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HAND AND POWER TOOLS

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PFI Hand and Power Tools Best Practice

Introduction

Hand and power tools are used everyday in our shops. These tools help us to easily perform tasks that otherwise would be difficult or impossible. However, these simple tools can be hazardous and have the potential for causing severe injuries when used or maintained improperly. It is important to always follow manufacturer recommendations, inspect tools, and use tools with proper guards, handles, and other supplied accessories.

Another factor to consider when using hand and power tools in the shop is to evaluate your work and work area for hazards. Take time through out the day to ensure that you have the right tool for the task. In addition, focus awareness on the changing work activities around you.

It is the companies and users responsibility to ensure that all regulatory and/or any tool manufacturer operating instructions are followed with regard to the use of any hand and power tool.

Personal Protective Equipment

Regulatory agencies require employers perform a hazard assessment for the work being performed and select the appropriate PPE for the task as identified by the hazard assessment.

The type of personal protective equipment (PPE) you need when using hand and power tools depends on the tool being used. At a minimum, eye protection in the form of safety glasses must be worn at all times. In addition, if the tool being used creates any type of flying debris utilize a face shield in addition to safety glasses.

It is also important to protect your hands from cuts, abrasion and repeated impact. Cut-resistant gloves can help protect against the effects of a sharp objects. Leather welding gloves protect against hazards associated with hot work. And chemical resistant gloves are designed to offer protection from various chemicals used in shop environments. On jobs that require long periods of hammering, impact-resistant gloves with gel or rubber palms can reduce vibration.

Safety shoes with a reinforced toe can help protect your feet from injury caused by a dropped tool. Safety footwear come in a variety of styles and are widely available. Choose footwear that offers adequate traction for your work site.

Hearing protection is recommended when using any hand and power tools where potential exposure is above 85 dBA over an 8 hour TWA (time weighted average).

HAND TOOLS

Wrenches

Wrenches come in an endless variety of styles such as socket, open-end, combination, adjustable and torque, to name a few. Wrenches are designed to turn or hold bolts, nuts or multiple-threaded fasteners. They are sized to keep the leverage and load in an acceptable balance.

- Choose a wrench that properly fits the fastener you wish to turn. Use metric wrenches for metric bolts and American inch wrenches for inch-sized bolts; by using the correct size, the wrench is less prone to slip or round off the fastener corners.
- Avoid using an extension to improve the leverage of a wrench
- Do not use open-end or adjustable wrenches for final tightening or loosening frozen fasteners—These wrenches do not have the strength of a box-end or socket wrench
- Apply penetrating oil on frozen fasteners before using a striking face box, socket or heavy-duty box wrench
- Do not expose a wrench to temperatures that could weaken tool hardness
- Always try to pull on a wrench (instead of pushing) in case the fastener loosens
- Adjustable wrenches must be adjusted tightly to the fasteners and then pulled, putting the force on the fixed end
- Turn power off and use electrically insulated wrenches when working on or around electrical components
- Never alter a wrench
- Do not over torque a fastener—Use a torque wrench to tighten the fastener to the exact torque required.
- Inspect wrenches periodically for damage, such as cracking, severe wear or distortion
- Always use nonsparking wrenches when in the presence of flammable vapors or dusts

Pliers

Pliers come in all shapes and sizes, such as lineman, diagonal cutting, needle nose, slip joint, locking tongue and groove (channel locks). Plier uses include gripping, cutting, turning and bending. Pliers are a versatile tool, but must be used according to how they are designed.

- Do not increase a pliers handle length to gain more leverage, instead choose larger sized pliers

- Never subject pliers to temperatures that could decrease tool hardness
- Do not substitute pliers for a wrench when turning nuts and bolts
- Be sure the pliers' jaws can grasp properly when bending rigid wire
- Do not hammer with pair of pliers
- Cut wire at right angles without bending wire back and forth against the cutting edge of a pliers
- Always use non-sparking pliers when in the presence of flammable vapors or dusts

Hammers and Striking Tools

Hammers are one of the most used tools in our tool boxes. Nail, soft-face, ball-peen, chipping, sledge and setting are just a few of the hammers we use in the workplace. Many hammer types are specific to a particular industry. Each kind of hammer has a head that is tailored to work best for a particular application. Hammer handles are now made stronger, ergonomically shaped and transmit less shock to the user.

- Always use a hammer of the proper weight and size for the task
- Do not strike the surface at an angle—the hammer face should contact the striking surface squarely, so the two are perpendicular.
- Do not use a hammer if the handle is damaged or loose
- Use a hammer face that is 3/8" larger in diameter than the striking tool.
- Never weld, heat or regrind a hammer head
- Remove from service any hammer exhibiting signs of excessive wear, cracks, mushrooming or chips
- Do not use a hammer to strike another hammer.
- Do not use the wrong hammer for the job, match the proper type of hammer to the task it is designed to perform
- Always use non-sparking hammers in the presence of flammable vapors or dust

Screwdrivers

Screwdrivers are intended for turning a variety of threaded fasteners, such as machine or wood screws, in or out of materials. Screwdriver tips come in a variety of different shapes and sizes. The slotted and Phillips tips are the most common, however, torx, hex, square and various others are also used. It is important to match the type of screwdriver you use to the type of job you're doing.

- Never use a screwdriver as a pry bar, chisel, punch or scraper
- Always use a screwdriver tip that properly fits the head of the screw
- Throw away screwdrivers with broken or worn handles
- Never expose screwdrivers to temperatures that could reduce tip hardness

- Turn power off and use electrically insulated screwdrivers when working on or around electrical components
- Never use pliers on a screwdriver for extra leverage
- Use magnetic or screw-holding screwdrivers to start fasteners in tight areas
- Use both hands when using a screwdriver—one to guide the tip and the other to turn the handle. Final tightening requires both hands on the screwdriver handle
- Always use non-sparking screwdrivers in the presence of flammable vapors or dusts

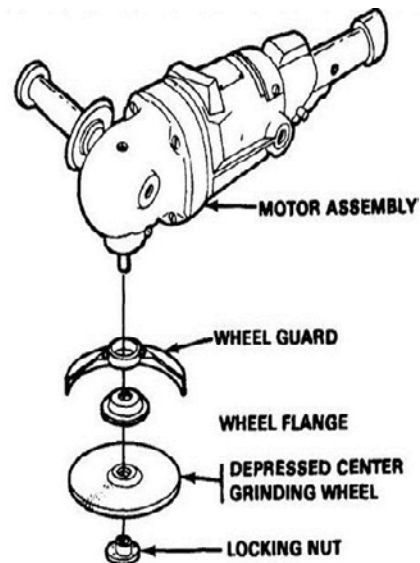
POWER TOOLS

Grinders

Like all power tools, portable grinders can present safety concerns, including flying particles and electrical hazards.

1. Preparation

- Remove flammable materials from the work area.
- Ensure work area is clean, free from slip, trip, and fall hazards and well maintained.
- Keep the power cord away from the grinding wheel and the material being ground.
- Have personnel not involved in the immediate work step away a safe distance from the grinding area.
- Secure work with clamps or a vice to free both hands to operate the tool.



2. Inspection

- Unplug power cord from power supply before inspecting, adjusting, removing or replacing parts.
- Ensure wheel guard and handle is in place.
- Check abrasive wheel for cracks or flaws – replace if necessary.
- Verify the maximum RPM rating of the grinder does not exceed the RPM rating on each abrasive wheel.
- When using a grinder that can switch between left-handed and right-handed operation, remember to move the blade guard when you move the handle.

- Tag out grinder if a deficiency is found – do not use grinder until the deficiency has been corrected.

3. Ring Test

- Before installing an abrasive wheel, visually inspect it for cracks or flaws and perform a **“Ring Test”**:
 - Place your finger through the mounting hole of the new abrasive wheel.
 - Lightly tap its face with a hammer or metallic object.
 - A “ring” will sound from a good wheel.
 - A “dull thud” will sound from a wheel with an internal fracture.

4. Replacing the Wheel

- The abrasive wheel should not be forced onto a grinder nor should the mounting hole size be changed. To control cracking of the abrasive wheel, it must fit freely on the spindle and be tightened to hold the wheel in place without distorting the flange.
- The mounting nut should not be tightened excessively.
- Run a newly mounted wheel at operating speed for 1 minute before grinding.

5. Wear required Personal Protective Equipment (PPE)

- Recommendations contained here are in addition to the PPE mentioned in the introduction section of the document
- Respiratory protection may be required depending on the work being performed.
- Do not wear jewelry or other items that could become entangled in moving parts.
- Avoid wearing loose clothing or secure loose clothing.
- Tuck or secure long hair.

6. Switch Grinder “ON”

- Ensure you have an adequate grip on the grinder. Grinders are designed to be a two-handed tool.
- Stand to one side and switch on grinder.
- Ensure the grinder operates smoothly and does not vibrate. **If you notice any unusual vibrations or noises, STOP. Re-inspect the grinder and fix the problem immediately.**

7. Grinding

- Use both hands to maintain hold of the grinder.
- Allow grinder to reach full rpm before grinding.
- Position yourself to avoid overreaching.
- When grinding avoid placing excessive pressure on abrasive wheels.

- Do not grind objects on sides of grinding wheels.
- Materials may become hot when grinding. Ensure task appropriate gloves are being worn.
- Clean and service grinders according to manufacturers' recommendations.
- Ensure the floor around the work area is clean.
- Do not use wheels that are cracked or those that excessively vibrate.
- Do not operate grinder on wet floors.

8. Switch Grinder “OFF”

- Switch off grinder when done.
- Wait until the wheel has stopped turning before setting it down.
- Unplug the power cord from the power supply.
- Clean area and dispose of grinder particles.

9. Other Precautions:

- Do not use liquid coolants with grinders as this may cause the metal to shatter.
- Do not clamp portable grinders in a vise for grinding hand-held work.
- Do not carry a grinder by the power cord.
- Do not pull on the power cord to disconnect it from the power supply.
- Keep cords away from heat, oil and sharp objects or edges.
- Ensure fire extinguisher is located within 25 feet of hot work activity

Band Saws

After you have determined that a band saw is the right tool, determine if you have the right blade.

- Use sharp blades. Damaged or dull blades could throw teeth, posing a serious injury risk. A sharp blade will tend to cut its way out of a pinching condition.
- When installing or changing a blade, be sure the blade is aligned properly and the teeth are running in the right direction. Check blade tension regularly and carefully. This helps prevent blade breakage.
- Be sure the blade is properly seated on the pulleys of the band saw before starting.
- Use clean blades. Buildup on the surface of the blade increases blade thickness and also increases blade friction.

1. Understand the Workpiece

- Take time to review your work and make sure that all necessary precautions have been taken before making a cut.
- Support work piece properly before cutting. Not doing so will increase the risk of binding the blade.

- Always place the workpiece securely in a vise or clamp when making cuts. Never make freehand cuts.
- Never try and remove or clamp the workpiece while the blade is rotating.

2. Before Cutting

- Make sure the bandsaw and its accessories are in proper working order. Failure to do so can increase the risk of injury and result in blade pinching, binding or stalling, and loss of control.
- Make sure the blade has adequate blade set. Blade set provides clearance between the sides of the blade and the workpiece, minimizing the probability of binding.
- Be sure all guards are in place and working properly before each use.
- Never attempt to cut material larger than the rated capacity listed in the operator's manual.
- Always check maximum operating speeds established for blades against band saw speed.

3. While cutting

- Concentrate on the task at hand and be aware of kickbacks. Take these specific precautions to help prevent kickback when using any type of band saw:
- Never overreach. Always hold the saw firmly with both hands after securing the workpiece.
- When you start the saw, allow the blade to reach full speed before contacting the workpiece.
- Keep hands and fingers away from all cutting edges and moving parts.
- Never remove the saw from a cut while the blade is rotating. When making a partial cut, release the switch immediately and don't remove the saw from the workpiece until the blade has come to a complete stop.
- Switch the tool off after a cut is complete, and keep the saw away from your body until the blade stops.
- Overheating a saw blade can cause it to warp and result in kickback. Insufficient blade set, dullness, and unguided cuts can all cause a blade to overheat.
- Do not bear down on the blade while cutting. The weight of the band saw is adequate pressure for the fastest cutting. Too much pressure will slow down the speed of the blade and reduce cutting efficiency.

Reciprocating Saws

After you have determined that a reciprocating saw is the right tool, determine if you have the right blade.

- Use sharp blades. Dull blades can produce excessive heat, make cutting difficult, resulting in the operator forcing the saw, and potentially leading to

an incident.

- When changing blades, be sure the spindle and blade clamp areas are clean. Metal chips may prevent the blade from being held securely.
- Blades can break. Use the blade and accessories recommended for the job being done. Be sure to reference the operator's manual.
- To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job but will extend beyond the workpiece throughout the stroke
- When cutting metal, choose a blade that will allow for at least three blade teeth to be in the material at all times.
- Use clean saw blades.

1. Understand the Workpiece

- Know what is behind a workpiece before you do the job. Do not cut into blind areas where electrical wiring, water or other piping exists. If it is necessary ensure that the energy source is isolated and in a safe manner before proceeding with a cut.
- Support large workpieces so they will not pinch the blade.
- Avoid cutting small pieces that may not be secured properly.
- When possible, avoid cutting overhead.

2. Before Cutting

- Unplug the saw before making any adjustments or changing the blade.
- Check blades carefully before each use.
- Ensure the blade has been set properly. This will minimize binding.
- Make sure the tool switch is working properly. If not tag the tool and remove it from service until it may be repaired.

3. While Cutting

- Position yourself so full control of the saw can be maintained.
- Keep hands clear of the blade at all times.
- Clamp workpieces securely.
- Never hold workpiece with your hands or across any part of your body.
- Do not overreach to make a cut.
- When starting the saw allow the blade to reach full speed before beginning the cut.

Drills

Drills are one of the most widely used power tools in the world. They are used to drill holes and drive fasteners into a wide variety of materials. Choosing the right tool and accessories can reduce the risk of incident.

- Ensure your bit has the appropriate shank for the tool (Hex, Round, etc.)
- Ensure the size of the bit is equal to or less than the capacity identified on

the tool

1. Before Drilling

- Check that the trigger is working properly.
- Check the cord and plug. For grounded tools, equipped with a three-prong plug, ensure that the ground prong is in good condition.
- Ensure the chuck is tightly secured to the spindle.
- Tighten the bit securely in the chuck. Remove chuck keys or wrenches before starting the drill.

2. While Drilling

- Firmly grasp the trigger handle and auxiliary handle (if provided) to maintain control.
- Understand that in a binding situation, the tool will react in the opposite direction of turning bit.
- Never force the drill. Apply enough pressure to keep the bit cutting, fastening or chipping smoothly.
- Ensure the drill is in a perpendicular position to minimize the risk of bit breaking.
- If the bit binds in the work piece, release the trigger immediately. Unplug the tool, and then free the bit from the work piece. Do not try to free a jammed bit by starting and stopping the tool
- Always keep firm footing while using a power tool.

Drill Press

1. Before Drilling

- Make sure that the tool and all accessories are in proper working order. This includes:
 - Belt guards are installed and working
 - Chuck is tightly secured to the spindle
 - Bits are tightly secured in the chuck and chuck keys or wrenches are removed.
 - Set the drill press speed appropriately for the type of material and the bit size being used

2. While Drilling

- Use recommended cutting fluid as applicable
- Never reach around or under the working head, or grab the chuck to stop the drill press. This can result in serious injury.
- Don't force the drill press. Always use the tool at the intended speeds.
- Reduce pressure and allow the bit to pass through the hole easily as the bit gets toward the bottom of the work piece.
- If the bit binds, release the on/off switch immediately. Unplug the tool, then free the bit from the work piece.