

# **Robotics Unit**

## **Safety Guidelines When Working With Tools**

**(Excerpted From Materials Distributed For Teachers -  
Toronto District School Board)**

**Wrenches**

**Hammer**

**Pliers**

**Screwdrivers**

**Utility Knife**

**Power Drill**

**Clamps and Vises**

**Snips**

### **Wrenches**

#### **Personal Protection Equipment (PPE) Requirements**

- Eye protection
- Gloves where necessary
- Apron where necessary

#### **Operating Procedures**

- A wrench is for turning things – do not use a wrench for other tasks.
- The user should always be braced to maintain balance and keep from being injured in case the wrench slips.
- Always inspect a wrench for flaws, damaged parts, or wear that can cause it to slip and damage fasteners.
- Where possible, use penetrating oil to loosen nuts and bolts.
- Always grip the wrench so it will not cause injury if it slips.
- Use the correct type of jaw to avoid slippage
- Never overload a wrench by using a pipe extension on the handle or by striking the handle with a hammer (special striking wrenches are available).
- When using a wrench always pull on the wrench – never push.

#### **Specific Instructions and Hazards**

- There are hazards with all types of wrenches: the wrench may slip off the work, the work piece may suddenly turn free, wrench or work piece may break.
- Muscle strain from poor posture/stance/grip during use of tool.
- Impact injuries from slipped wrench, causing hand to strike foreign material.
- Eye injuries from debris flying off of fasteners (particularly when positioned underneath the work piece).

# **Hammer**

## **Personal Protection Equipment (PPE) Requirements**

- Eye protection (mandatory at all times)
- Safety gloves (if necessary)

## **Operating Procedures**

- Wear safety glasses.
- Make sure the hammer is in good condition so that the handle will not splinter or the head fly off.
- Strike the surface squarely.
- Never use a claw hammer on hardened metal (chisels, punches).
- Watch the head of the nail, not the hammer.
- Look behind and above before swinging the hammer.
- Never use a hammer to strike another hammer.
- Rest your arm occasionally to avoid tendonitis.
- Concentrate on the work being done – inaccurate hammering can cause serious crushing injuries to fingers hit accidentally.

# **Pliers**

## **Personal Protection Equipment (PPE) Requirements**

- Eye protection
- Gloves where necessary

## **Operating Procedures**

- Choose pliers with enough space between the handles to prevent pinching of the palm or fingers.
- Pull on pliers – do not push.
- Don't use pliers as hammers – they might crack or break.
- Don't use cheaters to extend the handles – this can damage or spring the tool.
- Pliers should not be used to tighten nuts or bolts – use a wrench.

## **Specific Instructions and Hazards**

- Muscle strain from poor posture/stance/grip during use of tool.
- Impact injuries from slipped pliers, causing hand to strike foreign material.
- Side cutting pliers may cause injuries when ends of wire are cut and fragments fly off.
- Pliers used for electrical work should be insulated – cushion grips on handles are for comfort only and are not intended to protect against electrical shock.

# **Screwdriver**

## **Personal Protection Equipment (PPE) Requirements**

- Eye protection
- Safety gloves

## **Operating Procedures**

- Use the correct size screwdriver bit to match the screw head.
- Never use a screwdriver as a pry bar – it will damage the shaft of the tool and render it useless.
- Always make a pilot hole before driving a screw.
- Never get any part of your body in front of the screwdriver.
- Never hold the work in your hand while using screwdriver – use a vise, or at least a solid surface.
- Keep handles clean to prevent slippage.
- Start with one or two “soft” turns with the fingers of your free hand holding the screw, then remove for remainder of screw (you may also choose to keep free hand on shaft of screwdriver to help keep it seated and straight).
- Pass the screwdriver by holding the blade securely. Receiver accepts the handle.

## **Specific Hazards**

- Puncture wound from slipping off the head.
- Repetitive strain injury (tendonitis).
- When working around electricity, use screwdrivers with a handle insulated with dielectric material (keep in mind that this is only a secondary precaution – ensure electrical power is off before beginning work).

# **Utility Knife**

## **Personal Protection Equipment (PPE) Requirements**

- Eye protection
- Gloves where necessary

## **Operating Procedures**

- Advance the blade out of the housing only as far as necessary (snap dull blades off properly, as necessary, discarding safely).
- Use the blade locking mechanism on the knife to prevent it from slipping while in use.
- Keep your hands away from the front of the cutting edge when working.
- Cut away from your body – not toward it.
- Retract the blade fully into the housing before putting the tool away, particularly in a toolbox.

## **Specific Hazards**

- Cutting injuries from the exposed sharp blade.

# **Power Drills**

## **Personal Protection Equipment (PPE) Requirements**

- Eye protection
- Apron
- Face protection where necessary

## **Operating Procedures**

- Proper eye protection is essential.
- Material being drilled should always be clamped or well secured to prevent spinning should the bit bind in the hole.
- Always clamp small pieces when drilling them to prevent them from slipping.
- Always be sure the switch is off before plugging in the tool.
- Make sure the shank of the attachment is tight and square in the chuck and running true
- before starting the drill.
- For drills with a dual-gearbox, use the fast setting for boring holes; use the slow setting
- for driving screws.
- Drill a pilot hole in the work so that the bit won't slip or slide when you start drilling.
- Remember that friction builds up in the tip of drill bits and other cutting attachments – avoid contact that could result in a serious burn.
- When drilling into floor, ceilings, and walls, beware of plumbing and wiring.
- While drilling deep holes, especially with a twist bit, withdraw the drill several times with the motor running to clear the cuttings.
- When drilling a through hole, be sure to attach a piece of scrap wood to the exit side of the work piece.
- Never drill through cloth – it will twist around the bit.
- Never support material on your knee while drilling – use a bench or other work surface.
- Never use a bit with a square or tapered tang in an electric drill – the drill's chuck will not
- hold this type of bit securely.
- Unplug the drill and remove the bit as soon as you are done with the work.

## **Specific Hazards**

- Muscle strain from poor posture/stance/grip during use of tool.
- Electric drills can cause various accidents and injuries, including cuts, gashes, puncture wounds, burns, and eye injuries from flying particles or broken bits.

# **Clamps and Vises**

## **Personal Protection Equipment (PPE) Requirements**

- Eye protection
- Apron

## **Operating Procedures**

- Use the appropriate clamp for the job, and use it as intended.
- Choose a clamp suited to the size of the job.
- To stabilize work for certain cutting operations, use more than one clamp.
- Mount vise securely.
- Keep work close to jaws.
- Keep vise cleaned, oiled.
- Support extra long work.
- Prop very heavy work in vise with wood blocks to prevent it from falling and causing injury.
- Don't open jaws beyond their capacity – the moveable jaw may fall, causing injury or damage.

## **Specific Hazards**

- Clamps create pinch-points: be sure to keep all fingers and clothing free and

# **Snips**

## **Personal Protection Equipment (PPE) Requirements**

- Eye protection
- Gloves
- Apron

## **Operating Procedures**

- Wear eye protection.
- Keep snips clean and well maintained, including sharpening the blades when necessary.
- Use the right tool for the job – snips are only meant to cut relatively thin, soft material.
- Follow the procedures for making straight, curved and notch cuts.

## **Specific Hazards**

- Muscle strain from poor posture/stance/grip during use of tool.
- Impact injuries from slipped pliers, causing hand to strike foreign material.
- Snips may cause injuries when ends of material are cut and fragments fly off .
- Be careful at cutting edges of material – snips can create razor-sharp conditions, as well as pointed spear-tips.