1. **Purpose**

University of Alaska Anchorage (UAA) employees, student workers, faculty, staff, and outside contractors who use hand and portable power tools in the course of their work functions, risk incidents which could result in serious injury. The hazards associated with using hand and portable power tools can be substantially reduced by using tools properly and taking precautions. This program for hand and portable power tools is intended to ensure workers are knowledgeable in the hazards when using tool and the steps to be taken to protect themselves and others.

2. **Objective**

UAA, in its continuing effort to provide employees with safe, healthful working conditions, and to comply with the Occupational Safety and Health Act is implementing the following program for hand and portable power tool safety to protect people working at the University, by helping employees, student workers, faculty, staff, and outside contractors better understand hand and portable power tool safety.

3. **Scope**

This program applies to UAA employees, student employees, faculty, staff, and outside contractors working on UAA equipment who work with hand and portable power tools.

4. **Definitions**

   - **Ground Fault Circuit Interrupter (GFCI)** - A safety device that senses hazardous electrical leakage to ground and quickly shuts off the circuit to help prevent electric shock
   - **Machine Guard** - Protective devices that cover power tool blades, grinding heads or other hazardous points of contact
   - **Hand Tool** - Tools powered manually or by hand
   - **Personal Protective Equipment (PPE)** - specialized clothing or equipment worn by personnel for protection against health and safety hazards. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a health and safety hazard are not considered personal protective equipment
   - **Portable Power Tool** - tools that are powered with electricity, pneumatic, fuel, hydraulic, or powder-actuated
   - **Vise** - Equipment used to hold or secure a work piece in one place

5. **Authority and Responsibilities**

In addition to the roles and responsibilities outlined in the UAA Training Program, the following apply to the Hand and Portable Power Tool Safety Program.
<table>
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<th>EHS/RM Programs</th>
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**EHS/RM**

- Work with departments to determine proper tool selection, and safe-work practices unique to each department’s work activities
- Create, track, and/or conduct inspections on hand and portable power tools where applicable with this standard
- Provide support upon request to departments on tool selection and use

**Supervisor**

- Ensure all UAA personnel in the department receive proper training on tool use
- Ensure defective, damaged, or prohibited tools are removed from service
- Conduct periodic inspections of tools in their department to ensure integrity
- Assist in the determination of proper tool selection to efficiently and safely perform required tasks
- Ensure tools are maintained in proper working condition

**Department Safety Coordinator**

- Assist in the determination of defective, damaged, or prohibited tools
- Conduct periodic inspections of tools in their department to ensure integrity
- Assist in the determination of safe tools required to safely perform work tasks

**Employees/Student Workers**

- Visually inspect hand and portable power tools prior to every use for defects and damage
- Alerts department supervisor when tools need repair or replacement
- Assesses work to determine if available hand and portable power tools are appropriate for required tasks
- Store and take proper care of hand and portable power tools so they are available when required to perform a task

**Outside Contractors**

- Perform all work in compliance with their company’s hand and portable power tools safety program, which will be reviewed and approved by the EHS/RM department
- If the company does not have a program, they must comply with this program
6. Hazards Associated with Hand and Portable Power Tools

The following hazards associated with hand and portable power tools can lead to personal injury or death:

- Tool breakage
- Tool slippage
- Electricity leakage
- Dust production
- Ergonomic hazards

7. Engineering Controls

Engineering controls are design plans or changes to the working environment to prevent or reduce employee exposure to hazards from improper hand and portable power tool use. The following examples of engineering controls should be considered in area design to reduce the risk from hand and portable power tool misuse.

- Procurement of proper tools for the required tasks
- Installation of properly designed workstations to accommodate tool use
- Design and placement of equipment so they are accessible for maintenance

8. Administrative Controls

Administrative controls are safe work practices and procedures designed to reduce the risks associated with hand and portable power tools. Examples of administrative controls include the following:

- Train employees who work with hand and portable power tools
- Routine inspections of tools to ensure they are in safe working condition
- Immediate removal of any tools that are found to be damaged or defective
- Provide employees with the proper tools for their job tasks

9. Procedures

The following procedures will be followed when working with various types of hand and portable power tools. Many tools have similar hazards, but personnel should assess the hazards prior to every use. If it is not known how to properly use a specific tool seek help from the department supervisor or product manual.
General Safety Requirements

- Keep all tools in good condition with regular maintenance
- Use the right tool for the job
- Inspect each tool for damage before use
- Never use damaged tools (take damaged tools out of service immediately)
- Operate tools according to the manufacturers’ instructions
- Use the proper personal protective equipment (PPE)
- Compressed air shall not be used for cleaning
- Personnel should never use a tool if they do not know how to use it in a safe manner

Machine Guards

Refer to UAA EHS/RM Machine Guarding program for specifics on machine guarding. In general, if a tool is designed to be used with a guard, the guard must be in place while the tool is being used.

Hand Tool Safety

Hand tools includes a wide variety of tools that do not require additional power sources such as electric, hydraulic, compressed air etc. This group of tools includes many commonly found tools including hammers, screw drivers, wrenches, pliers, hammers and countless more.

Most often hand tool use incidents are a result of misuse or improper maintenance of the tool. To mitigate hand tool use hazards the following general precautions should be taken:

- Use tools only for their intended purpose
- Inspect tools for damage or wear prior to every use
- Be sure to use non-sparking tools in areas where flammables may be present
- Assess the hazards associated with the hand tool use and wear the appropriate PPE
- Do not use handmade tools for a job unless approved by the department supervisor
- When working at heights, never leave tools lying out in the areas where they could be knocked down to lower levels and become a hazard to workers below
- Never carry tools up a ladder by hand. Instead, use a bucket or bag to hoist tools from the ground to the worker
- When appropriate, secure work with a clamp or vise to keep it from slipping
Never carry pointed tools in your pocket. Carry them in a toolbox or cart instead.

While working with tools maintain a steady base and position yourself, so you do not fall or hit your knuckles in the event of tool slippage.

Maintain tools in good working condition
- Store tools in locations out of the elements away from other activity that could damage them
- Keep tools clean from dirt and grease
- Remove damaged tools from service immediately for repair or replacement

**Wrenches**

**Open-End or Box Wrenches**
- Ensure the wrench is the proper size to prevent slippage
- Never use with “sprung” or cracked jaws

**Adjustable Wrenches**
- Adjustable wrenches should not be used in place of an open end, box, or socket wrench
- Should be used for odd shaped bolts that do not fit a standard wrench
- Pressure should be applied only to the fixed jaw

**Socket Wrenches**
- Often the safest and best choice of wrenches
- Often better to use in hard to reach locations

**Pipe Wrenches**
- Ensure teeth/chains are not worn to prevent slippage
- Never use a cheater bar on the handle of a pipe wrench unless it is specifically designed for that purpose
- Do not use a pipe wrench on nuts and bolts to prevent wear of teeth or chain
- Pipe wrenches should never be struck with or used as a hammer

**Pliers**
- Pliers shall not be used as a substitute for a wrench.
Always check the teeth of a pliers to prevent slippage
The handles of electricians’ pliers are to be insulated

**Screwdrivers**
- Screw drivers shall not be used as punches, wedges, pinch bars, or pry-bars
- Cross-slot (Phillips head), Torx drive and Robertson screwdrivers are safer than the flat head type, because they have fewer tendencies to slip
- The tip must be kept clean and sharp to ensure a good grip on the head of the screw

**Hammers**
- Ensure hammers have a securely wedged handle suited to the type of head used
- The handle shall be smooth, without cracks or splinters, free of oil, and of the specified size and length for the task to be performed
- Ensure the area is clear before swinging a hammer to prevent hitting others
- Steel hammers should not be used on hardened steel surfaces
- Claw hammers should be used for driving nails as the claw is suitable for pulling nails
- Hammers with electrically insulated handles shall be used for work on or around exposed energized parts

**Cutting Tools/Knives**
- When using cutting devices always cut away from yourself and others
- Maintain cutting tool blades so the cutting edge is always sharp
- Knives should be carried with the blade safely closed, or in sheaths or holders
- In the event a knife cannot be sheathed or closed, the knife shall be carried in a manner where the blade is facing the floor
- Always store knives with the blade protected
- Never use a knife or blade for anything but the intended purpose

**Saws**
- Saws and saw blades should be selected for the task and material to be cut
- Saw handles should keep the wrist in a natural position
- A fine saw is better for smooth, accurate cutting when using dry wood
• Saws are to be kept sharp and well set to prevent binding
• Protect the teeth of a saw when not in use

**Portable Power Tool Safety**

The following safety rules are common to all power tools. In addition, each type of tool has its own unique hazards which must be considered.

• Read the owner’s manual to understand the tool’s proper applications, limitations, operation and hazards
• Protect yourself from electric shock by insuring that your tools are properly grounded; use a Ground Fault Circuit Interrupter (GFCI) for corded tools
• Always check for hidden wires that may contact bladed tools
• Avoid using electric power tools in wet environments
• Select a tool based on the task it is designed for. Only use attachments specifically recommended for your power tool and ensure that they are properly installed
• Inspect tools for damage including the cord, guards, alignment, binding of components or any condition that would affect the safe operation of the tool
• Avoid excessive force trying to make tools work faster
• Feed material at the rate at which the tool is designed to accept thus preventing excessive wear and decreased control
• Keep others away from the work area or provide shields to protect other employees from flying debris
• Always maintain tool control by keeping a tight grip on a tool
• Use the tool’s side handle, if available, for better control
• Always maintain your balance and do not overreach
• Do not operate a power tool if you are under the influence of medications or alcohol or if you are tired or distracted
• If possible secure your work in a vise or clamp for increased stability

**Electric Power Tools**

UAA personnel using electric tools must be aware of the additional hazards, including electrical burns and shocks. Even a small amount of electric current can result in fibrillation of
the heart and death.

To protect the user from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current-carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong must never be removed from the plug.

Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool. Double insulated tools and equipment will be clearly marked with the symbol shown in Figure 1:

![Double Insulation symbol](image)

Figure 1 Double Insulation symbol

The following general practices should be followed when using electric power tools:

- Operate electric tools within their design limitations
- Use gloves and appropriate safety footwear when using electric tools
- Store electric tools in a dry place when not in use
- Do not use electric tools in damp or wet locations unless they are approved for that purpose
- Keep work areas well lighted when operating electric tools
- Ensure that cords from electric tools do not present a tripping hazard
- During construction projects, employees who use electric tools must be protected by ground-fault circuit interrupters or an assured equipment-grounding conductor program
- Ensure properly inspected extension cords are used and are positions where they do not pose a trip hazard

**Electric Saws**

Electric power saws can include circular, table, saber, radial arm, miter, and band saws. The following are safe working procedures to be followed by UAA personnel when using
electric saws.

**Circular Saw** - A portable saw using a toothed metal cutting disc/blade used for cutting wood, metal and concrete depending on the blade being used.

- Portable circular saws with blades greater than 2 inches in diameter must be equipped at all times with guards
- An upper guard must cover the entire blade of the saw
- A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material
- The lower guard must automatically return to the covering position when the tool is withdrawn from the material being cut
- Saw depth should be adjusted to allow the blade no more than 1/8 inch below the material to be cut

**Table Saw** - Portable/semi-portable cutting tables with a fixed, toothed blade used when a stable work surface is needed for cutting longer lengths of wood and ensuring flush cuts.

- The blade on a table saw must be adjustable in height to allow the user to adjust the blade no more than 1/8 inch above the material to be cut
- Ensure the material set to be cut does not contact the blade when starting or stopping the saw
- Keep the body away from the saw
- Use a push stick to keep hands and fingers away from the cutting blade
- Guards covering the blade at all times should operate freely when the material to be cut is introduced to the saw blade
- When not in use, lower the blade fully below the tabletop to prevent inadvertent contact

**Saber Saw** - A portable reciprocating saw used to make custom cuts in wood or metal.

- Always select the blade appropriate for the material being cut
- Ensure the blade is sharp. Dull blades can present additional hazards
- Do not turn on the saw when the blade is in contact with the material to be cut. This may cause the tool to “jump” or chip the material to be cut
- Ensure the material to be cut is secure to prevent movement during cutting
• Keep hands and other objects free from the cutting area at all times

Radial Arm Saw - A semi portable saw equipped with a cutting table where the saw blade is above the table and moved along a rod to allow for flush cutting.

• The material to be cut should be placed firmly against the saw’s back guide
• The blade should rotate downward
• Pull the saw with one hand and hold the wood with the other, ensuring it is clear from the cutting area
• Never reach across the line of a cut
• Return the saw to the rear position after completing a cut
• Radial arm saws should be equipped with blade guards, which operate freely when contacting materials being cut

Miter Saw - Portable/semi-portable saw used to cut flush angles on materials with a pull-down blade.

• Miter saws use a downward cutting motion; therefore, keep hands and fingers well outside the cutting area
• Miter saws must be equipped with a blade guard, which must operate freely when the blade contacts the material to be cut
• Only use the manufacturer specified blade sizes and rpm ratings
• When changing saw blades ensure all bolts are adequately tightened and secured to the saw

Band Saw - A portable/semi-portable saw used for precision cuts on wood and metal with a rotating belt blade.

• Set the blade evenly and with the correct tension before cutting
• Push the cutting item through the blade with both hands on either side of the blade ensuring hands and fingers are clear of the cutting area
• Ensure guards are in place

Drills
Electric power drills are typically used to put holes in various materials including wood, metal, concrete and brick; and can be equipped with a hammer function.
• When operating a drill, use the proper size and type of bit for the job. Ensure the bit is sharp and not damaged
• Ensure the chuck is secured to the spindle. Tighten the bit securely as outlined in the owner’s manual. Remove the chuck key prior to starting the drill
• Ensure the handles are securely attached
• When drilling, brace the drill to prevent torque on the hands/wrists
• Never force a drill. Forcing a drill can cause the motor to overhead and damage the bit. Apply the appropriate pressure for the job. If the drill slows, relieve the pressure

Portable Abrasive Wheel Tools
Portable tools or grinders are used to grind, cut, polish, buff, etc. through a rotating wheel attached to the tool body, which typically generate large amounts of dust and particulates during cutting operations.
• Abrasive wheel tools must be equipped with guards that cover the spindle end, nut and flange projections; maintain proper alignment with the wheel; and do not exceed the strength of the fastenings
• Utilize handles on grinders and do not remove unless absolutely necessary to the grinding location. Removal of handles have resulted in wheel kickback and injury.
• Any damage or defects must be addressed prior to use
• To ensure cutting wheels are not cracked, tap with a non-metallic instrument. If the wheel sounds cracked or “dead” it could disintegrate during use and must not be used. A stable and undamaged wheel, when tapped, will give a clear metallic tone or “ring”
• Abrasive wheels must fit freely on the spindle. If a wheel is installed too tightly it may crack during use. Always follow the manufacturer’s instructions on wheel replacement
• Allow the wheel to reach optimal operating speed before conducting cutting, grinding, buffing, etc. operations
• Stand clear of flying particles coming from the tool during use if possible
• Turn off and unplug abrasive grinding tools when not in use
• Never clamp a grinding tool in a vise or to a surface to perform a function

Pneumatic Power Tools
Pneumatic tools are powered by compressed air and include chippers, drills, sanders, nailers, etc. Hazards associated with pneumatic power tools include noise, vibration and fatigue.
• Ensure the air hose is securely attached to the tool being used prior to activating
• Air hoses greater than 1/2 inch in diameter must be equipped with a safety excess flow valve to shut off the air automatically in case the hose breaks
• All pneumatic tools should be equipped with safety clips or other safety elements to prevent the release of tool parts during use
• Safety features of pneumatic tools must not be tampered with or altered in any way
• Pneumatic tools, which shoot nails, rivets, staples, or similar fasteners and operate at pressures above 100 psi, must be equipped with a muzzle safety feature to prevent fasteners from firing unless the muzzle is pressed against the materials to be fastened.
• Never pull the muzzle safety switch back manually to fire fasteners for any reason
• Pneumatic paint spray equipment must be equipped with safety switches to prevent accidental discharge of paint

**Liquid Fuel Powered Tools**

Fuel powered tools are typically powered by gasoline or gasoline/oil mixtures. Common hazards associated with gas powered equipment are handling flammable liquids/vapors and exposure to exhaust fumes.

• Fuel (fuel/oil mixtures) must be handled, stored and transported only in approved containers for flammable liquids
• When a fuel powered tool is used in an enclosed area, effective ventilation provided to avoid exposure to carbon monoxide
• Utilize only the manufacturer specified fuel when powering the equipment
• When refueling a tool or piece of equipment, ensure the motor is shut down and the engine is cool before refueling
• Fire extinguishers should be available wherever fuel powered tools are in use
• Cutting tools, such as chain saws or concrete saws, must be equipped with guards and/or safety switches to ensure safe use. Do not tamper with, or modify, safety features of fuel powered tools

**Hydraulic Power Tools**

Hydraulic power tools utilize pressurized lines filled with hydraulic fluid to provide the pressure. The fluid within hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be
exposed. Follow the manufacturer’s recommendations for safe operating pressures whenever using hydraulic power tools.

Hand-held power tools, powered by hydraulic lines must be equipped with a constant-pressure switch, or a control that shuts off the power when pressure is released. This includes drills, tappers, fastener drivers, angle grinders (with wheels greater than 2 inches in diameter), disc sanders (with discs greater than 2 inches in diameter), belt sanders, reciprocating saws, saber saws, scroll saws, jig saws and other similar tools.

Hydraulic jacks, including lever, ratchet, and screw jacks, must have a stop indicator, and the stop limit must not be exceeded. Load limits must be determined by the manufacturer and be marked on the jack. Load limits must not be exceeded. A jack should be used to raise a load, but not fully support a lifted load. Once raised, blocking should be placed firmly under the base of the load. To set up a jack:

- Place the base of the jack on a firm, level surface
- Center the jack correctly on the load
- Place the jack head against a level surface
- Apply the lifting force evenly
- Jacks should be lubricated regularly
- All jacks must be inspected regularly according to the manufacturer’s recommendations.

**Powder-Actuated Tools**

Powder-actuated tools, also called direct fasteners and explosive actuated fastening tools, use a small, controlled explosion to drive a nail, stud, or other specialized fastener into a solid base material such as steel, concrete, or masonry. Direct fastening systems, which include the powder-actuated tool, a magazine, fasteners, and cartridges, are designed for specific applications. The following apply when using powder actuated tools:

- Use the tool at right angles to the work surface
- Check the chamber to see that the barrel is clean and free from any obstruction, before using the tool
- Do not use the tool where flammable or explosive vapors, dust or similar substances are present
- Do not place your hand over the front (muzzle) end of a loaded tool
- Use only the projectiles (fasteners, nails, studs, etc.) recommended by the tool
manufacturer

- Ensure that the base material has no holes or openings and is of sufficient consistency to prevent a projectile from passing right through
- Do not load a tool until immediately before use
- Use only cartridges recommended by the tool manufacturer.
- Check that the color of the cartridge is appropriate for work being done. Charge cartridges are color-coded to show their strength
- Conduct a first trial by using the weakest or lowest strength charge cartridge
- Provide adequate ventilation in confined spaces where powder-actuated tools are used
- Hold the tool in the fixing position for no less than 5 to 15 seconds when a tool misfires. Keep the tool pointed in a direction that will not cause injury to you or others and unload a cartridge with extreme caution
- Use caution when using tools near live electrical circuits. Make sure that the nails (etc.) do not enter live circuits buried or hidden in the base material
- Keep cartridges in a lock up when not in use
- Do not attempt to force a cartridge into a tool
- Do not discard unfired cartridges carelessly
- Do not carry cartridges loose or in a pocket. Carry them in the manufacturer's package

10. Inspections

To ensure tools at UAA are maintained in a safe condition and workers to not use defective equipment the following inspections are required:

Prior to every use workers will visually inspect tools to ensure they are in proper working condition. There must be no missing or worn parts and be in good working condition.

If a tool has specific inspection requirements per manufacturer recommendations the inspection must be documented and performed as required. Inspection records must be maintained by the department and be available upon request.

11. Training

UAA shall provide a training program for each employee using tools as necessary.

The program shall enable each employee to recognize hazards related to tool use and shall train each employee in the procedures to be followed to minimize these hazards.
The employer shall ensure that each employee has been trained by a competent person in the following areas, as applicable:

- Recognition of the hazards associated with different types of tools and the safety precautions necessary for use;
- The PPE required during use; and
- The proper use of hand and powers tools and other hand-held equipment.
- Departments shall conduct training that is specific to the hand and power tools being used.

Retraining shall be provided for each employee as necessary if an accident occurs, new workplace hazards are identified, a near loss incident has occurred, or there is a change in the type of tools used, so that the employee maintains the understanding and knowledge acquired through compliance with this section.

12. Program Evaluation

The Hand and Portable Power Tool Safety program shall be evaluated on an annual basis utilizing the protocols set forth by EHS/RM. The evaluation team will consist of a department safety coordinator and a designee from EHS/RM. EHS/RM will define the scope of the evaluation. The final report will be developed by the EHS/RM utilizing the information received during the evaluation. The deficiencies determined in the report will be documented and corrective action plans will be developed.

13. References

OSHA regulations that apply to Hand and Portable Power Tool safety are included below.

- 29 CFR 1910.241
- 29 CFR 1910.242
- 29 CFR 1910.243
- 29 CFR 1910.244
- 29 CFR 1910.266
- OSHA Publication 3080 – Hand and Power Tools
- OSHA – Safeguarding Equipment and Protecting Employees from Amputation
14. Revision History

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