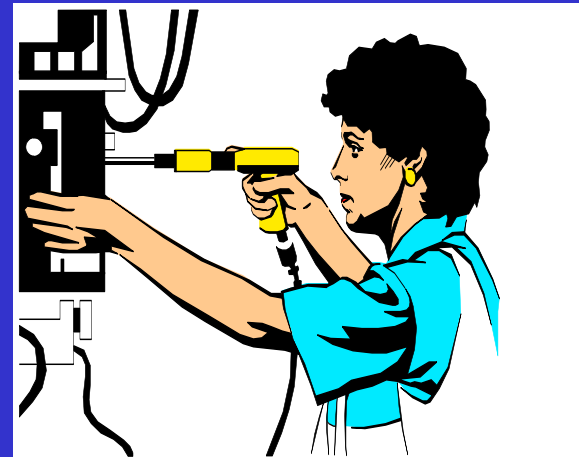


Hand and Power Tool Safety



Class Objectives

Describe general guidelines for hand and power tool safety.

Describe important hand and power tool basics.

Describe correct steps for proper tool maintenance and handling.

Identify personal protective equipment for using hand and power tools.

Describe safety procedures for point of operation safety.

Describe general guidelines for proper hand tool safety.

Describe general guidelines for proper electric tool safety.

Describe general guidelines for proper abrasive wheel tool safety.

Describe general guidelines for proper pneumatic tool safety.

Describe general guidelines for proper fuel and hydraulic tool safety.

Describe ergonomics in relation to tool use.

Just the Facts

The Occupational Safety and Health Administration states that most injuries on construction sites involve excavation cave-ins, **power tool accidents**, falls, electrical hazards, and exposure to potentially dangerous materials

Working with power tools, you can get an electric shock, lose a finger, lose an eye, or go deaf. It's especially dangerous to use a tool that's defective, that's been modified, or that's not designed for the job. Of course, you can also get injured if you use any tool carelessly.

Regulations and Guidelines for Hand and Power Tools

For General Industry

- **1910 Subpart P, Hand and Portable Power Tools and Other Hand-Held Equipment.**
- **1910.241, Definitions.**
- **1910.242, Hand and portable powered tools and equipment, general.**
- **1910.243, Guarding of portable powered tools.**
- **1910.244, Other portable tools and equipment.**

OSHA Publication 3080

Hand and Power Tools (2002 revised)

Great reference that can be saved or printed for your use

<http://www.osha.gov/Publications/osha3080.pdf>

What the Regulations say about Hand Tools

- Everyone shall not issue or permit the use of unsafe hand tools
- Wrenches, including adjustable, pipe, end, and socket wrenches shall not be used when jaws are sprung to the point that slippage occurs
- Impact tools, such as drift pins, wedges, and chisels, shall be kept free of mushroomed heads
- The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool

Hazards

Workers using hand and power tools may be exposed to these hazards:



- Objects that fall, fly, are abrasive, or splash
- Harmful dusts, fumes, mists, vapors, and gases
- Frayed or damaged electrical cords, hazardous connections and improper grounding
- Vibration and impact

What do you think are the most common injuries from working with hand and power tools?

- Electric shock
- Flash burns
- Falling
- Hand and Eye injuries
- Hearing loss
- Crushing, cuts or losing a body part
- Ergonomic injuries

Basic Tool Safety Rules

- Maintain regularly
- Inspect before use
- Use the right tool for the job
- Operate according to manufacturers' instructions
- Use the right Personal Protective Equipment (PPE)
- Use guarding

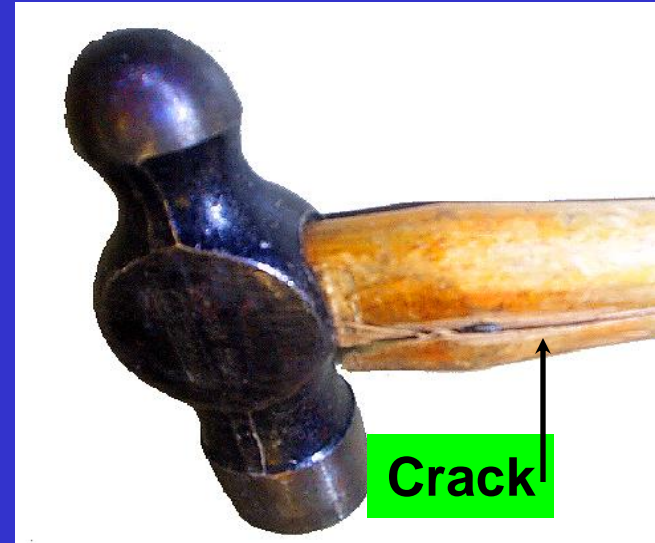


Hand Tool Hazards

Hazards are usually caused by misuse and improper maintenance

Do not use:

- wrenches when jaws are sprung
- impact tools (chisels and wedges) when heads have mushroomed
- tools with loose, cracked or splintered handles
- a screwdriver as a chisel
- tools with taped handles – they may be hiding cracks



Cutting and Slicing Tools

(Knives, Box Cutters, Scissors, Razor Blades, etc...)

Safety Gloves – Protection against accidental cuts and vibration

A Sharp Blade Is Safer – When dull, a blade can slip from the object being cut and cause a serious injury.

Cut Downward – Always away from your hand.

Put It Back – Never leave a cutting tool lying on a table, chair, sink or desk. There are only three places that a cutting tool should ever be

- 1) in use,
- 2) stored safely in a drawer, tool box, in a knife rack, or,
- 3) in the dishwasher (blade down, handle up)

Never put knives in a sink full of soapy or dirty water. Someone could reach into the water and severely cut their hand.



Cutting and Slicing Tools



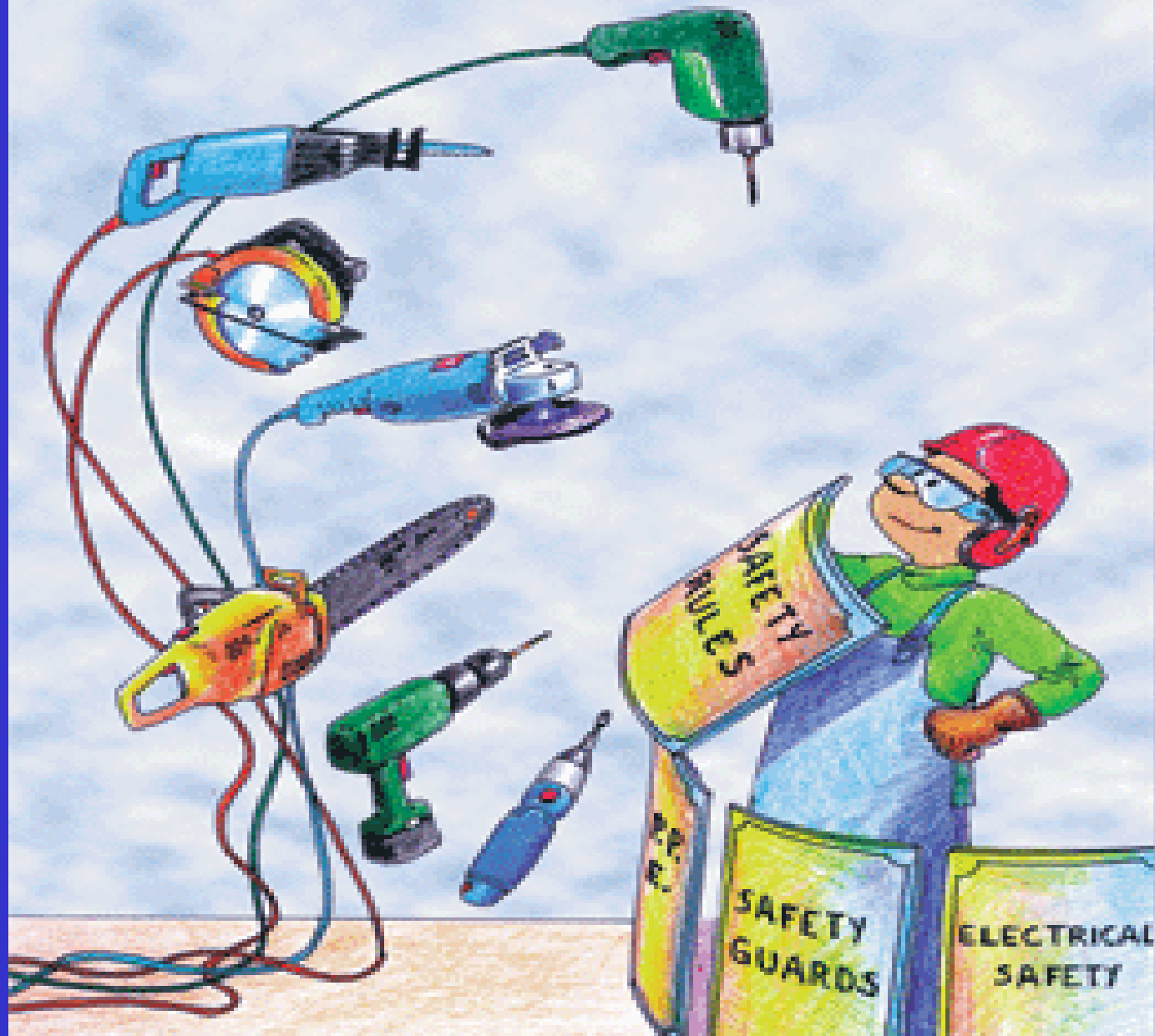
Let It Go! – Never attempt to catch a dropped knife or other cutting tool – let it fall.

Wipe Away From The Sharp Edge – if you need to wipe or clean material off the blade, always wipe away from the sharp edge.

Never Touch The Sharp Edge – Always use a piece of paper to test the sharpness of a knife
– NEVER use your fingers!

Never use a knife as a substitute for other tools – such as a screwdriver or bottle opener.

Protect Yourself from Hand Tool Hazards



Hand Tools - Protection



Keep floor surface where working free from debris and tripping or slipping hazards

Keep cutting tools sharp

Use tools as they were intended to be used

Use Personal Protective Equipment (PPE), such as safety glasses and gloves

PPE determined by Job Hazard Analysis (JHA)

Examples of PPE

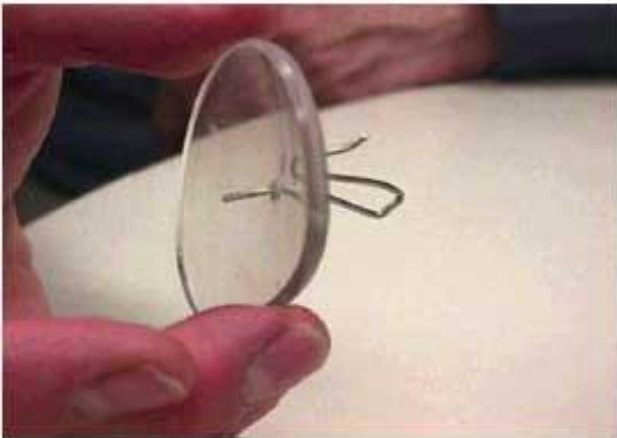
Body Part	Protection
Eye	safety glasses, goggles
Face	face shields
Head	hard hats
Feet	safety shoes
Hands and arms	gloves
Bodies	vests
Hearing	earplugs, earmuffs

Does PPE Help?



A trash bag that held a turpentine container ruptured. Without warning, the can exploded and the mixture of paint thinner and paint sprayed all over Phil's face, head, and upper body. The force of the explosion knocked him to the ground.

While applying siding with an air powered staple gun, the son fired a staple, hitting a metal plate behind the siding. It ricocheted back towards his face and one leg of the staple



penetrated the safety glasses' lens. The staple hit with such force that the frames were cracked and the son received bruising on the eyebrow and cheekbone.

PPE Standards

Various OSHA standards list specific requirements for various types/levels of PPE

- **Logging Standards**
- **Electrical Standards**
- **Hazardous Noise Standards**
- **Respiratory Protection Standards**
- **Chemical-Specific Standards**

Personal Protective Equipment

Responsibilities

- **Employer**
 - Assess workplace for hazards
 - Provide PPE
 - Determine when to use
 - Provide PPE training for employees and instruction in proper use
- **Employee**
 - Use PPE in accordance with training received and other instructions
 - Inspect daily and maintain in a clean and reliable condition

Power Tools

Must be fitted with guards and safety switches

Extremely hazardous when used improperly

Different types, determined by their power source:

- Electric
- Pneumatic
- Liquid fuel
- Hydraulic
- Powder-actuated



General Safety Guidelines for Power Tools

Be aware of all power lines and electrical circuits, water pipes, and other mechanical hazards in your work area, particularly those below the work surface, hidden from the operator's view, that may be contacted.

Wear proper apparel. Do not wear loose clothing, dangling objects or jewelry. Long hair must be restrained. Gloves should not be worn when operating certain power tools. Check appropriate tool manuals.

Spark Resistant Tools

Around flammable substances, sparks produced by iron and steel hand tools can be a dangerous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminum, or wood will provide for safety.



"Non-sparking", "spark-resistant" or "spark-proof" tools are names given to tools made of metals such as brass, bronze, Monel metal (copper-nickel alloy), copper-aluminum alloys (aluminum bronze), copper-beryllium alloys (beryllium bronze), and titanium.

Preferred "non-sparking" metals have less tensile strength than steels usually used to make tools. A lower tensile strength means the metal has less strength or resistance to tearing apart when stretched under test conditions.

It also means that these tools are softer, wear down more quickly than ordinary steel tools, and have to be dressed more frequently.

Most Dangerous Powered Hand Tool?

HINTS

1. Operating temperature can reach 900 degrees F.
2. Parts can move up to 68 miles an hour
3. At full speed, > 600 teeth pass at a given point per second
4. One in 5 injuries are from “kickback”.

Answer: Chain Saw



Switches

Hand-held power tools must be equipped with one of the following:

Constant pressure switch

shuts off power upon release

Examples: circular saw, chain saw, grinder, hand-held power drill



On-Off Switch

Examples: routers, planers, laminate trimmers, shears, jig saws, nibblers, scroll saws



Power Tools - Precautions

- **Disconnect tools when not in use, before servicing and cleaning, and when changing accessories**
- **Keep people not involved with the work away from the work**
- **Secure work with clamps or a vise, freeing both hands to operate the tool**
- **Don't hold the switch button while carrying a plugged-in tool**
- **Keep tools sharp and clean**
- **Remove damaged electric tools & tag them: "Do Not Use"**

Power Tools – Precautions

Electric Cords



Don't carry portable tools by the cord

Don't use electric cords to hoist or lower tools

Don't yank cord or hose to disconnect it

Keep cords and hoses away from heat, oil, and sharp edges

Replace damaged cords immediately!

Would you use this extension cord?



Electric Power Tools

To protect a worker from shock, these tools must:

- have a 3-wire cord plugged into a grounded receptacle
- be double insulated, or
- be powered by a low-voltage isolation transformer

Double
insulated
markings



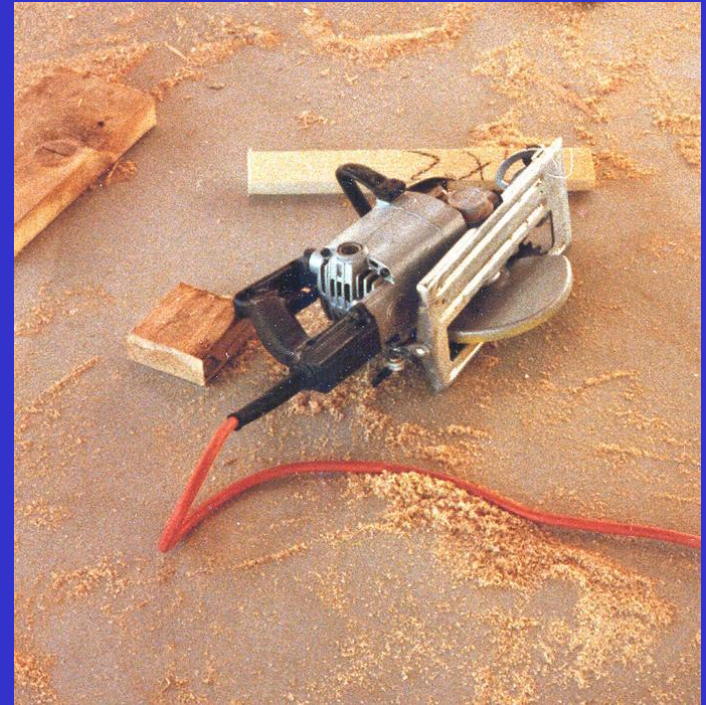
When using double insulated tools, be sure the outer case is undamaged and the tools are distinctly marked with this symbol or clearly labeled as "DOUBLE INSULATION" or "DOUBLE INSULATED" by the manufacturer.



Plug with a
grounding
pin

Electric Tools – Good Practices

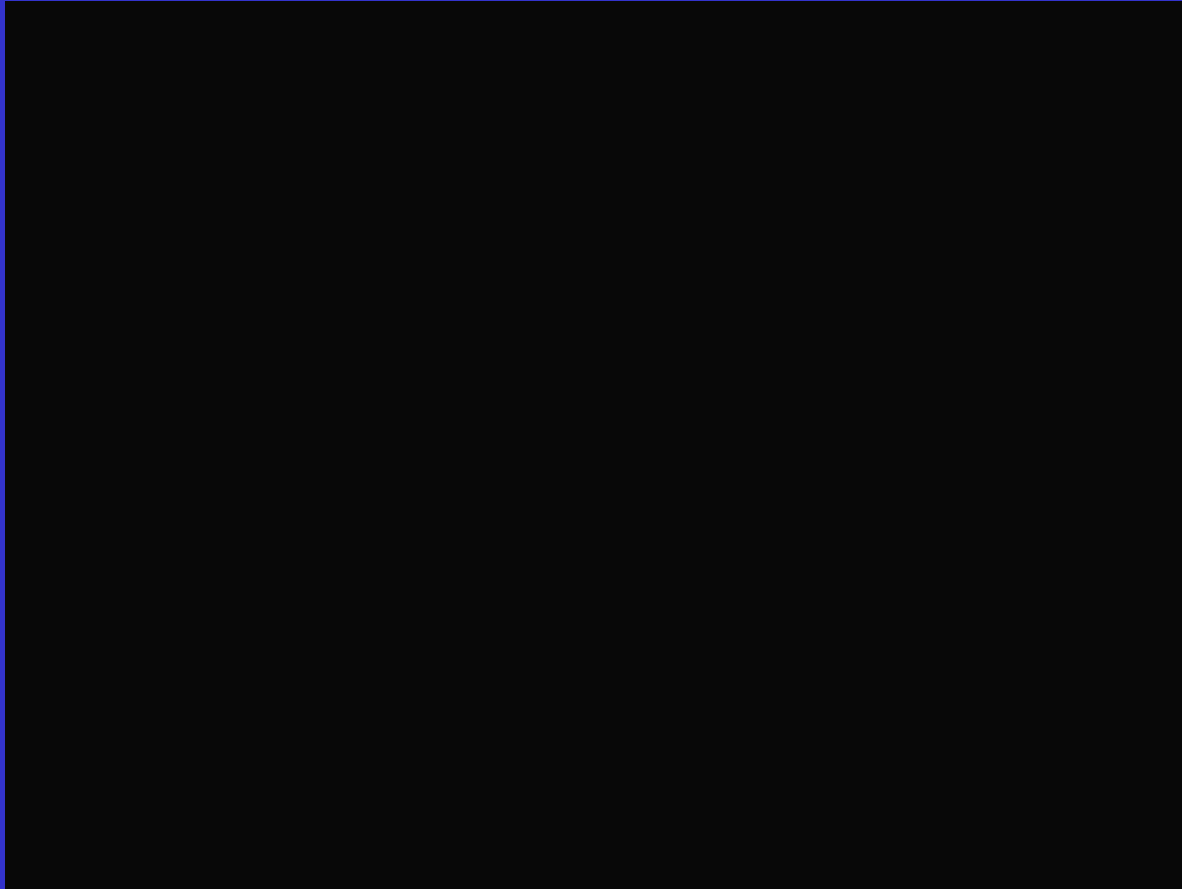
- Operate within design limits
- Use gloves and safety shoes
- Store in a dry place
- Don't use in wet locations unless approved for that (use GFCI)
- Keep work areas well lit
- Ensure cords don't present a tripping hazard



Good Practice?



Cordless Tools Need Love Too



Abrasive Wheels and Tools

May throw off flying fragments

Equip with guards that:

- Cover the spindle end, nut, & flange projections
- Maintain proper alignment with the wheel
- Don't exceed the strength of the fastenings

Guard so that a minimal amount of the wheel is exposed



Inspecting Abrasive Wheels

Before mounting:

- inspect closely for damage
- perform sound- or ring-test to ensure free from cracks and defects

To test:

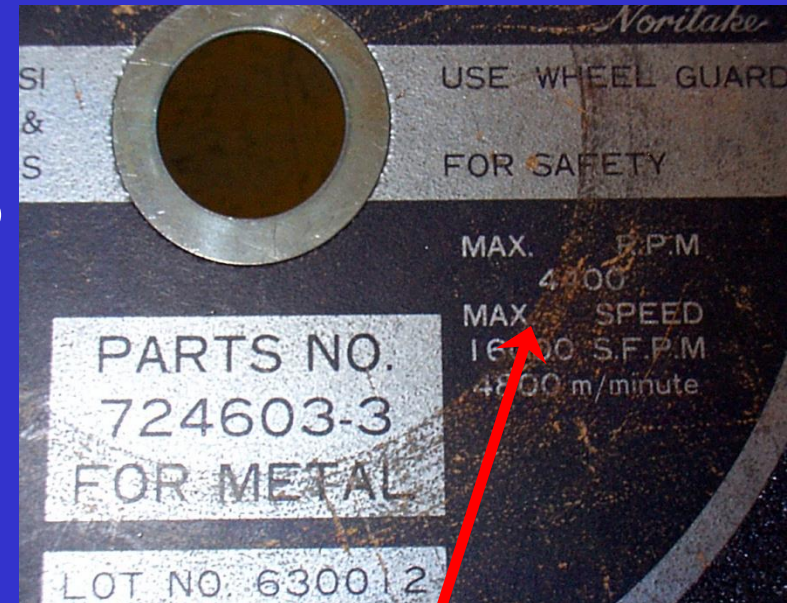
- tap wheel gently with a light, non-metallic instrument
- if wheel sounds cracked or dead, do not use it because it could fly apart



Abrasive Wheel Use

To prevent cracking:

- Fit the wheel freely on the spindle
- Tighten the spindle nut enough to hold the wheel in place without distorting the flange
- Let the tool come up to speed prior to grinding or cutting
- Don't stand in front of the wheel as it comes up to full speed
- Use eye and/or face protection



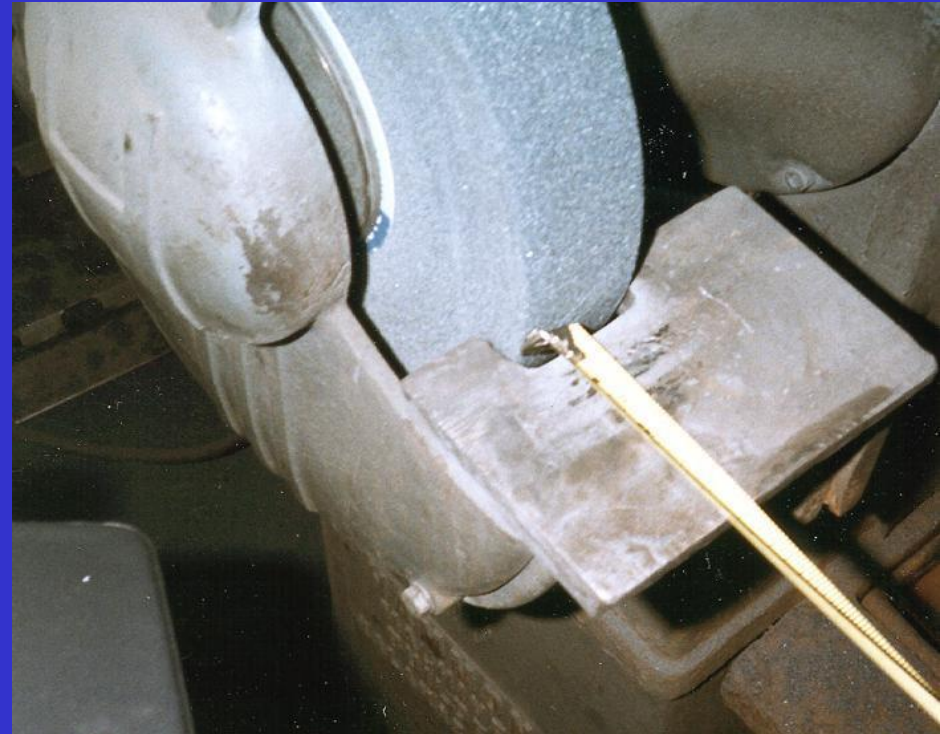
Ensure the spindle speed doesn't exceed the maximum speed marked on the wheel

Abrasive Wheel Work Rests

Keep work rests not more than 1/8th inch from wheel surface

This prevents jamming the work between the wheel and the rest, which may cause the wheel to break

Don't adjust wheel while it's rotating



Guarding

Guard exposed moving parts of power tools

Guard belts, gears, shafts, pulleys, sprockets, spindles, flywheels, chains, or other moving parts

Never remove a guard when a tool is in use



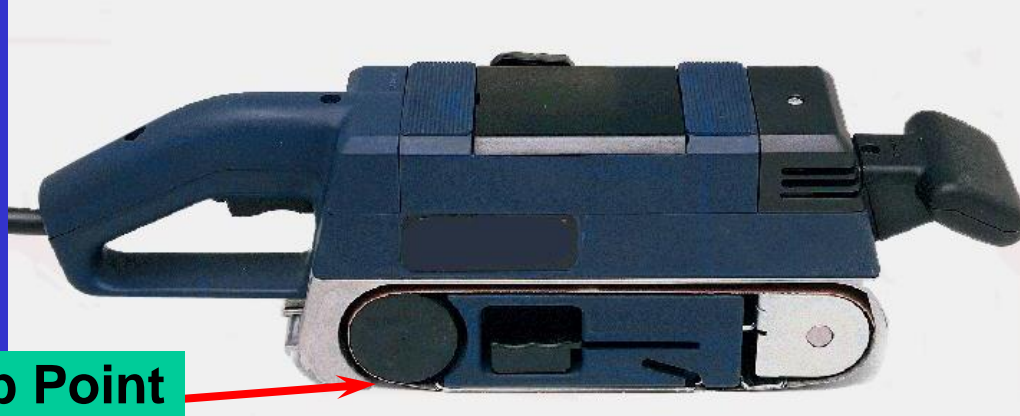
Guarding - Point of Operation



This shows a radial arm saw equipped with proper point of operation guards

The point of operation is where the work is actually performed on the materials – it must be guarded

Guarding Protection



Machine guards must protect the operator and others from:

- **Point of operation**
- **In-running nip points**
- **Rotating parts**
- **Flying chips and sparks**

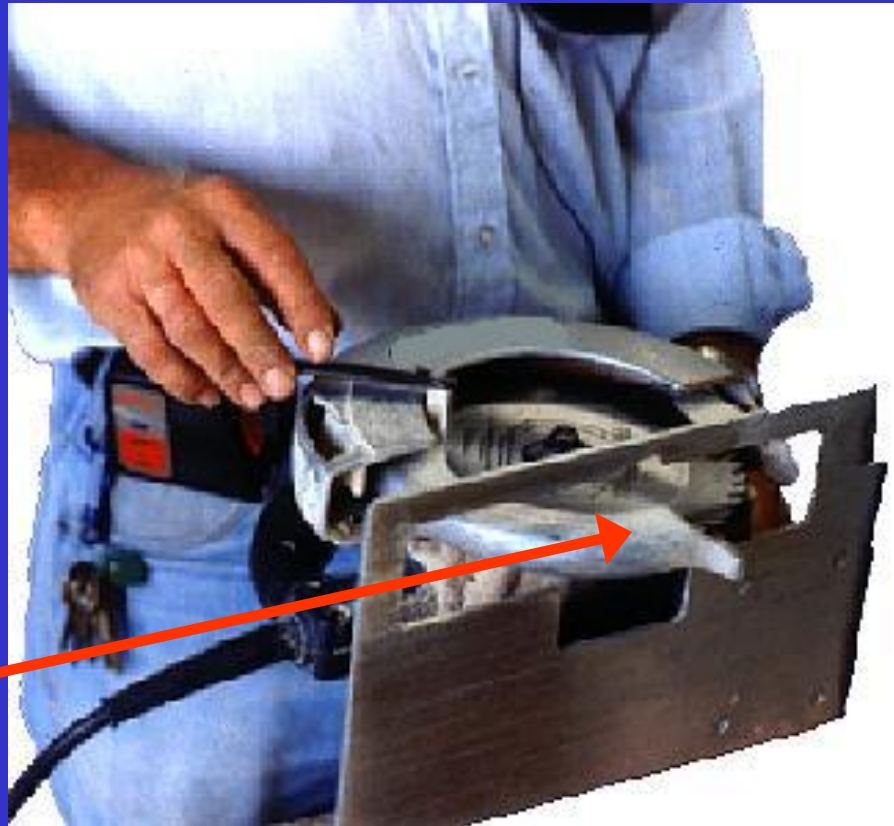
Radial Saw Guarding



Radial arm saw
equipped with an
upper and lower
blade guard

**Guard to prevent the operator from coming
in contact the the rotating blade**

Guarding Portable Circular Saws



**Guard these saws above and below the base plate or shoe.
The lower guard must cover the saw to the depth of the teeth.**

Table Saw Guarding



Hood guard



Use a hood for guarding

Avoid This.....



Pneumatic Tools

Powered by compressed air

Includes nailers, staplers, chippers, drills & sanders

Main hazard - getting hit by a tool attachment or by a fastener the worker is using with the tool

Take the same precautions with an air hose that you take with electric cords

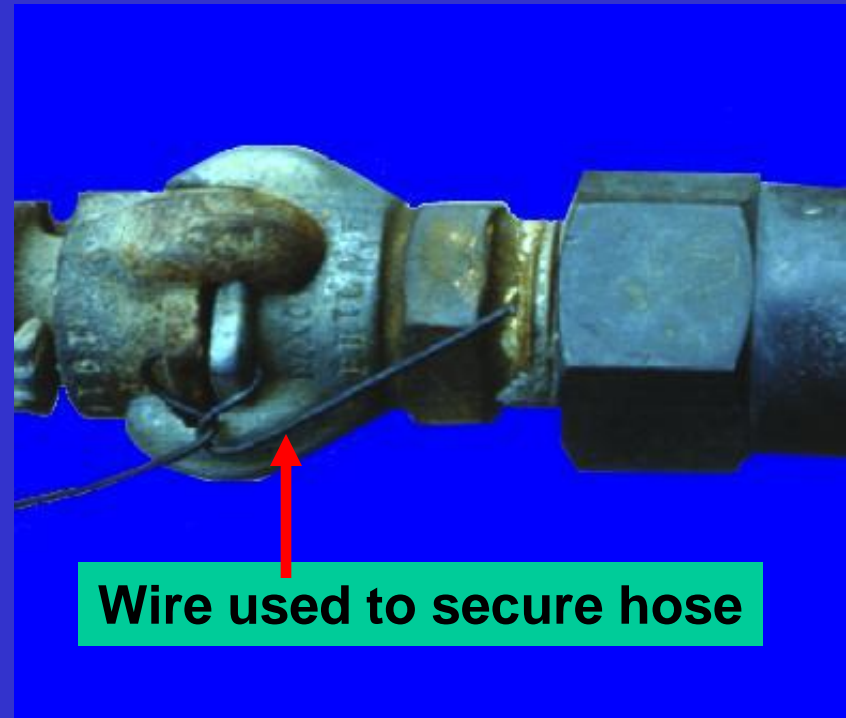


**Nail Gun -
Cut-Away View**

Pneumatic Tools - Fastening

Ensure tool is fastened securely to the air hose to prevent a disconnection

Use a short wire or positive locking device attaching the air hose to the tool



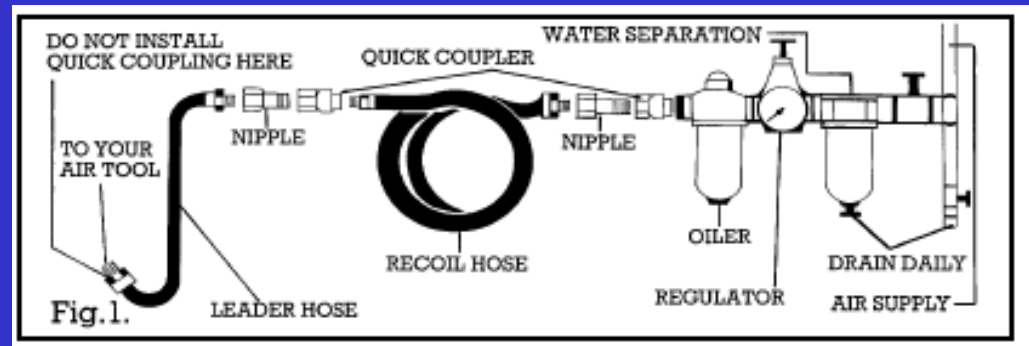
Pneumatic Tool Connections



← Unacceptable



← Acceptable



Pneumatic Tool Safety

Place a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with work surface

Install a safety clip or retainer to prevent attachments, such as chisels on a chipping hammer, from being ejected

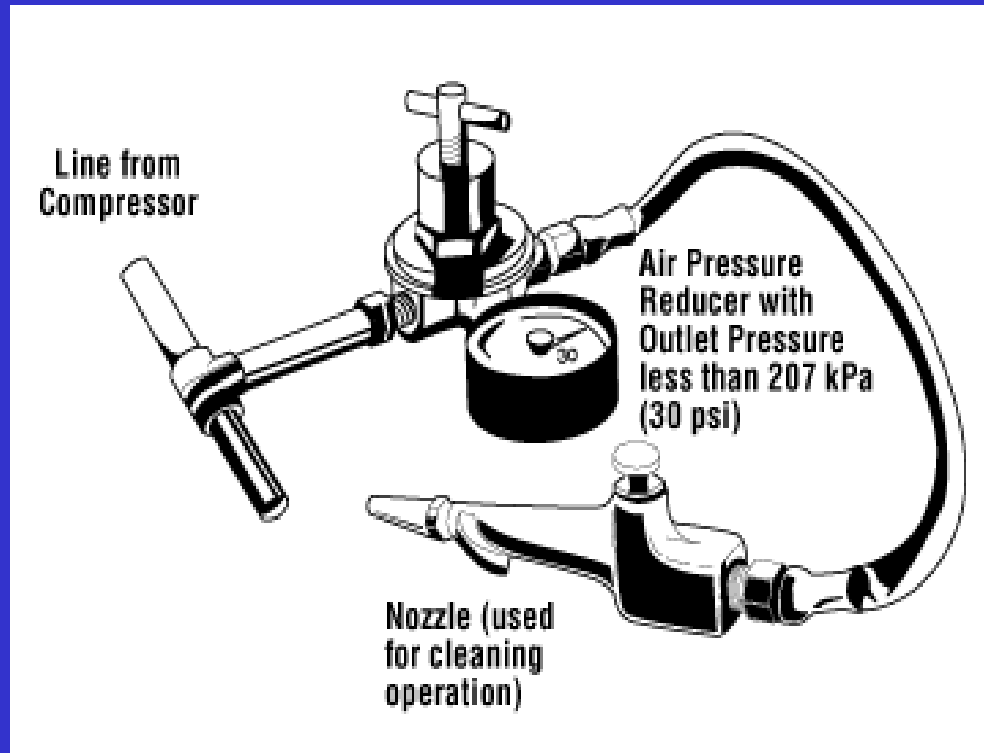
Wear eye protection. Wear hearing protection with jackhammers.



Muzzle in contact with work surface

Compressed Air Cleaning

Don't use compressed air for cleaning



Exception - where reduced to less than 30 p.s.i. with effective chip guarding and PPE

Outdoor “Yard” Tools

- Read and Heed owners manual
- Guards in place
- Turn off to perform maintenance or free jams/debris
- Wear PPE
- Proper plug in or fueling procedures



Liquid Fuel Tools

Usually gas powered

Main hazard – fuel vapors

Carbon Monoxide Hazards

Use only approved flammable liquid containers

Before refilling a fuel-powered tool tank, shut down the engine and allow it to cool

Refuel at least 10 feet from combustible materials



Powder-Actuated Tools

User must be trained and licensed to operate

Test tool each day before loading to ensure the safety devices are working properly

Wear suitable ear, eye, and face protection

Select a powder level that will do the work without excessive force



HILTI H 875182

QUALIFIED OPERATOR
Powder Actuated Tools

DATE: 22 Feb 92
6 JUN 56

326529074
36091

This certifies that: Michael J. Anderson
has received the prescribed training in the operation of powder operated tools manufactured by HILTI, INC.

HILTI, MODEL: DX 36 M, DX 350, DX 451

Will [Signature] 36091
SIGNATURE OF AUTHORIZED INSTRUCTOR INSTRUCTOR CARD NO:

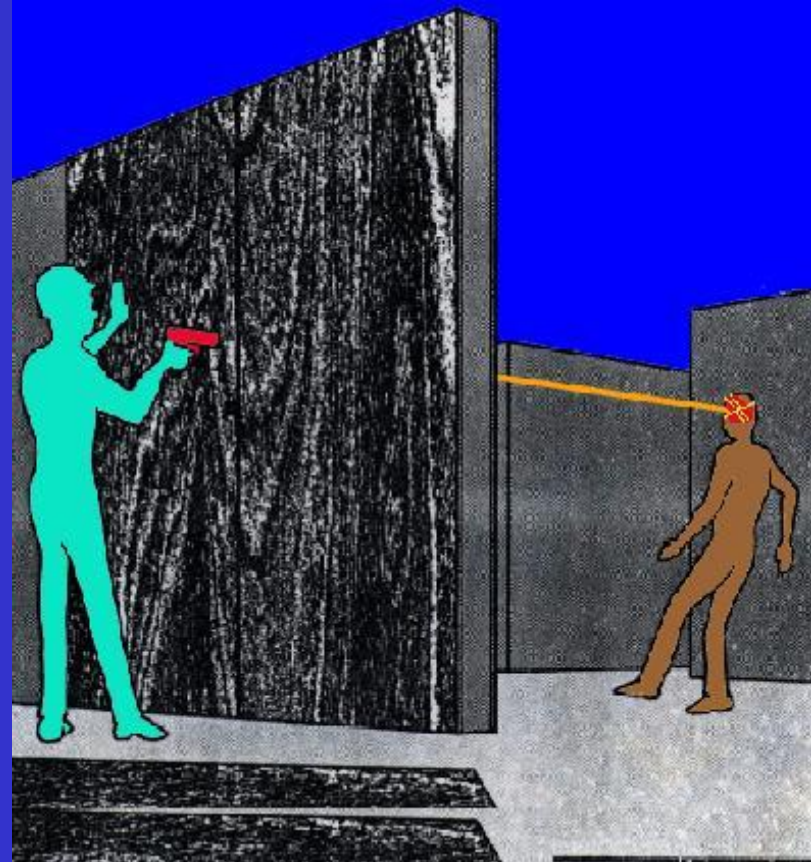
I have received the instruction in the safe operation and maintenance of powder actuated fastening tools of the makes and models specified and agree to conform to all rules and regulations governing their use.

PRIMI SIGNATURE: Michael J. Anderson
Revocation of card - Failure to comply with any of the rules and regulations for safe operation of powder actuated fastening tools shall be cause for the immediate revocation of this card, and it must be surrendered upon demand of the proper authority.

Fatal Fact

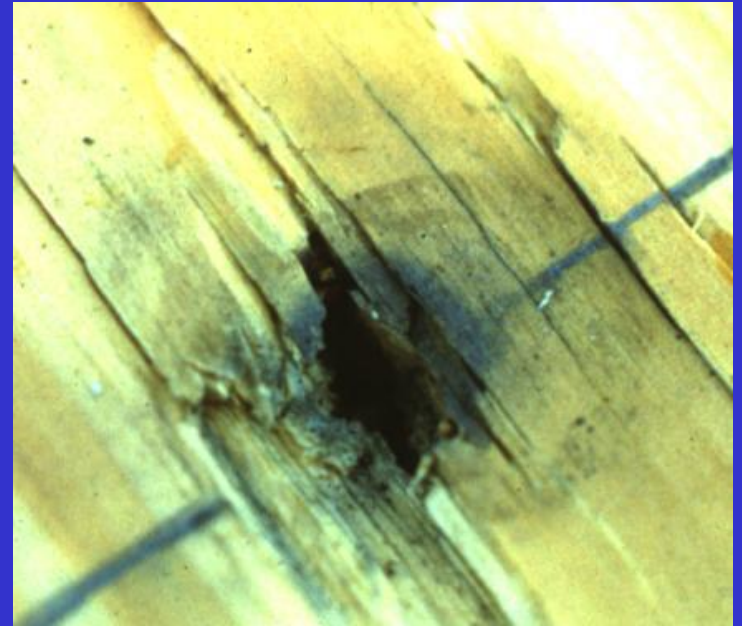
Employee killed when struck in head by a nail fired from a powder actuated tool.

Tool operator was attempting to anchor a plywood form in preparation for pouring a concrete wall



Easily Penetrated Material

Avoid driving into materials easily penetrated unless materials are backed by a substance that will prevent the pin or fastener from passing through



Also, don't drive fasteners into very hard or brittle material that might chip or splatter, or make the fasteners ricochet

Powder-Actuated Tool Safety Tips

- Don't use in explosive or flammable atmosphere
- Inspect tool before use to ensure:
 - it is clean,
 - that moving parts operate freely
 - the barrel is free from obstructions and has the proper shield, guard, and attachments
- Don't load the tool unless using immediately
- Don't leave a loaded tool unattended
- Keep hands clear of the barrel end
- Never point the tool at anyone
- Store unloaded in a locked box

Powder-Actuated Tool Safety



Jacks

To set up a jack, ensure:

- The base is on a firm, level surface
- It's centered
- The jack head is placed against a level surface
- You apply the lift force evenly
- ❖ Lubricate and inspect jacks regularly



Jacks - Capacity



The manufacturer's rated capacity must be marked on all jacks and must not be exceeded

All jacks must have a stop indicator (for over-travel) that is not exceeded

Jacks - Blocking

Immediately block the load after it is lifted. Put a block under the base of the jack when the foundation is not firm, and place a block between the jack cap and load if the cap might slip.

Photo - handyman jack is provided a firm base by using the railroad tie. The load is cribbed to prevent it from falling.



Reporting Accidents/Injuries

- First priority is to receive prompt medical attention (call 911)
- Report all work-related accidents, injuries or illnesses to your supervisor
 - Regardless of severity
- Paperwork to be filled out
 - Incident Report
 - Workers' Compensation

Hospitalization must be reported immediately to EHS&RM and no later than 8 hours from time of accident

Summary

Hazards are usually the result of improper tool use or not following one or more of these protection techniques:

- Inspecting the tool before use
- Read Tool Owners Manual prior to use
- Using PPE (Personal Protective Equipment)
- Using guards
- Properly storing and maintaining the tool
- Keep the workplace neat and free of clutter
- Using safe handling techniques

Quiz

