

CAES TOOL GOOD PRACTICES AND EXPECTATIONS

Hand Tools: A core set of hand tools are available in each CAES Laboratory for use by CAES researchers. Researchers, technicians, and students under their supervision routinely use hand tools to set up, adjust, and maintain experiments. Hand tools include only manually applied or actuated tools with the exception of a cordless pistol drill. To ensure CAES research is conducted productively and safely, CAES provides certain tools and guidance for their use.

- CAES-purchased tools are not to be stored in a locked cabinet
- Specialty tools will be procured by individual programs or projects as needed. These tools are subject to inspection and surveillance by CAES.

Use of these tools is common place for most people and when used properly present no significant hazards to the user.

However, these same tools when used improperly or used in faulty condition can seriously injure users. CAES researchers are expected to be mindful of the proper use of hand tools and to ensure they are in proper working condition prior to their use. Maintaining an acute awareness of how you use these tools is the primary means of avoiding injury to you and your colleagues.

The information below is provided as a reminder of when and how to use some of the core hand tools provided for CAES researchers. Adherence to these practices is expected. We also ask that you demonstrate caring about your colleagues -- if you observe them improperly using hand tools, remind them about how and when tools should be used so we can all go home the same way we came to CAES. If you are unsure about how to use a tool then ask one of your colleagues, your principal investigator, the laboratory lead or a CAES Safety person.

Power Tools: Power tools are tools energized by any energy source including electric, pneumatic, hydraulic, or combustible gas. CAES purchases and controls access to all power tools which are stored in the Instrument Repair Shop (IRS, room 115). These power tools are shared in "common," but access is controlled by the IRS Lab Lead or his or her designees.

Power tool selections are forwarded by any Lab Lead to the IRS Lab Lead as needed.

- CAES power tool users will demonstrate familiarity with their use by completing an on-line "read-and-sign" exercise based on the tool manufacturer's safety manual.
- The IRS Lab Lead or his or her designees will provide just-in-time power tool training as needed.

Many accidents result from improper use of tools and use of defective tools and equipment. Supervisors will assure that employees use only tools and equipment which are in good condition and for the purpose for which they are designed. Where proper and safe tools are not available for the work on hand, the employee is required to report the facts to the supervisor.

1. Tools which develop defects while in use will be removed from service, tagged, and not used again until they have been reconditioned.
2. Impact tools such as chisels, drills, hammers, and wedges with mushroom heads will not be used until they have been reconditioned.
3. Hammers, axes, shovels, and similar tools will not be used if the handles are loose, cracked, or splintered.
4. Defective wrenches, such as open end and adjustable wrenches with spread jaws or pipe wrenches with dull teeth, will not be used as they are likely to slip.
5. Sharp edged or pointed tools will have the edge or point guarded at all times when not in use.
6. Files or other tools with pointed edges will be equipped with suitable handles. Files or other tools with pointed edges will be equipped with suitable handles.

Specific Hand Tools

Wrench

- a) Be sure wrench is adjusted to fit tightly or is the correct size, open end or box wrenches.
- b) Pull; don't push, when using a wrench.
- c) Don't tighten a nut or bolt too much. You may strip the threads or snap the bolt.
- d) When stooping and using a wrench or when using a large wrench on heavy work, brace yourself to avoid slipping or being thrown off balance. When using a wrench while lying on your back, don't let it slip and hit your face.
- e) Never hit a wrench with a hammer unless the wrench is made for striking.
- f) Don't use a pipe or other wrench extension on a wrench handle to increase leverage. This often causes stripped threads, broken bolts, sudden loosening of nuts or bolts, slipping of the pipe from the wrench and broken wrenches and fingers.
- g) When pulling on a wrench above you, stand out of its line.
- h) Place wrench so that the force will be on the stationary jaw.

Screwdriver

- a) Don't use screwdrivers with broken or rounded points or bent shafts.
- b) When using a screwdriver, place work on a solid object; never hold it in the palm of your hand.
- c) Keep the screwdriver shank directly over the screw head.
- d) Never use pliers or wrenches on the shanks of screwdrivers unless they are a type especially designed to withstand the strain.

Saw

- a) Use each type of saw only for the purposes for which it is intended.
- b) Start the cut carefully so the saw will not jump and strike you.
- c) Be sure that the materials to be cut are firmly supported or secured. When sawing horizontally, cut on the side opposite the direction in which you want the cut off parts to fall.

Chisel

- a) Hold the chisel in your fingers with a steady but a relaxed grip. Keep your eyes on working area.
- b) Clamp small pieces in a vise before chiseling them. Chip toward the stationary jaw of the vise. Chip away from yourself.
- c) Wear goggles when chipping.

Punching

- a) Keep the points of center punches round and the faces of starting and pin punches square.
- b) Don't use center punches on materials hard enough to dull or shatter the points.
- c) Be sure punches are held firmly in position before striking, especially on round surfaces.
- d) Strike lightly at first, and then increase the force.

Files and Rasps

- a) Cut only in the forward direction. Ease pressure on the backward stroke. When teeth become clogged, clean them with a file card (a brush with short, stiff wire bristles).
- b) When storing files or rasps in tool boxes, wrap each tool with cloth or paper.
- c) Don't use file and rasps on materials that are too hard or soft. Hard objects wear the teeth smooth. Soft objects clog the teeth. Smooth cutting faces may cause the tool to slip suddenly and injure you.

Hacksaw

- a) Place the blade in the frame so the teeth point toward the end of the frame and away from the handle. Tighten the blade rigidly.
- b) Cut away from yourself and saw with straight, long strokes, using almost the whole blade.
- c) Ease pressure on the backward stroke.
- d) Judge cutting speed by the hardness of the metal. 40 to 50 strokes per minute is right for metals of average hardness. A faster rate may ruin the blade.
- e) Don't saw objects that are too hard. Test objects for hardness with the front or rear end of the blade.

Pliers

- a) Use pliers only when no other tool will do the job.
- b) Don't use pliers as wrenches.
- c) Use cutting pliers only for cutting soft metals, never on hardened metals or as nail pullers.
- d) When cutting wire that is under tension, protect yourself so the wire can't fly and strike you.
- e) When cutting wire in rolls and on bales, loaded cars, trucks, boxes, use long handled wire cutting pliers.

Hammer

- a) A hammer is unsafe to use if it has a split handle or a loose or chipped head.
- b) Claw hammers are designed for driving and drawing nails. Their shape, depth of face, and balance make them unsuitable for striking objects such as cold chisels.

Cordless Drill

- a) Prevent unintentional starting. Ensure the switch is in the off position before connecting the battery pack, picking up or carrying the tool.
- b) Carrying tools with your finger on the switch or energizing tools that have the switch on invites accidents.
- c) Remove any adjusting key or wrench before turning the tool on. A wrench or a key left attached to a rotating part of the tool may result in personal injury.

- d) Do not overreach. Keep proper footing and balance at all times. This enables better control of the tool in unexpected situations.
- e) Do not wear loose clothing or jewellery. Keep your hair, clothing and gloves away from moving parts. Loose clothes, jewellery or long hair can be caught in moving parts.
- f) Do not force the tool. Use the correct tool for your application. The correct tool will do the job better and safer at the rate for which it was designed.
- g) Do not use the tool if the switch does not turn it on and off. Any tool that cannot be controlled with the switch is dangerous and must be repaired.
- h) Disconnect the battery pack from the tool before making any adjustments, changing accessories, or storing the tool.
- i) Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the tool's operation. If damaged, have the tool repaired before use. Many accidents are caused by poorly maintained tools.
- j) Keep cutting tools sharp and clean. Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
- k) Use the tool, accessories and tool bits, etc. in accordance with manufacturer's instructions, taking into account the working conditions and the work to be performed. Use of the tool for operations different from those intended could result in a hazardous situation.
- l) Use clamps or another practical way to secure and support the work piece to a stable platform. Holding the work by hand or against your body leaves it unstable and may lead to loss of control.
- m) Accessories and tool may get hot during operation. Wear gloves when handling them if performing heat producing applications.
- n) Air vents often cover moving parts and should be avoided. Loose clothes, jewellery or long hair can be caught in moving parts.
- o) **BATTERY USE AND CARE**
 - Recharge only with the charger specified by the manufacturer. A charger that is suitable for one type of battery pack may create a risk of fire when used with another battery pack.
 - Use tools only with specifically designated battery packs. Use of any other battery packs may create a risk of injury and fire.
 - When battery pack is not in use, keep it away from other metal objects like paper clips, coins, keys, nails, screws, or other small metal objects that can make a connection from one terminal to another. Shorting the battery terminals together may cause burns or a fire.
 - Under abusive conditions, liquid may be ejected from the battery; avoid contact. If contact accidentally occurs, flush with water. If liquid contacts eyes, additionally seek medical help. Liquid ejected from the battery may cause irritation or burns.