- Rule 20: Do not place tools on the steps of the ladder. Unless the steps are magnetized.  
Expl: The objects stored on the ladder will fall.
- Rule 21: Common sense and good judgment are essential to maintaining a safe shop environment.  
Expl: Every unsafe condition cannot be covered by a rule or warning. Safety depends on you.
- Rule 22: Students are to observe all fire drill instructions. When the fire alarm sounds turn off the equipment and torches then walk carefully to the front of the Ag building (D wing) and proceed to football field.  
Expl: When each student knows where he/she is to go in case of a fire, there is less confusion and everyone can safely get out of the area.
- Rule 23: Never attempt to lift any materials that are too heavy for your strength.  
Expl: Heavy lifts may cause dangerous strains, which may result in permanent injury. Lift loads with your legs, not your back.
- Rule 24: Never wear loose clothing, neckties or loose sleeves while operating any machine.  
Expl: Loose clothing may become caught in a machine causing serious injury.
- Rule 25: Immediately clean up grease or oil spills on the floor.  
Expl: Someone may slip in the oil or grease and fall.
- Rule 26: Never leave pieces of round stock on the floor.  
Expl: Such materials may cause a serious fall.
- Rule 27: Do not leave oil cans on benches or tables of machines.  
Expl: Many oil containers are prone to leaking or have oil dripping from them.
- Rule 28: Most machines must never be oiled, cleaned or adjusted while in motion.  
Expl: These tasks are carried out safely only when the machine is not in use.
- Rule 29: When leaving power driven machinery, always turn off the power and remain until the unit has stopped.  
Expl: Someone might come into contact with the machine and become injured.

- Rule 30: All safety guards must be in proper position before power is turned on and while the machine is in use. Guards are required by law.  
Expl: If not in proper position, someone might be injured.
- Rule 31: All portable electrical equipment must be grounded through ground wire.  
Expl: This protects the operator from electrical shock due to shorts and is required by law.
- Rule 32: Always clean all tools before replacing them in the storage cabinet.  
Expl: Grease and oil cause tools to become difficult to handle. Also excess water can cause the tools to rust.
- Rule 33: When in the agriculture shop, students will wear safety glasses at **ALL** times.  
Expl: There is always the possibility of injuring your eye when in the shop. Students are working in the shop at many different times.
- Rule 34: Proper dress is required at all times in the shop. This includes proper leg and foot protection this means no short pants/shorts or open toed shoes.  
Expl: Exposed areas are extremely susceptible to injury. Coveralls are recommended.
- Rule 35: No glass containers are allowed in the shop.  
Expl: The glass can easily be broken and someone could be cut.
- Rule 36: Always be certain that the extension cord is kept free from oil and grease, and is laid so that no one will trip over them. Be sure to place them back on the racks after their used.  
Expl: Oil and grease may rot the cord and cause shorts.

# **SPECIFIC SAFETY RULES**

## **GRINDING MACHINES, PORTABLE AND STATIONARY**

- Rule 1: The operator should stand to the side when he starts a grinder.  
Expl: The greatest danger of shatter occurs while the grinder is building up speed.
- Rule 2: Workers in the shop should not closely watch another person using the grinder.  
Expl: Particles from a grinder wheel may fly quite a distance and endanger a nearby worker.
- Rule 3: The tool rest should be adjusted as close to grinding wheel as possible (Maximum of 1/8") and level with the center of the arbor.  
Expl: This is so the work cannot be wedged between the wheel and the tool rest. If an adjustment is necessary, the grinding wheel must be stopped and the machine unplugged.
- Rule 4: Work should not be held against a grinding wheel with pliers or tongs, always use a lever jawed wrench.  
Expl: A person cannot hold work steady enough in this manner and insure against accidents.
- Rule 5: As a rule, heavy grinding should never be done on the side of a small grinding wheel (1/2" width or less). Sharpening and very light grinding may be done on the side of the wheel.  
Expl: This could result in undercutting the wheel and may result in the wheel shattering. A wheel which shatters at a high speed throws its pieces vary hard in all directions.
- Rule 6: Small objects should never be ground without consulting the instructor.  
Expl: The piece will quite likely not be ground safely in the usual procedure. If it must be ground, the instructor can provide you with a safe method.

- Rule 7: All tools should be held at the center or above while being ground this is called grinding against the rotation of the wheel.  
Expl: The tool will not be pulled out of your hand.
- Rule 8: Never use a rag to hold objects that are to be ground.  
Expl: The rag may become caught in the wheel causing injury to operator and damage the machine.
- Rule 9: Keep a firm grip on the portable grinder when operating.  
Expl: A high speed portable grinder can cause serious injury if the operator loses control of the tool.
- Rule 10: Be aware of flying sparks and caution fellow students when using the portable grinder in their presence.  
Expl: Sparks can cause serious injury. Common courtesy demands that we look out for the welfare of fellow workers.
- Rule 11: Never lay a portable grinder on the bench or floor while it is running.  
Expl: The grinder may fall over rubbing the wheel or disk on the bench top or floor causing sparks or damage to the wheel or disk.

## **Abrasive Cut-Off Saw/Friction Saw, Cold Cut Saw**

- Rule 1: A face shield must be worn in addition to the safety glasses  
Expl: With sparks flying around there is a chance that the safety glasses will not provide enough protection.
- Rule 2: When cutting angles with the abrasive saw you cannot use one side of the clamping vise, you must have it retracted and not in the path of the blade. Then use a vise-grip "C" clamp to secure the un-clamped side.  
Expl: This will ensure that the clamping device is not damaged and no pieces fly from the table.
- Rule 3: You should reduce the down ward pressure when cutting just prior to completing the cut.  
Expl: This will eliminate the operator becoming off balanced and reduce the chance of an accident.
- Rule 4: Make sure cooling fluids are flowing.  
Expl: Overheating may occur causing breakage of blade.

## **IRONWORKER- still trying to acquirer**

- Rule 1: Be sure that all guards are in place and that they are operating properly.  
Expl: This will ensure that the machine is operated safely.
- Rule 2: Cut only one thickness at a time and never stack the material.  
Expl: The stacking of the material will damage the shear and could cause an injury.
- Rule 3: Make sure the material to be sheared is secured to the table by the vise.  
Expl: Improperly secured materials will not cut squarely.
- Rule 4: All adjustments and the removal of metal from the machine can only be done when the machine is turned off.  
Expl: In the off position the Ironworker cannot hurt anyone.
- Rule 5: Your hands must never hold on to the metal or the machine while it is operating.  
Expl: This could result in an injury to you.

Rule 6: When cutting thick metal have the materials to the left near the pivot point.  
Expl: This makes it easier for the machine to cut the metal.

Rule 7: When using the punch the minimum diameter of the punch is determined by the thickness of the metal. If the metal is 1/4" thick then the minimum punch diameter is 1/4".  
Expl: Damage to the punch will occur if this rule is not followed.

Rule 8: No pipe, channel iron, or square tubing can be cut by the Ironworker.  
Expl: These materials will damage the Ironworker.

## **CHAIN HOIST AND HYDRAULIC JACK**

Rule 1: Be sure the object to be lifted weighs less than the capacity of the hoist or jack.  
Expl: This could damage the hoist and jack and also make for an unstable lifting condition.

Rule 2: Be sure before lifting that the object is securely attached to the hoist and the area that the jack is to lift will not slip off.  
Expl: This will ensure that the object does not fall off.

Rule 3: Never work under an object supported by the hoist or jack.  
Expl: These tools are designed to lift and then have them blocked up or resting on a stand.

Rule 4: Never leave an object lifted by the hoist or jack unattended.  
Expl: The devices are designed to be lifted and then secured. It could fall and injure someone.

## **HAND TOOLS**

Rule 1: Do not use wrenches which are badly worn, chewed or sprung.  
Expl: Wrenches in such condition are likely to slip, causing knuckles to be skinned or smashed.

Rule 2: Adjustable wrenches should always be used with the jaw facing the direction of the pull.  
Expl: Proper use of adjustable wrenches reduces slipping.

Rule 3: Tools with sharp edges should not be carried in the pocket.  
Expl: They can be dangerous to others as well as yourself.

Rule 4: Cut away from yourself when using sharp hand tools.  
Expl: There are fewer tendencies to cut yourself should the tool slip.

Rule 5: Do not use a file without a handle.  
Expl: This is dangerous to cut as the tang may go through your hand if you slip.

Rule 6: "Mushroom" ends on chisels or hand tools must be ground off.  
Expl: Chips or pieces of the mushroom ends may fly off and injure someone.

Rule 7: Keep the hands away from the screwdriver point.  
Expl: The screwdriver may slip and cut the operator's hand.

Rule 8: No hammers with loose handles or chipped faces should be permitted in the shop.  
Expl: Loose heads often come off when the danger is the greatest. More chips readily come off of a hammer head already marred or chipped.

Rule 9: Use tools for their intended use only.  
Expl: Trying to get a tool to do something it was not designed to do, causes accidents.

Rule 10: Use sharp tools in cutting cold metal.

Expl: Rough jagged edges result when dull tools are used.

Rule 11: Always fasten pipe or mild steel securely before starting work.

Expl: Slipping may result in injury to operator, equipment or stock.

Rule 12: Always remove burrs on pipe or mild steel (and rough or pointed edges on sheet metal) with grinder, reamer or file.

Expl: Sharp edges may cause a serious injury.

## **PORTABLE and STATIONARY BELT SANDERS**

Rule 1: When replacing belts, which are available in various types and degrees of coarseness, be sure to install with correct direction of rotation.

Expl: The belt is easily torn and may injure you and damage the equipment.

Rule 2: Use the tracking adjustment knob to align the belts on the end rollers to prevent wear on the housing.

Expl: Improper aligned belt will cause excessive wear on the machine and weaken the belt.

Rule 3: Work should be rested on the tool rest while sanding when using the stationary sander.

Expl: Work can easily be pulled into the belt along with your hand, causing serious damage.

Rule 4: Before sanding metal parts be sure that all sawdust has been removed from the belt area.

Expl: Possible fire hazard.

Rule 5: It is important to secure the wood before sanding it with a portable sander.

Expl: If wood is not secured then the wood can shoot out and injure someone.

Rule 6: Adjusting the sanding belts must take place when the machine is running. Adjustment is complete when the belt stays in the center of the machine.

Expl: This will prevent excessive turning of the adjustment screws that cause the belts to be completely out of adjustment and damage the machine or injure the operator.

## **BAND SAWS – wood & metal**

Rule 1: Only stock that has a flat surface on the bottom may be cut by the band saw.

Expl: Any other shape will bind in the saw and cause an accident.

Rule 2: Before beginning your cut be sure that the guards are in place and that the blade guard is 1/4" above the stock being cut.

Expl: This will ensure that greatest margin of safety.

Rule 3: If a curve cut becomes difficult and you cannot continue, shut off the saw and remove it.

Expl: The saw blade will be pulled from the guide and come off the pulleys.

Rule 4: Keep hands on both sides of the board being cut and never within 2" of the blade.

Expl: This will keep the pieces secured and having your hands clear will lessen the chance of an accident.

## **JOINTER**

Rule 1: Before turning on the machine, make adjustments for the depth of cut and position of fence. Be sure the guard is in place and is operating properly.

Expl: To ensure a safe, smooth cut.

Rule 2: The maximum cut for jointing on edge on a small jointer is 1/8 inch and for a flat surface is 1/16 inch.

Expl: Possibility of kick back and damaging the jointer.

Rule 3: Stock must be at least 12 inches long. Stock to be surfaced must be at least 3/8 inch thick unless a special feather board is used. If stock is less than 12 inches long, use a hand plane to dress edges.

Expl: Boards of a short length are hard to control.

Rule 4: Feed the work so the knives will cut "with the grain." Use stock that is free from knots, splits, and checks.

Expl: Easier to cut and gives a better finished product.

Rule 5: Keep your hands away from the cutter head even though the guard is in position. Maintain at least a 4 inch margin of safety.

Expl: Knives are razor sharp and will remove fingers easily.

Rule 6: Use a push block when jointing a flat surface.

Expl: Provides protection for the hands.

Rule 7: Do not joint end grain.

Expl: Possibility of splitting wood, damaging the machine, and injuring yourself.

## **PORTABLE CIRCULAR AND JIG SAW**

Rule 1: Always unplug the saw before changing blades or making adjustments.

Expl: A tool such as this cannot operate without power-therefore there is no chance of injury.

Rule 2: Make sure that the saw guard is operating and in place before turning power on.

Expl: A properly working guard protects the operator from the saw blade.

Rule 3: Always use the proper sharp blade for the job.

Expl: A dull blade or an incorrect blade for a specific job can cause the saw to kick-back.

Rule 4: Keep a firm grip on the saw at all times.

Expl: Saws have a tendency to kick up or kick back and can cause injury if not gripped firmly.

Rule 5: Never force a saw to cut faster than it can safely cut.

Expl: The saw may bind and kick back, or may cause the blade to bend.

Rule 6: When using the Jig saw, be sure the blade has come to a complete stop before removing the blade from the work piece.

Expl: The saw may stab the wood and the blade may shatter.

Rule 7: Before cutting, be sure to remove the electrical cord from the area to be cut.

Expl: Electrocutation may occur!!!!

Rule 8: With jig saws it is important that the base be in contact with the board being cut.

Expl: This will allow the saw to cut more evenly and safely.

## **WIRE WHEEL – portable & stationary**

Rule 1: All buffing **MUST** be done below the center of the wheel.

Expl: This allows for greater control during the buffing process. If buffed above center the material may be thrown back at the operator.

Rule 2: Be sure no one is standing behind the buffer while it is in use.

Expl: If material is pulled from the operator, the material will be thrown into the person standing behind the buffer.

Rule 3: If buffing a small object it must be held with a lever jawed wrench.

Expl: A small object is easily pulled from your hands and may cause an injury.

## **DRILL PRESS AND PORTABLE ELECTRIC DRILLS**

Rule 1: Unless permission is otherwise granted by the instructor, work must be held in a vise, or the work should be clamped to the drill press table. Use drill press vise, C-clamp or lever jawed C-clamp. If possible place tail of work next to drill press body.

Expl: Work not securely fastened may fly off the table and injure the operator or fellow workers.

Rule 2: The pressure should be eased when you feel the drill starting to break through the work.

Expl: Just as the drill starts to break through, it has a tendency to corkscrew. This often causes it to feed itself more rapidly and exert more pressure than the work holding device can withstand.

Rule 3: The drill press must have its speed adjusted when it is running.

Expl: Damage may result to the drill press.

Rule 4: Ask the instructor's advice before attempting to drill thin material of any kind. This includes thin-walled tubing and pipe.

Expl: Work of this nature requires special precautions. The drill has a greater tendency to grab the material being drilled.

Rule 5: Mark all metal to be drilled with a center punch.

Expl: Unless the metal piece is marked, it is difficult to start or to drill a hole where desired. A broken drill bit may also result.

Rule 6: Always remove the chuck key wrench before starting the drill press.

Expl: The key or wrench revolving in the chuck might entwine the operator.

Rule 7: Do not attempt to remove shavings from the drill while it is revolving. Stop the drill and remove them with pliers or use a brush, not your hands.

Expl: Shavings are hot and sharp and may cut your hands.

Rule 8: Use the proper cooling solution for each drilling operation. Use soluble oil or cutting oil.

Expl: Improper use of coolants may cause the drill bit to be burned and dulled.

Rule 9: Special precaution should be used when using a drill to enlarge a hole that has been threaded.

Expl: Threaded holes sometimes cause the drill to feed itself which in turn may cause the work to be twisted out of the holding device.

Rule 10: Do not attempt to slow down the drill chuck with the hands.

Expl: The hand may be injured by sharp edges on the chuck.

Rule 11: Stop the drill press before making adjustments on either the drill press or the work piece, or before cleaning any part.

Expl: The turning drill may entangle one's clothing and cause an injury.

Rule 12: Do not bend downward to pick up anything while a drill press is in motion. Stop the drill first.

Expl: A turning drill may entwine the hair or clothing and cause a painful injury. Never wear loose clothing or loose gloves when operating a drill.

Rule 13: Hold the portable drill firmly before starting and during all drilling processes.

Expl: You will have complete control of the drill and it is less likely to be torn from your grip.

Rule 14: Always wear a face shield when drilling overhead with a portable drill.

Expl: This keeps the drill chips from getting in your eyes.

Rule 15: Use the proper speed for drill bits and different metals.

Expl: Fast speed for small drills and slower speeds for large drills. Use the speed indicated by the manufacturer.

Rule 16: Never use a dull drill bit.

Expl: Keep the bits sharp for efficient work. They are less apt to break and allow the operator to drill with less effort and do a better job.

Rule 17: The drill bits must always be tightened in the chuck with a chuck key except keyless chucks.

Expl: This will ensure that the drill will not slip and cause an injury or damage the project.

## **CIRCULAR TABLE SAW**

Rule 1: Before starting the saw be sure the guards are in position and operative.

Expl: Any exposed blade above the table is a great hazard to the fingers. Also there is the danger of pieces of stock falling onto or becoming engaged with the exposed portion of the blade. When this occurs the pieces are thrown back with terrific force.

Rule 2: Never look around while operating a power saw.

Expl: Keep your eyes on your work and your fingers on your hands.

Rule 3: The fingers must always be kept clear of the track of the saw, and hands must never cross the saw line while the machine is in operation. At no time will the operator's hands come within 4 inches of the blade.

Expl: The most common cause of finger accidents is due to pushing boards through the saw with the hands. The safe method is to always use a push stick when ripping boards.

Rule 4: Do not reach over the saw to pick up pieces of stock. Shut the saw off and walk around.

Expl: It is easy to slip or be thrown off balance. A hand or part of the body may be thrown into the saw blade.

Rule 5: Always keep a firm grip on the stock.

Expl: It is easy to lose concentration while working, keep your mind on what you are doing, and you will be able to work safely with a firm grip.

Rule 6: Cracked or warped saw blades must be discarded immediately.

Expl: Such blades are apt to break apart.

Rule 7: When cutting to length either remove the ripping fence or provide a clearance block to prevent binding or "kick-back."

Expl: It is not considered good practice to use the ripping fence as a stop block as short pieces will wedge between the saw and ripping fence.

Rule 8: Stay on the job until the saw has coasted to a complete stop.

Expl: Someone may lay a hand or board on the blade not knowing it is still turning.

Rule 9: The saw should extend only 1/4" above the material when cross cutting or ripping.

Expl: The exposed portion of the blade is an additional hazard.

Rule 10: The wood being cut must always be in contact with the rip fence unless using the miter gauge.  
Expl: This will ensure that a straight cut is made.

Rule 11: Always keep the piece of wood which you are cutting between the blade and the rip fence.  
Expl: This will ensure your board will be the correct width.

Rule 12: All adjustments must be checked before turning on the power.  
Expl: A loose adjustment in the ripping fence will allow the fence to creep back from the saw resulting in an unevenly sized board. Rip fences not securely adjusted to the table may jar loose and cause an accident.

Rule 13: Special cutting jobs must be checked by the instructor before the power is turned on.  
Expl: Such work as doing bevel work and radial cutting are especially difficult to set up and hazardous if not done properly.

Rule 14: It is dangerous for the operator or anyone else to stand in line with the saw blade when it is in operation.  
Expl: Always stand to the left or right because the force of a piece of stock thrown may cause serious injury.

Rule 15: The saw should be stopped before clearing away scraps from the table top.  
Expl: It is very easy to push some of the scraps into the saw blades. Should this happen they are either thrown in the line of the saw or they wedge in the throat of the saw.

Rule 16: Never pile material or tools on the table saw.  
Expl: As every machine has a certain amount of vibration, materials are quite apt to shift into the moving saw.

Rule 17: Stock should never be pulled through the saw by the operator.  
Expl: The operator should never leave the operating side of the saw or switch. Note: If boards are to long to handle alone, get a person to help.

Rule 18: Stock should never be re-sawed without special permission of the instructor.  
Expl: Resawing is one of the most hazardous operations on the table saw and without special skills one will almost inevitable cause small pieces to be thrown about.

Rule 20: Stock should never be lowered over the saw without special permission of the instructor.  
Expl: There is a great tendency for the saw to kick the stock back when dropped over the saw. This operation necessitates the dispensing of all guards and is therefore an operation that should be done by the instructor.

Rule 21: Stock should never be cut without the use of a guard or fence. Freehand cutting is never permitted.  
Expl: There is too much tendency for the blade to bind in the work and cause the wood to kick back.

Rule 22: Always lower the saw blade below the table after its use.  
Expl: It is impossible for the saw to be of any hazard when the blade is below the table.

Rule 23: Never overload the saw. Feed materials at a rate which prevents choking the saw. If work binds or pinches, shut off power and wait until saw is completely stopped before backing work out.  
Expl: Overloading the saw is hard on bearings and may burn out the motor and cause the saw to burn.

Rule 24: You should never cut a piece of stock less than 8" long without special permission.  
Expl: A piece of stock shorter than 8" is too light to hold itself down on the saw by its own weight. It must be

fed by special cradle or hold-down device to prevent from being kicked back from the saw.

## **PANAL SAW**

Rule 1: Know the tool or equipment

Expl: Learn settings of the tool before operation. This way you will know the applications and limitations as well as the potential hazards associated with this type of tool.

Rule 2: Keep area clean and well lit.

Expl: Cluttered, dark areas invite accidents

Rule 3: Remove all adjusting wrenches and tool before turning equipment on.

Expl: Tools can fly off injuring yourself or innocent bystanders

Rule 4: Do not abuse the electrical cord.

Expl: Never unplug a cord by yanking it from the outlet. This will insure long life from the cord.

Rule 5: Try to avoid kickback.

Expl: This is a violent reaction caused by the pinching or binding of the saw blade. Do not force a tool to cut, secure work properly, and if blade stops do not turn the switch off and on!!!

Rule 6: Inspect wood prior to cutting.

Expl: This allows you to see a nail or other fasteners which may damage the blade when cutting.

Rule 7: Grip the handle firmly and balance yourself before, during, and after cutting the wood.

Expl: The counter balance helps to support the motor not you. Do not let the motor go the recoil may damage the saw and your project.

Rule 8: Guards are there for a reason.

Expl: There is never a reason to remove guards from this saw.

Rule 9: Never stand on or lean against this tool.

Expl: Serious injury could result if this tool is tipped over or you come in contact with the cutting tool.

Rule 10: Keep the carriage locked when not in use.

Expl: This will prevent damage from occurring to the tool or someone whom may come in contact with the tool.

## **RADIAL ARM SAW & POWER MITER SAW**

Rule 1: Grip the saw handle firmly with the left hand and hold the stock being cut with the right hand on the radial arm saw.

Expl: The saw blade positioned to the left of the motor will not be near the operator's right hand holding the stock. A firm grip prevents the saw from jumping forward when brought into contact with the stock.

Rule 2: Always stop the saw before making any adjustments or setups.

Expl: The rotating blade is highly dangerous and may cause injury when adjusting the saw.

Rule 3: Make sure that the saw is properly adjusted and the required levers are locked in position before power is turned on.

Expl: This not only protects the operator but also the machine, should any parts or levers become jarred loose. Properly adjusted machines eliminate all but operator error.

Rule 4: Make a cut by pulling the saw through the stock and make sure the saw is returned to the rear position.

Expl: The blade is rotated in such a way as to bite into the wood in a downward motion against the table as it is pulled through the stock.

Rule 5: Wait until the blade comes to a complete stop before removing pieces or ends.

Expl: This eliminates the danger of the operating student's hands coming into contact with a rotating blade.

Rule 6: Ripping of material is not allowed on the radial arm saw.

Expl: This can be done much safer on the table saw.

Rule 7: Use a stop block when cutting several pieces of the same length.

Expl: It is much faster, more accurate and safer.

Rule 8: Make sure the wood is held firmly against the rear fence (use clamp device on miter saw).

Expl: This will ensure a square cut and be safer.

Rule 9: All miter cuts will be made by the power miter saw.

Expl: This equipment is designed to cut angles and is the safest tool for the job.

## **ROUTERS STATIONARY/PORTABLE**

Rule 1: All adjustments to the blade should be done while the router is up plugged and in the off position.

Expl: This will prevent accidental damage to the operator and the equipment

Rule 2: When router is not being used be sure to unplug and set in a safe position.

Expl: Routers on the edge of a table when not in use get knocked off and damaged.

Rule 3: Keep work area clear to avoid running into miscellaneous items while working.

Expl: This will allow you to complete the job safely.

Rule 4: Always wear safety glasses.

Expl: Wood particles fly when this equipment is being used so protect your eyes.

## **POWER SPRAY PAINTING AND COMPRESSED AIR LINES**

Rule 1: Air pressure for spraying should be kept below 50 lbs. per square inch. (Preferable 30 to 35 lbs. per square inch)

Expl: Over 50 lbs. per square inch is dangerous as equipment is not made to withstand such high pressures. Use specified pressure for material and equipment.

Rule 2: Never look into the end of a spray gun or air nozzle while it is connected to the air line.

Expl: If the valve is released, liquid or air will be blown into the eyes and may cause permanent injury.

Rule 3: Keep all fire away from painting area, this includes welders, and cutting torches.

Expl: Be especially careful with lacquers and lacquer thinners as they are highly flammable.

Rule 4: Always use a respirator while spray painting.

Expl: Inhaling paint spray from the air may injure the operator's health.

Rule 5: Always place all rags having paint or linseed oil on them in a metal can provided for that purpose.

- Expl: Such rags are likely to cause a spontaneous fire.
- Rule 6: Never blow air from air nozzle around one's head or directly on other parts of a person's body.  
Expl: The air pressure is usually over 100 lbs. per square inch and will tear and puff the skin.  
Ears are easily broken by this high pressure if blown around the head.
- Rule 7: Before painting is begun make sure area is well ventilated.  
Expl: Painting vapors are hazardous to one's health. An exhaust fan should be provided for the painting area to remove vapors. Also be aware of where the paint might drift.
- Rule 8: Operate air tools at the manufacturer's specified air pressures (approx 90 PSI)  
Expl: This will allow the tool to operate properly and have a longer shop life.
- Rule 9: Use only air lines with water traps when using air tools and painting.  
Expl: This will give the tool a longer shop life and will allow one to paint better.
- Rule 10: All paints and paint supplies must be stored in a metal storage area, according to local ordinances and state law.  
Expl: Paints and paint thinners are flammable and must be kept away from fire.
- Rule 11: The storage of gasoline as a cleaner is prohibited by law.  
Expl: Gasoline is highly flammable and is very dangerous to use as a cleaner. Use cleaning solvent.
- Rule 12: Use one drop of pneumatic oil every time one operates a pneumatic tool.  
Expl: Proper lubrication will cause the tools to last longer and operate better.

## **PROPANE TORCH**

- Rule 1: Keep area well ventilated and clear of flammable materials.  
Expl: Good ventilation eliminates burnt gases from accumulating and replacing the oxygen.
- Rule 2: Follow this procedure when lighting the torch:  
(A) Turn propane on slightly.  
(B) Use striker to light.  
(C) Adjust to proper flame.  
(D) Direct flame to desired area  
(C) Turn gas valve slowly to off position.  
Expl: By using proper procedure the propane torch will be started correctly and operated safely.
- Rule 3: Never set a lighted torch down unattended.  
Expl: An unattended torch can lead to an accident.
- Rule 4: Caution fellow students that you are carrying hot metal when transporting the object to be cooled in the quench tank. **Never use the sink!!** Mark heated metal with soapstone "HOT" when necessary to leave your work.  
Expl: Take every precaution to prevent injury to yourself and your fellow classmates.
- Rule 5: Be careful when quenching hot metal; keep your face protected.  
Expl: Hot metal in contact with cold water can cause excessive splashing.
- Rule 6: Quench hot pliers or tongs before replacing on tool or rack.  
Expl: The next student to use these may not realize they are hot and seriously be burned.

- Rule 7: Before lighting the torch be sure to have all necessary tools within your reach and parts ready to be soldered.  
Expl: By being prepared one will be able to complete the job without shutting down to obtain tools and will not waste propane.

## **FIRST AID**

Rule 1: Proper order of diagnosing an injury that you come across first on the scene possible no response:

- 1) Check for heart rate.
- 2) Breathing - Brain damage occurs after 7 minutes without oxygen.
- 3) Check for bleeding
- 4) Broken bones

Expl: No heart beat is serious! You can have heart beat and no breathing, must start resuscitation. Bleeding is serious but if no heart beat or breathing is happening stopping bleeding is pointless. Same is true with broken bones.

Rule 2: Do not move a person who appears to have broken bones.

Expl: This could cause serious damage to the person.

Rule 3: If person has experienced an electrical shock be sure that all electricity has been turned off before administering first aid.

Expl: Possibility of electrical shock.

Rule 4: When something gets into your eyes flush with cold water.

Expl: Rubbing and trying to get it out can do more harm.

Rule 5: When a person is in shock or feeling faint have them lie down or be seated.

Expl: To avoid an injury from falling

Rule 6: If clothes are on fire smother flames immediately with a blanket or by rolling on the ground.

Expl: Best and fastest method to put out a fire.

Rule 7: If you receive a burn the best first aid procedure is continued flushing with cool water over the burn area for an extended period of time.

Expl: Any other treatment may cause further injury.

Rule 8: If an injury takes place you need to keep calm so you might be able to provide assistance to the person injured.

Expl: By staying calm yourself you help calm the injured person.

## **ELECTRIC ARC WELDERS**

Rule 1: Never watch the arc or arc reflection of an electric welder.

Expl: The ultra-violet rays which are produced by the arc will cause a severe eye burn.

Rule 2: Always protect the eyes and face with a welding helmet, (# 10 Lens) the hands with gloves and the body with proper clothing when arc welding. Button up shirt collar and roll down sleeves.

Expl: Severe burns will result from exposure to the rays, produced during the welding process.

Rule 3: Warn persons around you to protect their eyes before you start to weld. Use curtains or partitions to shield others.

Expl: To protect them from arc flash.

- Rule 4: Do not lay the electrode holder on your work.  
Expl: It may short out causing a flash.
- Rule 5: Trousers with cuffs should be turned down to prevent hot metal or sparks from lodging in cuffs or into shoes.  
Expl: Sparks may ignite clothing or may drop into shoes causing burns.
- Rule 6: Do not weld metal directly on a concrete floor.  
Expl: Heat from the arc will cause the moisture in the concrete to change into steam exploding out small places of the concrete floor.
- Rule 7: Do not attempt to weld any closed container.  
Expl: It may have had a combustible material in it, traces of which may volatilize and then explode.
- Rule 8: When changing electrodes, be sure you are insulated from your work.  
Expl: To prevent electric shock.
- Rule 9: Always wear safety glasses under your arc welding helmet.  
Expl: Hot slag may fly into your eyes causing injury.
- Rule 10: Do not weld near burnable materials such as cardboard, wood, oil, grease, rags, etc.  
Expl: Hot sparks or metal may cause a fire.
- Rule 11: Always use gloves when plugging in 220 extension cords.  
Expl: To prevent electric shock.
- Rule 12: Protect the cables from hot metal and other possible damage  
Expl: This will prevent the welders from shorting out and damaging the welders.
- Rule 13: When using the MIG or TIG welders be careful to protect the lead cords from being crushed, bent or damaged.  
Expl: Damaged cords lead to poor performing units and can lead to severe damage of the welder, causing a costly repair job and a long downtime.
- Rule 14: The CO<sub>2</sub>, ArCO<sub>2</sub> and Argon tanks are all high pressure tanks and the valves are double seated and need to be opened all the way.  
Expl: The tank valves are dual stage and must be opened all of the way to prevent tanks from being damaged and tanks leaking.

## **OXY-ACETYLENE WELDING EQUIPMENT**

- Rule 1: Oxygen and acetylene cylinders must be securely fastened to a welding truck, cylinder rack.  
Expl: The cylinders are tall, and it is easy to accidentally knock them over and cause an extremely dangerous situation.
- Rule 2: Never use oil or grease on any welding fitting or handle oxygen cylinders or apparatus with oily hands or gloves.  
Expl: Oil or grease in the presence of oxygen under pressure is an explosive combination.
- Rule 3: Always keep the caps screwed on all tanks not in use.  
Expl: This will help keep dirt away from the fitting and will protect the valves and threads.
- Rule 4: Before the welding torch, hose, regulators or cylinders are used, be very certain they are all free of dirt.  
Expl: Obstructions of any kind are dangerous. If the dirt is of an oily nature, a violent explosion may occur. Cylinders should be "cracked" in order to free the fitting of dirt before attaching occurs.

Cylinders should be "cracked" in order to free the fitting of dirt before attaching regulators. This is done by opening the tank valve for an instant.

Rule 5: Always open cylinder valves slowly and stand to one side.

Expl: If high pressure is suddenly released it is liable to damage the regulator and pressure gauges and blow them out into your face.

Rule 6: Never put your hands on welding fittings (threads).

Expl: Often times there is enough oil present in the skin to be hazardous.

Rule 7: Use the proper wrench to tighten or loosen all fittings.

Expl: The fittings are made of brass and are comparatively soft.

Rule 8: Oxygen or acetylene should not be used as a pressure supply (to blow out oil lines, gasoline lines, gas tanks, etc.)

Expl: Both these gasses may be explosive under conditions for which they are not intended.

Rule 9: Use soapy water to test for leaks around cylinder valves or fittings of equipment.

Expl: Small bubbles will expose the leaks.

Rule 10: Keep the hoses free from flames and sparks. Do not allow pieces of metal to fall onto, or let people walk on them or objects roll over them.

Expl: A damaged hose presents a dangerous situation. If a hose develops a leak, do not use it. Do not attempt to repair a hose with tape.

Rule 11: Be careful not to direct the flame towards a cylinder.

Expl: An explosion may be fatal.

Rule 12: Never store cylinders near a stove, forge or other source of heat.

Expl: Excessive heat will increase the temperature and pressure within the cylinders and cause an explosion.

Rule 13: Never lie down or hang up a lighted torch.

Expl: The hose may be kicked and change the direction of the flame.

Rule 14: Welding goggles must be worn at all times when using the oxy-acetylene equipment (#5 lens).

Expl: This is to protect your eyes from sparks, heat and infrared rays.

Rule 15: Always be sure that regulator screw is in a fully released position, turned out until loose, before turning on the tank valves.

Expl: The sudden force of high pressure may seriously damage or break a regulator.

Rule 16: Any container which contains or has contained flammable materials such as thinners, cleaners, fuels, or solvents should **not** be present in the vicinity where welding is done.

Expl: Sparks may fly many feet and set fire to anything that will burn.

Rule 17: The welding area should be well ventilated.

Expl: This is especially important when welding galvanized steel or aluminum. The ensuing fumes are very toxic and can make you quite ill.

Rule 18: Never weld a container that has ever had gasoline in it.

Expl: A container that has ever contained gasoline cannot be completely free of it. The gasoline penetrates the pores of the container and there is no safe method of removing it.

Rule 19: Do not cut materials in such a position that sparks or cut out sections will fall on legs, feet, hoses or tanks.

Expl: Injury to the operator's body or damage to equipment may result.

Rule 20: Always use a friction lighter to light the oxy-fuel torch.

Expl: Do not use a match as you may be burned when the gas is ignited.

Rule 21: Always keep the space between the operator and cylinders clear.

Expl: In cases of emergency it is important to be able to turn off tank valves quickly.

Rule 22: Do not gesture or point carelessly with a lit welding torch.

Expl: You may burn yourself, another student, or your equipment.

Rule 23: Always turn off the acetylene torch valve first; and then turn off the oxygen valve.

Expl: The fuel supply (acetylene) is cut off, and the oxygen flushes out the mixing chamber. This will eliminate the popping when shutting down a torch.

Rule 24: Never open the Acetylene tank valve more than half a turn, while the Oxygen tank valve should be opened all the way. (Propylene should be opened all the way.)

Expl: This will allow the operator to quickly shut down the acetylene if an unsafe situation arises. The other tanks are higher pressures and the valves need to be resealed to prevent valves from being damaged or leaking.