6. Power Tools

Power tools are used to save time and physical labor. When operated carelessly or improperly they can inflict severe injuries. All employees are to wear the appropriate Personnel Protective Equipment (PPE) for each job involving power tools. If unsure consult with supervisor.

6.1 Safety Rules for the Use of Power Tools

SR 6.1.1 Electrically powered tools designed for use with a three-wire grounded plug shall only be used with a three-hole receptacle. No such equipment or plugs shall be altered for use with ungrounded receptacles.

SR 6.1.2 Tools shall only be dismantled for repair by personnel designated by a supervisor.

SR 6.1.3 Safety Guards, switches or devices installed on tools to provide safety in operation shall not be removed or made ineffective.

SR 6.1.4 Safety goggles or glasses must be worn when grinding, chipping, cutting, or doing other work which may create dust or flying debris.

SR 6.1.5 Scarves, ties and other loose clothing shall not be worn when operating power tools.

SR 6.1.6 Ear-muffs or other protective ear devices shall be worn when using or working near compressed air tools or other devices which exceed allowable noise levels.

SR 6.1.7 Persons using jack hammers and chainsaws must wear safety foot protection.

SR 6.1.8 Welders and persons working in an area where welding is being done shall wear approved goggles or shields. Welders must wear approved gloves.

SR 6.1.9 Welding screens shall be used whenever possible to isolate the work and protect the vision of others in the area.

SR 6.1.10 Shut off all power tools before moving.

SR 6.1.11 Wear closed-toed or safety shoes and full length trousers when operating power hand lawn mowers.

6.2 Safety Procedures for Electric Tools

6.2.1 Electrical cords from the tool itself and extension cords shall be protected from contamination by oil or acid solutions.
6.2.2 Cords shall be protected from damage to the rubber insulation by exposure to heat, cuts, pinching, etc.

6.2.3 Cords shall be protected from damage to wire conductors or terminal connections by excessive tension (pulling), kinks, pinching, etc.

6.2.4 Each time they are used, electrical hand tools shall be visually inspected for damage to cords and ground connections. The most common defects occur at the points where the cord is attached to the plug. Be sure to check for a secure connection and for lack of proper insulation at these points.

6.2.5 Remove adjusting keys or wrenches before starting.

6.2.6 Never overload the equipment.

6.2.7 Do not leave portable electric tools unattended with the power cord plugged in.

6.2.8 Do not carry plugged-in portable electric tools with a finger on the switch.

6.2.9 Frequently inspect the flange that abuts circular blades, grinding wheels or abrasive cutting wheels for damage. Nicks or chips that cause the blade or wheel to be mounted off-center cause vibration and possible disintegration of abrasive cutting wheels.

6.3 Grinders

6.3.1 Only those employees who are familiar with the mounting of grinding wheels are permitted to do so. A ring test on each of the new grinding wheels should be completed before installation. (A ring test is made by supporting the wheel freely on a rod through the arbor hole and tapping it lightly with a wooden object. A clear, metallic ring indicates absence of cracks.)

6.3.2 Wheels must fit easily onto spindles. Too loose or too tight is dangerous.

6.3.3 When the wheel is mounted, stand out of danger to opposite side of wheel and allow it to develop full operating speed for at least one minute.

6.3.4 Apply work gradually to a cold wheel at the beginning of each work period, as cold wheels are more subject to breakage.

6.3.5 Never store a grinding wheel on damp or cement surfaces, nor put oily rags on the wheel.

6.3.6 Every grinding tool must be securely fastened to the shaft before commencing work.

6.3.7 The maximum operating speed as given by the wheel manufacturer is on the wheel label, and grinding wheels must not be operated in excess of these speeds.
6.3.8 Avoid using the side of an emery wheel for grinding, unless it is specially designed for side
grinding. Side grinding weakens the ordinary wheel and may cause it to burst.

6.3.9 Use the cutting surface of a grinding wheel uniformly, as a grooved wheel has been
dangerously weakened.

6.3.10 Grinder bearings must be kept properly oiled and adjusted. This will help to prevent hot
bearings and spindles, which are sometimes responsible for melted bushings.

6.3.11 Do not abuse the wheel by applying excess pressure.

6.3.12 The "ToolRest" on a stationary grinder shall be set about 1/8 inch from the wheel. Never
adjust the rest when the wheel is in motion.

6.3.13 Be particularly careful when grinding narrow tools or other objects as they are apt to catch
between the rest and the wheel.

6.4 Drill Presses
6.4.1 Adjust the table so that you have sufficient room for the jig and keep your hands away from
the revolving drill. Never run the point of the drill bit into the table.

6.4.2 Be certain that both the chuck and the drill bit are tight on the spindle and that any circular
tables are tightened before beginning to drill.

6.4.3 A sluggish drill is probably the result of incorrect grinding. Be sure the drill bits are
sharpened properly for the particular material, so that the cut may be the right size.

6.4.4 Materials shall be clamped or otherwise fastened to the drill press bed, not held in the hand.

6.4.5 Never run a drill bit faster than the rated speed as this may result in broken drill bits,
damaged materials and serious injury.

6.4.6 It is dangerous to attempt the removal of broken drill pieces with a center punch and
hammer. For instructions, ask your supervisor.

6.4.7 Never leave keys in chucks after tightening drills. If set screws protrude, report it to your
supervisor.

6.4.8 Reduce the pressure if there is any backlash in the spindle. Listen carefully for the
distinctive noise made when the drill comes through work so you can ease off the pressure.

6.4.9 Safety stops must be set to keep the over arm of a radial drill from swinging out where it
may cause injury.
6.5 Compressed Air
6.5.1 When other means of cleaning are unavailable, compressed air may be used to clean machinery and other surfaces only when the operator is wearing protective eye-wear and a particle mask, and if the pressure is reduced to 30 psi and appropriate chip guarding is present.

6.5.2 All quick couplers shall be secured with safety wire.

6.6 Air Hammers
6.6.1 Remove the piston or tool of an air hammer whenever it is not in use to avoid the danger of it flying out and striking someone.

6.6.2 Always close the valve on the air line and release the air from the hose before cleaning, repairing, trying to insert any tool or leaving any air-powered unit.

6.6.3 Maintain your hold securely on the handle on an air motor to prevent it from flying around and striking you.

6.6.4 Be certain the discharge end is made secure before turning compressed air into a hose so that it will not swing around and cause injury.

6.7 Woodworking Machinery
6.7.1 If you are running short or narrow stock, protect your fingers by using a block.

6.7.2 Before using a circular saw, check all materials for possible warping. If a concave edge is found, always place it away from the straight-edge guide of the table saw.

6.7.3 If the saw binds in a cut, the saw must be shut off before attempting to dislodge the lumber.

6.7.4 A rip saw shall not be used for cross-cutting, nor shall a cross-cut saw be used for ripping. A spreader and kickback fingers shall be required when using a rip saw. A spreader will be required when using a cross-cut saw.

6.7.5 Learn to stand out of the line of possible "kick-back" and to avoid the danger of being struck by the small pieces that are frequently thrown from a circular saw.

6.7.6 Never reach over any machine to get finished materials from the opposite side, to remove dust or wood particles from the saw table or to oil the machine while it is in operation.

6.7.7 In using a joiner, never allow either hand to pass over the knife. Use both hands, one on each side of the material, using particular care during entire operation.
6.8 Gas Welding

6.8.1 All gas welding equipment and connections should be kept free from grease and oil. (Oxygen will explode upon contact with oil or grease.) Oily and greasy gloves may result in the same effect, in addition to making it difficult to handle the cylinders.

6.8.2 Tanks must always be in the upright position and never rolled on the floor in the prone position. Never attempt to hoist tanks unless properly slung. Use the skid provided when unloading cylinders from the truck. After unloading the tank, the cylinder must be securely chained to wall or portable carrier.

6.8.3 Securely fasten with a chain the acetylene and oxygen tanks in an upright position where there is no danger of their falling or being bumped.

6.8.4 Use only standard green oxygen hose with right-hand couplings, together with red acetylene hose with left hand thread.

6.8.5 Blowout the tank valve before attaching the regulator. Never use compressed air for blowing out Facilities Services, Resident Life, or Missoula College equipment as air may contain some oil and moisture. Use oxygen to blowout the oxygen hose and acetylene to blowout the acetylene hose. Blowout oxygen and acetylene tanks in a well-ventilated area.

6.8.6 When changing empty tanks for full ones:

   a. Shut off valve on empty tanks.

   b. Release thumb screw on regulator.

   c. Disconnect regulator, blowout tank valve and connect on full tank.

   d. Stand on opposite side of tank, point the acetylene valve outlet away from the oxygen tank and face from the gauge while opening the tank valve.

   e. Adjust thumb screw on regulator to proper pressure, making sure that you do not have excess oxygen, which causes unnecessary sparks in operation.

6.8.7 Be sure the end of the torch is cleaned before attempting to light. Use only friction lighters.

6.8.8 Do not put the materials in position so as to permit sparks, hot metal or the severed section of metal to fall on the gas supply hose or the feet of any employee.

6.8.9 At completion of the work, the welder shall make a careful inspection of the job site to insure that hot articles have not been left smoldering which might later develop into a fire.
6.9 Electric Arc Welding

6.9.1 Whenever possible, welding operations should be carried on inside a regular welding booth. If work must be performed outside a booth, the arc shall be effectively screened to prevent injury to eyes or others.

6.9.2 Before entering the welding area, an effective warning (such as shouting) shall be given so the operator may be aware of your presence and help you to avoid a sudden flash or other injury.

6.9.3 Like welding operator, the person entering the welding area shall wear required eye protection.

6.9.4 The welding of galvanized materials requires the operator to protect her/himself with a specially designed airline respirator which fits under the helmet.

6.9.5 Deposit short ends of welding rods in the containers provided for that purpose to prevent burning holes in your shoes or starting fires. Unused ends are a slipping hazard if allowed to accumulate on work area floors.

6.9.6 When not in use, place the electric holder where it cannot cause an arc.

6.9.7 Prevent injury to yourself and others from short circuits by using only welding cables that are in good condition.

6.9.8 Only properly authorized operators shall use welding equipment. Never attempt to repair welding equipment yourself.

6.9.9 Helmets and shields will be used with all electrical welding. Do not remove your helmet while bending over or inspecting a hot weld.

6.10 Tree Trimming and Chain Saw Safety

6.10.1 No person shall be assigned to work in a tree unless trained as a climber or bucket truck operator, and is:

   a. Able to use climbing rope and saddle,
   
   b. Able to tie all necessary knots,
   
   c. Able to use necessary hand tools.

6.10.2 Before starting any tree operations, time should be taken to check the trees in the surrounding area for any dangerous conditions, such as suspended electrical lines.
6.10.3 Except in cases of emergency, tree work should be avoided when trees are wet, during high winds or during extreme low temperatures.

6.10.4 Only physically fit personnel shall be allowed to climb.

6.10.5 Tree trimmers should ask for assistance only from persons on the crew, never from bystanders or neighborhood residents.

6.10.6 Danger signs and barriers shall be placed around areas where tree work is to be done.

6.10.7 The supervisor is responsible for instruction of personnel, inspection of tools and enforcement of all safety rules. Suitable clothing shall be worn as determined by the supervisor.

6.10.8 Ropes of suitable length and tensile strength shall be used for lowering large limbs.

6.10.9 Ropes shall be used for raising and lowering tools.

6.10.10 Safety or climbing ropes shall not be used for lowering limbs.

6.10.11 Ladders shall not be used unless they can be set on a firm foundation; up to ten-foot step ladders may be used alone; taller step ladders may be used when someone is present to steady the ladder if there is a firm foundation.

6.10.12 Ladders shall be frequently inspected for damage.

6.10.13 Tree pruners shall always call a warning before dropping limbs.

6.10.14 Never leave hangers or tools in a tree during work breaks or overnight.

6.10.15 For removal operations, pull ropes are used to guide the fall of large trees. Once the notching has started, the tree must not be left unguarded.

6.10.16 Only one-man saws should be used in a tree. All chain saws should be roped with their own rope using either a taut-line hitch or a ground-man to hold the rope.

6.10.17 Walk with the saw stopped and the guide bar pointing to the rear. Never walk with the power saw running.

6.10.18 Always stand at the end of the saw when cutting, never at the side.

6.10.19 Avoid using the tip of the saw for cutting.

6.10.20 Never replace the chain in the guide rail groove while the motor is running.
6.10.21 Clean and check the saw thoroughly and lubricate daily as required. Maintain a proper tension on the chain. Always inspect the saw for sharpness, as a sharp saw will reduce maintenance cost and result in faster, safer and easier cutting.

6.10.22 Refuel the saw before it runs out of gasoline to avoid a "bound saw" which is difficult to refuel and start, and to avoid the danger of fire when starting a saw at the refueling site.

6.10.23 Special caution should be taken when it is necessary to work around live wires.

6.10.24 All wires broken during tree work shall be immediately reported to the Work Order Desk (6091) or Northwestern Energy (888-467-2669).

6.10.25 Fallen wires shall be guarded until servicemen arrive.

6.10.26 In case of contact with live wires, do not touch any victims. The victim must be separated from wires by use of nonconductive materials. Call an ambulance at once. (Campus emergency 4000 or 9-911)

6.10.27 A ground-man shall be present with the tree-trimmer on all trimming operations requiring tree climbing or use of the bucket truck.

6.11 Bucket and Ladder Trucks

Note: Please refer to the Scissor Lift and Aerial Lift Safety Programs for more details.

6.11.1 Perform maintenance checks on bucket and ladder vehicles before leaving shop area and have discrepancies repaired/replaced.

6.11.2 After stopping (or while running), immediately turn on hazard lights.

6.11.3 Set barricades and cones at a reasonable distance to the front and rear of vehicle for the safety of workers and motorists.

6.11.4 Set signs or barricades on the sidewalk when applicable to warn pedestrians of overhead work.

6.11.5 All on-site workers will wear appropriate personal safety equipment.

6.11.6 Out-riggers shall be lowered for stabilization of vehicle.

6.11.7 At no time will ground personnel be positioned so as to be struck by falling debris.

6.11.8 Safety belt shall be worn when working in the bucket.
6.12 Lawn Mowers
6.12.1 Power mowers will not be left unattended with motors running.

6.12.2 Areas to be mowed must be inspected for foreign objects. Wire, stones and other large debris should be removed before mowing.

6.12.3 To make adjustments, clear jammed objects or change blades, bits, etc., always shut off mower, wait for the machine to stop and disconnect the electrical plug.

6.12.4 Bystanders should be warned by the operator of the danger of flying objects. Extreme precaution must be taken when there are children in the immediate area.

6.12.5 Operators must keep hands and feet away from the undercarriage of the mower.

6.12.6 During maintenance, repairs or when refueling, the spark plug wire must be disconnected from the spark plug.

6.12.7 After mowing is completed, disconnect spark plug wire from the spark plug; remove dirt, grass, etc. from the top of the mower; place mower in dry location under cover.

6.12.8 When storing a lawn mower for the winter, drain all gasoline and purge the engine to avoid gas fumes.

6.12.9 Proper hearing, eye and foot protective apparel shall be worn at all times.

6.13 Tucker Window Washers
6.13.1 Extreme care must be taken to avoid contacting any suspended wires when raising or lowering the boom.

6.13.2 Care must be taken to prevent loss of control of the boom and allowing the device to strike a window too hard or fall to the ground.

6.13.3 The Tucker should not be used in high winds.

6.13.4 The Tucker should never be used during a lightning storm.