

LOS ANGELES UNIFIED SCHOOL DISTRICT
DIVISION OF ADULT AND CAREER EDUCATION
SAFETY MANUAL FOR INDUSTRIAL EDUCATION
CONSTRUCTION

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GENERAL SAFETY INSTRUCTIONS

These instructions, which your instructor gives you as you enter the class, are an important part of your training in CONSTRUCTION. Safety rules and precautions must be observed by all. Habitual carelessness, or non-observance of these rules, is sufficient cause for dismissal from the class.

You will be required to learn these instructions as part of your training. Additional and specific safety instructions are taught in the shop in connection with the various operations of handling machines, equipment, tools, and materials.

After your instructor has given safety demonstrations and instructions you will be required to pass a written safety examination and to sign a statement in the presence of another student verifying that you have received safety instructions.

1) THINK SAFETYAND PASS THE SAFETY TEST

- a) You are individually responsible for putting safety first. Be ready and willing to learn how to work safely. Your life may be at stake! More accidents are caused by unsafe acts of people than by unsafe conditions.
- b) Before working with any machine, equipment, or tool, you must receive safety instructions, pass the safety test, and be sure that an instructor is present in the shop.
- c) Look for, read, and obey all the warning signs posted in the shop that are placed there to call your attention to possible dangers.
- d) Become familiar with the school's fire signal, fire drill procedures, and fire exits. In case of fire alarm, turn off all power and flames and walk quietly to the nearest exit. Follow the instructor's directions.

2) REPORT TO YOUR INSTRUCTOR WHENEVER:

- a) Any student, including yourself, feels ill or has even the slightest injury, accident, burn, or electric shock.
- b) You see anyone breaking a safety rule, such as clowning, running, snapping rags, playing around, or otherwise acting in an unsafe manner. A playful push may cause a fall and injure someone.
- c) You find a faulty tool, questionable equipment, or a safety guard removed from a machine. Report any machine out of adjustment or in need of repair, or any other unsafe shop condition. Take damaged or broken tools to your instructor. Tag the tool as unsafe. Report any machine that does not operate correctly.

3) ASK YOUR INSTRUCTOR'S PERMISSION BEFORE:

- a) Using any power machine or test equipment. You are permitted to work with machines and equipment only after you have been given safety instructions. Every machine is dangerous if operated incorrectly. Get instructions from your instructor on safe operation before operating tools.
- b) You are not permitted to work with any machine or equipment before, during, or after class hours unless you have received permission and there is an instructor in the shop or project area. Should you or any other student get injured, report it to the instructor immediately.
- c) Do not use any shop made jigs, without the instructor's permission.
- d) Using any materials at the school or project location.

4) WEAR PROTECTIVE CLOTHING

- a) **It is mandatory to wear safety goggles or a face shield** in the construction project area to protect your eyes and face from sparks, flames, blinding light, solvents, soldering fluxes, chemicals, dust or chips from saws, air guns, or other equipment. California law states that "Eye protective devices shall be worn...while repairing or servicing any project or operating any machinery or equipment".
- b) Wear a cap and properly fitted clothing. All loose clothing and hair should be tucked out of danger from being caught in wheels, drive belts, or gears. Do not wear ties, scarves, dangling chains, or jewelry in the shop. These can get caught in machinery.
- c) When you are working on electrical circuits, remove metal watchbands or rings. They can conduct electricity and cause burns.
- d) Wear solid shoes rather than sandals or sneakers. They protect your feet from falling objects or floor litter and sparks. To prevent slipping, shoes should have full tops and rubber soles and heels in good repair. Shoes with worn soles are dangerous if the wearer steps on a nail.
- e) Wear gloves when handling solder, chemicals, sharp objects, or electric wires. Do not wear gloves when they might get caught in machinery or saw blades.

5) LIFTING AND CARRYING SAFETY

- a) Grasp any object to be lifted with a firm grip and lift with your legs, not with your back. Squat down and keep your back and head in as straight a line as possible when you lift. Keep your back vertical and use your leg muscles for lifting.
- b) Get help with large or heavy objects. Make sure the path to where you are moving the object is clear. Clear the path from the area where the object is located to the area where it is to be set down. Do not twist your body when moving or carrying things.
- c) Set objects down keeping the back and head straight and lower with your legs and not your back (in the same way that you lifted the material).

6) PREVENT FIRE AND BURNS

- a) Remember there is sawdust and flammable materials around the project site. There must be NO smoking in the work area.
- b) In the case of fire, follow only your instructor's directions. Know and practice the fire drill rules. Locate the exits.
- c) Never use or operate any equipment that generates sparks and flames near any flammable or combustionable materials. Keep all rags containing oil, gasoline, paint, solvents, or any other combustibles in covered metal containers.
- d) Never use gasoline near flames, potential sparks, or radiators. Do not use gasoline for cleaning of any kind.
- e) Be careful when picking up metal tools and other equipment that has been sitting in the sun or has been used. It might be hot and could cause a burn.
- f) Keep hands away from open flames, hot metal, drill bits, saw blades, and any other hot objects that could result in a burn.
- g) Do not use paint, enamel, lacquer, or solvents near flames or sparks.

7) GENERAL SHOP SAFETY GUIDELINES:

- a) Keep the floor, aisles, and passageways clear of stock, materials, scraps, tools, and equipment. Place all scrap material or cuttings in the scrap box provided.
- b) Clean up immediately any liquids or grease spilled on the floor to prevent slips and falls and to reduce fire danger.
- c) Do not increase the air pressure in the air regulator past 40 lb. when cleaning dust or filings off tools. Use low-pressure nozzles and do not blow compressed air onto your body to clean off clothes or body parts or for any other reason.

8) LADDER SAFETY

- a) Select a ladder of the correct length for the job. Determine the vertical height from ground level to the point where the ladder is to rest. Inspect the rungs for safety. Then place the ladder so the space between its bottom and the surface it is to rest against is $1/4^{\text{th}}$ the length of the ladder. Finally, be sure that the top of the ladder extends at least 30" above the roof, landing, or platform to provide a secure grip when a person gets on or off the top of the ladder.
- b) Obtain the assistance of a second person in raising or lowering long ladders.
- c) Face the ladder and grasp the side rails or rungs with both hands when moving up or down. Take one step at a time. Do not hurry. Do not try to carry tools or materials in your hands: put them in a sack that hangs over your shoulder or use a bucket to raise or lower them. Remove any oil or grease from your shoes before climbing a ladder.

- d) Protect anyone on a ladder. Be sure that someone stands guard in dangerous circumstances. Such as when a ladder must be placed in front of a door or when there is some other condition in which a person or vehicle might bump against the ladder.
- e) Do not climb on an unsafe ladder. Do not use ladders that are bent, damaged, or have missing rungs. Make sure the ladder is not placed on a loose surface or object. Make sure the surface has an even footing and that the ladder is not uneven. If necessary, block a leg so that the legs of the ladder are even. All legs of the ladder must be solidly planted on firm ground. Do not lean it up against a wall and climb the ladder.
- f) Do not lean an "A" frame ladder against window sashes or against a moveable object. Fasten a board securely across the top of the ladder to give a bearing on each side of a window. Always hold onto the ladder with one hand, do not over reach from the ladder. Do not work on a ladder in a high wind.
- g) Equip the ladder, whenever possible, with non-slip points or safety sleeves. Fasten the ladder securely at the top and at the bottom.
- h) Do not stand on the top two steps of an "A" frame ladder. Do not work above the second rung from the top of a straight ladder. The paint shelf should not be used as a step.
- i) All ladder legs should be fully opened and locked before climbing on the ladder position.
- j) Not more than one person should be on a ladder at any given time.
- k) Do not climb on the backside of the ladder, only use steps to climb.
- l) Do not set things on top of the ladder. Objects may fall, especially when moving the ladder.
- m) When using electrical equipment, a fiberglass or wood ladder must be used. Do not use a metal ladder when using any electrical equipment.
- n) The extension ladder must be secured or strapped to the platform, level, or roof to provide a secure grip when getting off the ladder.
- o) Do not walk under a ladder, objects may fall from the ladder
- p) Be aware of electrical wire location (especially overhead wires) when setting up or moving ladders.

9) HAND TOOLS AND BENCH WORK

- a) Use the right tool for the right job. Hand tools come in many shapes and sizes. Each tool is made to do only certain jobs with safety and ease. Using any available tool to "get by" is one of the main causes of hand tool accidents. Do not, for example, use a wrench as a hammer or a screwdriver as a chisel or pry bar. Use only tools that are in safe condition. Report any sub-standard or unsafe tools to the instructor.
- b) Do not throw tools or materials to another student since this can endanger eyes, hands, and body parts. Pass tools directly, with handles extended. Do not leave tools or materials projecting from a vise, workbench, or pants pockets. Other students can bump into them.

- c) Keep all tools clean. Do not let oil, grease, or dirt accumulate on the tool or on your hands. Avoid using wrenches with cracked, sprung, or worn jaws. A slipping wrench usually causes a painful hand injury.
- d) Make sure that handles are used on all tanged tools such as files, chisels, and scrapers. Do not carry sharp-edged tools in your pockets. Objects can cut hands or puncture body parts during a fall.
- e) Keep sharp edged tools sharp. A dull tool is more dangerous than a sharp tool because it will slip over work or slip away from the work. It could require more pressure or be difficult to control.
- f) **Chisel or gouge:** hold a chisel or gouge with both hands unless one hand is used to drive the tool with a mallet. Sharpen chisels or plane irons carefully. Keep fingers away from cutting edges and never test the edge of the blade by drawing fingers across it.
- g) **Clamp:** use both hands to remove a bar clamp from the rack. Be sure that the clamp being removed is not in contact with another clamp in the rack. Never carry or move projects after the clamps have been applied. If it is necessary to move the project with the clamps attached, notify the instructor and then follow his instructions carefully.
- h) **Hammer:** make sure the nail is securely set in wood before striking. Always use safety goggles when working with hammers. Make sure the head of the hammer is securely attached to the handle. Do not strike two hammerheads together. Never use a wood handled hammer to pull nails.
- i) **Miter box:** release the catches of a miter box to lower the blade. Hold the saw with one hand by the metal reinforcing strip on the back of the blade and use the other hand to release the catches. Never place your hands under or near the teeth of the saw.
- j) **Sawing:** when hand sawing, start the teeth on the backstroke, keeping your thumb well above the teeth while guiding the beginning cut.
- k) **Screwdrivers:** always use the appropriate size and type of screwdriver for the job. Drive screws carefully and keep both hands on the screwdriver. Never hold the screwdriver with one hand or place a hand in front of the screwdriver tip. To start a screw, first prepare the stock with a "starter" hole. Then set the screw in the hole before picking up the screwdriver. Do not hold small articles in the palm of the hand while tightening the screws with a screwdriver. Hold the items in a vise or support them on a bench.
- l) **Shovels:** do not use shovels with split, broken, loose rivets.
- m) **Vise:** never tighten an unused vise. When a vise is not in use, be sure the jaws are closed and the vise handle is in a vertical position.

10) GENERAL POWER TOOL SAFETY

- a) Recognize that the right size and shape of the tool is important to the job. Every tool has a "built-in" safety limit or capacity. It is important to read the tables and instruction manuals from the tool manufacturer. They contain information on the tool's range of workload. Overloading a tool can lead to breakage and injury. Obtain the instructor's permission before turning on

- any power tools or equipment. Do not use any power tool while standing on a wet or damp floor.
- b) Use extension cords carefully. Drop the lead wire directly from the wall plug to the floor to avoid tripping over the cord. Inspect the condition of the cord, cap, and body and be sure that insulation and covering are not broken or worn and that it has a grounding prong. Be sure your hands are dry before touching switches or receptacles. Wet hands invite electrical conduction and can cause shocks or burns from electricity. If possible, try to route an extension cord overhead to avoid hazard or tripping problems.
 - c) Before turning on the power to any tool, pick up loose tools and materials around the power tool and make certain that all other students are clear of the machines and equipment. Clean, oil or adjust machinery only when the machine is stopped and preferably when the machine is unplugged.
 - d) Keep clothes, cords, and loose objects away from moving parts. They can get caught in the equipment causing injury to yourself and possibly others.
 - e) Never remove guards of safety devices from any machine. They must always be in place when the tool is being used. If for any reason a safety guard is removed, or if the machine is defective in anyway, the machine must not be used until proper authorities make corrections.
 - f) The student operating any electrical equipment is called the "operator". Only the operator can start and stop the equipment. The operator should verify that other students do not crowd the machine or get too close to the operating equipment. The operator assumes control and must decide exactly what is to be done. The operator should check and verify the machine will not injure other students.
 - g) Check all adjustments before turning on the power. Verify that all adjustments are locked into place before starting a piece of equipment. Vibration may cause an adjustment to loosen, slip, or change position. Vibration may cause tools or other loose objects to be drawn into the moving parts, causing personal injury and damage to the equipment.
 - h) Keep all sharp-edged tools sharp. A dull tool is more dangerous than a sharp one because it will slip over and away from the work, requires more pressure, and is difficult to control.
 - i) Do not in any way distract the operator of a machine. If you start a machine, stay with it until the machine is turned off and do not walk away from a running machine.
 - j) Use caution when approaching power machines. Stay away from moving parts. Never stand in the direct line or "throw" of any machine. If a machine breaks or becomes overloaded, objects can be thrown out with strong force (the stock could not be held securely or knots/slivers can break loose).
 - k) Electric jointer: never plane more than 1/8th of an inch in depth at any one time. Adjust the cutter to be even with the feed table. Do not place fingers near the edge of the cutter opening or the chip ejector port. Do not use material under 18" on the joiner. When face-planing stock, the stock must

- be a minimum of 3/4th of an inch thick. Allow the guard to completely cover the blade before removing the stock.
- l) Before starting the drill press make sure the chuck is properly installed, the drill bit is tight, the chuck key is removed, and the table is firmly clamped. Make sure a drill vise or clamp securely holds the material being drilled. Never hold material being drilled with your hands.
 - m) When the drill bit breaks through the material being drilled make sure you ease up on the drill pressure.
 - n) When cleaning material off the drill table, use a brush and never use your hands to wipe the chips from the table.
 - o) An improperly sharpened drill bit could dig into the work too fast or throw the work from the table.

11) PORTABLE POWER TOOL SAFETY

a) Drill safety:

- i) Make sure the drill is unplugged before tightening the chuck. Keep the chuck away from loose objects and clothing. The chuck could get caught in clothing and cause damage or injury.
- ii) Be sure the drill is in the "OFF" position when it is plugged into an electric outlet, in order to prevent anything from being caught by the rotating drill bit.
- iii) Always hold the switch when operating the drill. Be ready to stop the drill at any time. When using a heavy-duty drill be sure the handle is in place. Hold the drill with both hands and brace the body securely to avoid twisting. Discontinue drilling if electric sparks jump from the point of the drill to the work. This may indicate electrical grounding. Contact your instructor for further instructions.

b) Band saw:

- i) Obtain the instructor's permission to saw anything other than wood, plywood, or Masonite on the band saw.
- ii) Make adjustments only when the machine is at a dead stop. Saw guides should be adjusted to approximately 1/2" above the stock to be cut. Obtain the instructor's permission to saw any material that does not lie flat on the table.
- iii) Use a clamp or jig on uneven material. Whenever possible, make relief cuts through scrap to avoid the necessity of backing out of a long cut. If it is necessary to back out, stop the machine before doing so. Make relief cuts while sawing small radius curves. Feed into the teeth. Do not twist and bind the blade.

c) Bench Grinder

- (1) Wear goggles or a face shield while using the grinder or wire wheel. Safety glasses must always be worn during any grinding operation for eye protection.
 - (2) Adjust the “work rests” on the grinders and emery wheels as close to the wheel as possible to prevent the work from catching between the rest and the wheel. The gap should not be greater than $1/64^{\text{th}}$ of an inch. The work rests should be tightly clamped after each adjustment.
 - (3) Be sure the grinding wheel fits the arbor and is tightened securely. Make sure the side wheel guards are in place. When grinding work is held in the hands, use special care to prevent the work from slipping and causing finger injuries.
 - (4) Keep the tool rest as close to the grinding wheel as possible. The gap should not exceed $1/64$ inch. Tools or materials may become jammed between tool and rest, causing breakage of grinding wheel and flying particles.
 - (5) Use particular caution when grinding work is held in the hands so as to prevent the work from slipping, causing injury to your fingers. Grind work below the center of the wheel so that the wheel cannot throw the work. Never hold the tool downward between the wheel and the rest when grinding because this could cause dangerous jamming of the tool and wheel that could result in an injury.
- (1) Stand to one side while the grinding wheel is being dressed or started. Grinding on one side of the wheel is dangerous, as the wheel may break from side tension. Grind on the face of the wheel only, unless the wheel is designed for side grinding, so that the wheel will not break from side tension.
 - (2) Hold small pieces of material with vise grips or a small vise to prevent the work from slipping and becoming jammed in the wheel. Never use pliers or a rag.
 - (3) Do not push the tool or part being dressed downward between the wheel and the rest while grinding. Jamming the breaking of the tool and wheel can result.

d) Jigsaw:

- i) Keep body parts clear of the saw blade, hold the saw firmly against the stock being cut. Do not use the saw to cut small pieces of material. Do not force the cutting action. A blade will break if forced to cut too fast. If a saw blade breaks, turn the switch off immediately. Be sure the jigsaw is unplugged before changing the blade or making any adjustments.

- ii) Guide the saw carefully so that the blade does not strike the bench, sawhorse, or platform supporting the stock. Do not force the jigsaw to cut too fast. Cut turns and curves slowly. Be sure there is enough clearance underneath the jig saw blade and workbench.
- iii) Start the saw and then saw into the board. Do not start a saw while the blade is in contact with the board or material. Never remove the saw from the material while the blade is moving.
- iv) Before using the jigsaw or any other electric power tool make sure the cord is in good shape and the ground terminal is in tact.
- v) When starting in the field (the field is in the center of the plywood sheet), drill a hole. Do not plunge cut.

e) Skill saw (Circular saw)

- i) Check the blade and make sure it is sharp (a dull blade can cause kickbacks and injury). Verify the blade is on correctly. One end of the material being cut should be free to fall after the cut has been completed.
- ii) Make sure the blade guard is in place and operating freely. Verify it is not binding. Make sure the arbor is tight. Make all necessary and proper adjustments of the angle and depth before using the saw. Make sure all adjustments are tight. The depth of the cut should not be greater than (should not extend or protrude) more than 1/2" beyond the material being cut.
- iii) The saw base must be flat on the surface of the board. Do not attempt to saw work that does not lie flat on the table. If the stock can turn or roll, you must obtain the instructor's permission before cutting.
- iv) When using a skill saw always stand to the side of the project. Do not have any body part in line with the blade. Saw kickback can cause injury.

f) Table Saw:

- i) Use the right saw blade for the job. Don't use a ripsaw for crosscutting, or a crosscut for ripping. Don't use a warped blade. Before starting the machine, see that the blade is securely fastened to the arbor and revolves freely. Verify that the screws or clamps on the fences are tightened.
- ii) When ripping stock, attach a splinter behind the ripsaw to keep the stock separated as it passes and prevent it from binding the saw blade, thus avoiding kickback. Do not rip boards unless they have a straight edge against the fence, otherwise they might kickback.
- iii) When ripping narrow stock, clamp a piece of scrap wood to the fence to protect the fence. Use a push stick when ripping narrow stock. The push stick is narrower than the hand and keeps the hand at a safe distance. Use the clearance block when crosscutting short pieces.

Never use the ripping fence as a stop when crosscutting, it may cause a kickback. When several short pieces are to be cut the same length, fasten a clearance block to the fence for a stop. When cutting a miter, extend guide with board close to the saw. Use a sliding miter gauge when crosscutting stock.

- iv) Use a helper when ripping long stock. Be sure the helper supports the stock and does not pull unless you direct the helper to pull. (If the helper pulls on the stock, it could upset your balance or jerk your hands into the saw.)
- v) Ask the instructor to supervise whenever work is to be lowered onto the blade to make a blind cut. Rig a stop to prevent kickbacks. Do not perform any step involving re-sawing without the instructor's permission. The instructor must check setups involving dadoes and grooving.

g) Reciprocating Saw:

- i) When carrying a reciprocating saw make sure the blade is pointing down. Do not saw materials unless they are properly supported. Do not use the saw if you cannot grip it firmly and securely. Do not use the saw without a shoe or a guide. Check that the foot is in good working order.
- ii) Unplug the electrical cord before replacing a saw blade. The saw blade must completely pass through the work while cutting. When cutting make sure the foot of the saw is resting on the material being cut.
- iii) Have the proper blade for the material being cut. Make sure the blade is tight (all bolts and retainers are tight). Inspect the electrical cord and verify the cord is not kinked, wires are not frayed, and damaged and all prongs are present on the cord connection.
- iv) Do not plunge cut.

h) Radial saw:

- i) Check all adjustments and locks before turning on the machine. The blade should be adjusted just below the top of the table, not cutting into the top. Tighten all necessary screws after making adjustments. Check saw travel on bevels and angle cuts so that it will not bind, strike the arm support, or cut deeply into the table.
- ii) Hold wood solidly against the fence. Do not move wood until the saw is back, completely clear of the wood. Hold the saw handle firmly to prevent the saw from "jumping" into the wood. Pull slowly, allowing it to cut easily. Cut only one piece at a time, removing scraps from the saw track with a stick. Do not cut short pieces.
- iii) While the saw is backing out, hold a loose piece of wood against the stop block to prevent the piece from being thrown.
- iv) When crosscutting bowed lumber, keep crown to fence and down on table to prevent binding the blade. Do not rip with the radial arm saw.

i) Disk Sanders:

- i) Perform all adjustments and fasten the table before starting the sanding disc.
- ii) Use caution in sanding small pieces of stock that may slip and cause the fingers to come in contact with the abrasive surface. Be sure that thin stock does not wedge between the table and disc or between the sander belt and stop board.
- iii) Apply work to the part of the disc that is traveling downward (to apply it to the upward travel would cause the work or stock to be snapped from your grasp and it might jerk your hand against the disc).
- iv) Feed the material gently to the disc. A sander is not to be used as a plane. Check sandpaper before starting the machine. If the paper is torn or loose, check with the instructor.

j) Planers

- i) Obtain the instructor's permission before surfacing lumber that is less than 18" long and 1/4" thick. Adjust the machine to not more than a 1/8" cut. It is possible to surface more than one piece at a time only if all are of the same thickness. Do not set the depth of the blade to cut greater than 1/8th of an inch.
- ii) Check materials carefully for loose knots, dirt, splits, cracks, and metal fasteners. Be sure the planer is completely stopped before you clean off shavings or chips.
- iii) Promptly correct a board that turns sideways toward the edge of the bed, or rollers that reverse to remove wood. Pause between forward and reverse. Support long boards as they are fed through the machine and always check that there is sufficient clearance to the wall.
- iv) Do not attempt to surface boards cross-grain. Keep hands away from the feed rolls and from stock already gripped by the feed rolls. Stop the machine to clean the bed and rollers of pitch or gum.
- v) Stand to one side while the machine is in operation. Do not lean down and look at the board as it is traveling through the planer. Chips, knots, or a piece of stock may fly out.
- vi) Run thin stock through the planer on top of a thick-surfaced board to prevent the thin stock from breaking. Be sure the stock is longer than the distance between centers of feed rolls. Otherwise, it could become caught in the rollers, disintegrate, and be thrown out.
- vii) Keep the planer bases flat on the material to be planed at all times during operation. Wait until the planer has stopped before removing the material.

k) Power Miter Saw

- i) Hold the stock that is to be cut firmly against the fence to prevent kickback. Do not start the saw blade while the blade is in contact with

the wood.

- ii) Do not cut small pieces. They can shatter and shoot out from the blade.
- iii) Keep the cord free from the blade.
- iv) When operating the miter saw do not cross your arm in front of the blade.

l) Router

- i) When changing router bits or cutters, disconnect the power cord.
- ii) Keep both hands on the router handles during operation.
- iii) If you are using shop made jigs or templates always check with the instructor before turning on the power. Before plugging in the router, be sure the switch is in the off position.
- iv) Let the router reach operating speed before the bit comes in contact with the wood.
- v) The Router should be used in the LEFT to RIGHT direction. Be sure that router bits with roller guides are not set too deep.
- vi) Do not allow the bit to come in contact with the materials before the router is started.

m) Nail Gun

- i) Keep fingers clear of the foot of the nail gun. Nails can turn and come out when least expected.
- ii) The plastic that holds the clips of nails together can shoot out in all directions so safety glasses are mandatory when using the nail gun.
- iii) Disconnect the nail gun from the compressor when not in use.
- iv) Do not hold small pieces of wood in your hand when nailing the wood.
- v) When using nail guns point the gun down and away from you.
- vi) Safety glasses are mandatory when using the nail gun.

12) DRILL PRESS

- a) Be sure that the drill is securely fastened and is centered in the chuck before turning on the power. Before starting the drill press make sure the chuck is properly installed, the drill bit is tight, the chuck key is removed, and the table is firmly clamped.
- b) Make sure a drill vise or clamp securely holds the material being drilled. Never hold material being drilled with your hands. Use the drill press vise or clamp to hold the work being drilled to prevent the drill from catching into and throwing the work. Grip the vise firmly while drilling to prevent the drill from breaking or the work and vise from revolving dangerously, or clamp the vise to the table.
- c) Lessen the feed pressure as the drill cuts through the work. This will decrease the danger of the drill catching the work and causing it to revolve.

- d) Stop the machine immediately if the drill catches in a piece of work, causing it to revolve and do not touch the work while it is in motion.
- e) Always use a sharp drill that has been ground appropriately for the material to be cut. Drills that have been improperly ground may dig into the work and throw it.
- f) Operate the drill at the correct speed for the size of the drill and the kind of material. If too much speed is used, or if the drill is forced too rapidly into the material, the drill will break.
- g) Remove the chuck key from the chuck and the drift from the spindle before turning on the power to prevent them from flying.
- h) Stop the machine before removing work, chips, or cuttings. Avoid deep, painful cuts by using a brush to remove chips.
- i) Keep face away from the work being drilled to prevent injury to eyes or face in case the drill breaks or hot oil and chips fly out.