Hand and Power Tools

OSHA

WAYNE STATE UNIVERSITY

Overview of Module 5

- Types of Hand and Power Tools
- Hazards
- Injury/Illness Prevention
- Summary

OSHA

WAYNE STATE UNIVERSITY

Types of Hand and Power Tools

- Classified into two categories:
  - Hand (Manual) Tools
  - Power Tools
    - Electric Tools
    - Pneumatic Tools
    - Hydraulic Tools
    - Powder Actuated Tools

OSHA

WAYNE STATE UNIVERSITY

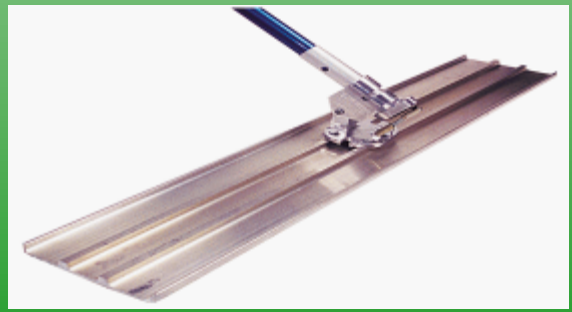
Hand Tools

- No external power required
- Broad range of tools from extremely simple to more complex, such as:
  - Hammers
  - Saws
  - Spades
  - Bullfloats

Hammer

Spade

Hack Saw



Bullfloat

Power Tools

- Operated with external power
- Determined by their power source (electric, pneumatic, powder actuated, etc.)
- Some examples are:
  - Jackhammers
  - Power Saws
  - Grinders
  - Power Drills, etc.

Powder Actuated Fastener

Grinder

Jackhammer

OSHA

WAYNE STATE UNIVERSITY

Hazards and Injury/Illness Prevention

- General Hazards and Injury Prevention
- Hand Tools
- Power Tools
  - General Safety Precautions
  - Machine Guarding
  - Electric Tools
  - Power Saws
  - Abrasive Wheel Tools
  - Pneumatic Tools
  - Powder Actuated Tools

OSHA

WAYNE STATE UNIVERSITY

General Hazards

- Dust, fumes and sparks generated by hand and power tools
- Falling, flying, abrasive, and splashing objects
- Lack of Personal Protective Equipment (PPE)
  - e.g. lack of eye protection may result in foreign body in the eye
- Untrained and/or unauthorized person working with the tools

OSHA

WAYNE STATE UNIVERSITY

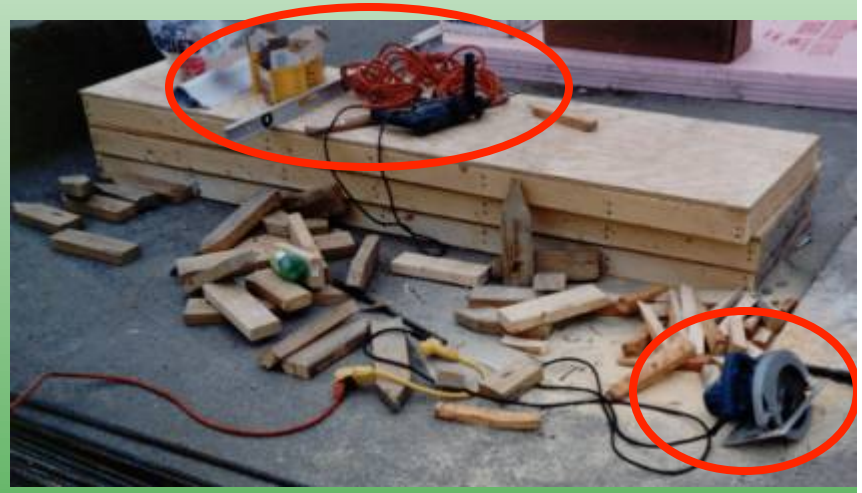
General Hazards

- Keep all tools in good condition with proper storage and regular maintenance
- Use the right tool for the job
- Examine each tool for damage before use
  - Do not use damaged tools
- Operate tools according to the manufacturers' instructions and recommendations
- Provide and use appropriate PPE

Hand Tools

Hazards:

- Misuse of tools or using tools for wrong tasks
- Using damaged tools (poor maintenance)
- Poor housekeeping and improper storage (tripping hazard)



Poor Housekeeping

OSHA

WAYNE STATE UNIVERSITY

Hand Tools

Injury/Illness Prevention:

- Inspect and remove unsafe hand tools
- Keep workspace as clean as possible and don't leave tools laying around unattended
- When using saw blades and knives, direct the tools away from other workers working in close proximity
- When using equipment with long handles (e.g. bullfloat), keep it clear from the path of traffic or construction equipment

OSHA

Hand Tools

Injury/Illness Prevention:

- Stay away from flammable substance while working with hand tools that may produce sparks
- Keep wooden handles of tools free of splinters and cracks
- Keep impact tools free of mushroomed heads
- Wear appropriate personal protective equipment

OSHA

WAYNE STATE UNIVERSITY

Power Tool Hazards and Injury/Illness Prevention

- General Safety Precautions
- Machine Guarding
- Electric Tools
- Power Saws
- Portable Abrasive Wheel Tools
- Pneumatic Tools

OSHA

WAYNE STATE UNIVERSITY

General Safety Precautions for Power Tools

- Disconnect tools when not in use
- Never carry a tool by the cord or hose
- Keep cords and hoses away from heat, oil, and sharp edges
- Avoid accidental starting
  - Do not hold fingers on the switch button while carrying a plugged-in tool

General Safety Precautions for Power Tools

- Secure work with clamps or a vise, freeing both hands to operate the tool
- Keep all people not involved with the work at a safe distance
- Be sure to keep good footing and maintain good balance when operating power tools
- Wear proper apparel for the task

OSHA

WAYNE STATE UNIVERSITY

Machine Guarding

- Guard exposed moving parts of power tools
- Machine guards must protect the operator and others from:
  - Point of operation
  - In-running nip points
  - Rotating parts
  - Flying chips and sparks

- Guards must be properly affixed to the machine
- Never remove safety guards when a tool is still in use

OSHA

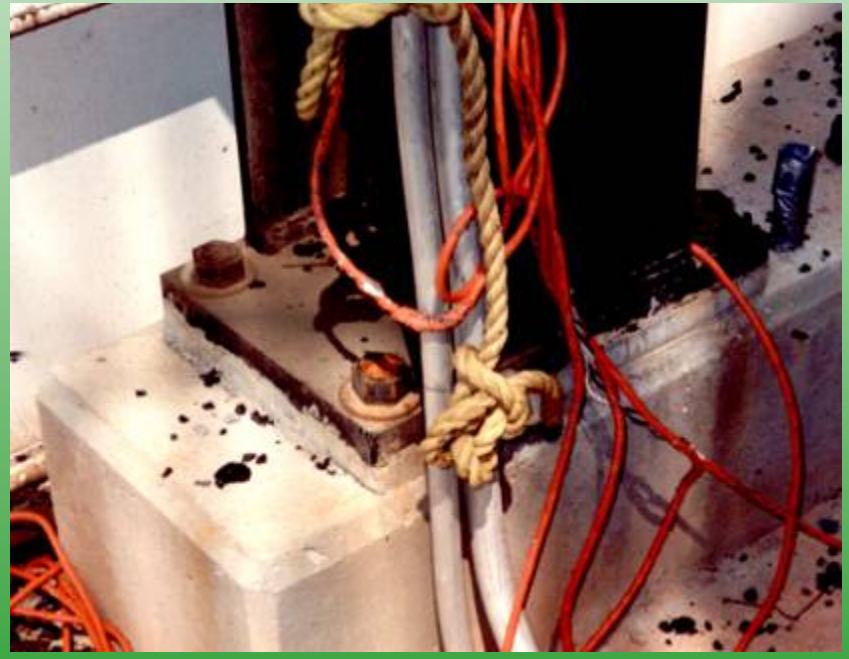
WAYNE STATE UNIVERSITY

Electric Tools

Hazards:

Electrical shock and fire hazards due to:

- Damage or internal defects
- Improper or no grounding
- Defective insulation and wiring
- Damage to insulation
  - Due to overworking, overheating.



Defective insulation

Electric Tools

Hazards:

- Damaged cords
- Reversal of polarity in wiring
- Using tools in wet areas

Cord, plug and ground prong should be in good condition

OSHA

WAYNE STATE UNIVERSITY

Electric Tools

Injury / Illness Prevention:

- Connect tools only to outlets with ground fault circuit interrupters (GFCI)
- Inspect tools and extension cords before each use
- Use durable and weather proof extension cords
- Use cords with three prong plugs

GFCI

OSHA

WAYNE STATE UNIVERSITY

Electric Tools

Injury / Illness Prevention:

- Operate electric tools within the limits of their design
- Do not use electrical tools in damp and /or wet areas
- Remove all damaged portable electric tools from use
- Ensure that electrical cords do not present tripping hazards
- Use gloves and appropriate safety footwear when using electric tools

Do not use wires with worn out insulation

OSHA

WAYNE STATE UNIVERSITY

Power Saws

Hazards:

- Lack of proper guarding
- Sawing objects not adequately supported
- Dust inhalation due to lack of personal protective equipment
- Operator distraction

Saw not stored properly after use

Power Saws

Prevention:

- Proper machine guarding
- Use of respiratory protection and safety goggles
- Don't keep saws and blades in motion when not in use

Chip Guard on Saw

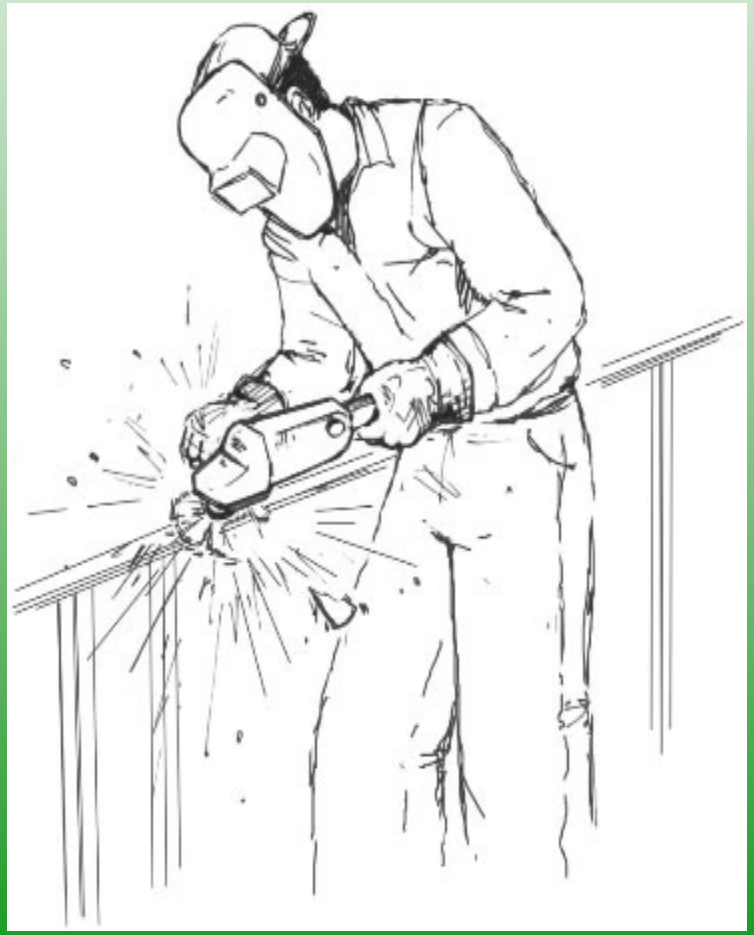
OSHA

WAYNE STATE UNIVERSITY

Portable Abrasive Wheel Tools

Hazards:

- Flying fragments
- Defective or cracked wheels
- Wheel breakage during start-up



OSHA

WAYNE STATE UNIVERSITY

Portable Abrasive Wheel Tools

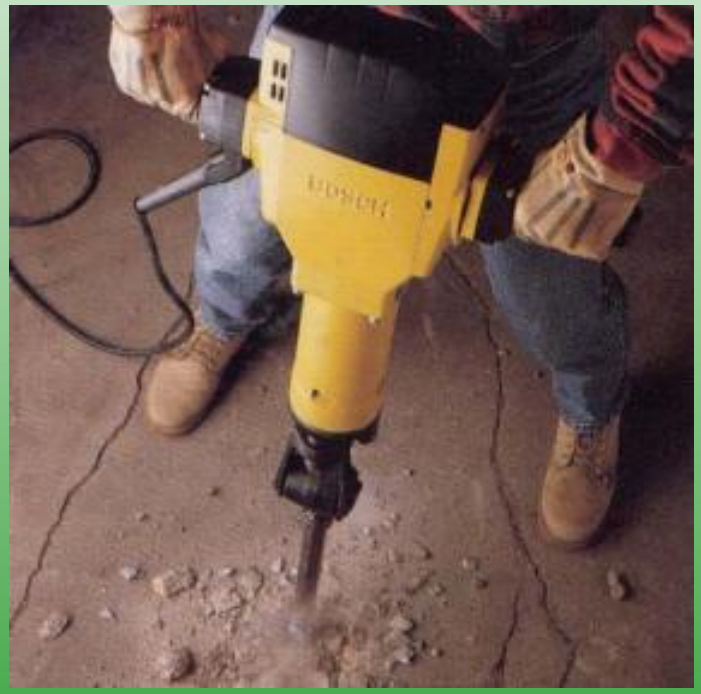
Injury/Illness Prevention:

- Proper machine guarding
  - Cover the spindle end, nut, and flange projections
  - Maintain proper alignment with the wheel
  - Do not exceed the strength of the fastenings
- Before mounting the wheel, inspect for damage and perform “ring-testing” (tap with a light instrument)
- Ensure wheel fits freely on the spindle
  - Spindle speed should not exceed the maximum operating speed
- Never stand in the plane of rotation as the wheel accelerates to full operating speed

Pneumatic Tools

Hazards:

- Getting hit by one of tool's attachments
- Air hose (disconnection, tripping hazard)
- Flying fragments
- Fatigue and strains while using jackhammers
- Noise



OSHA

WAYNE STATE UNIVERSITY

Pneumatic Tools

Injury/Illness Prevention:

- Securely fasten the pneumatic tool to the air hose
- Install a safety clip or a retainer to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation
- Set up screens to protect nearby workers from being struck by flying fragments
- Use heavy rubber grips to reduce fatigue and strain caused by operating jackhammers
- Use appropriate hearing protection

Powder Actuated Tool Hazards

Hazards:

- Using tools on unsuitable materials
- Thorough penetration
- Ricochet of fasteners
- Spalling of material
- Misfiring
- Operating near explosive materials

OSHA

WAYNE STATE UNIVERSITY

Powder Actuated Tools

Injury / Illness Prevention:

- Only trained operators must use powder-actuated tools
- An appropriate powder level must be selected to perform the work without using excessive force
- If a powder actuated tool misfires, the user must hold the tool in the operating position for at least 30 seconds before trying to fire it again
- Suitable ear, eye, and face protection must be worn

OSHA

WAYNE STATE UNIVERSITY

Powder Actuated Tools

Injury / Illness Prevention:

- Do not use the tool in an explosive or flammable atmosphere
- Inspect the tool and the barrel before using
- Do not load the tool unless it is to be used immediately
- Do not leave a loaded tool unattended
- Keep hands clear of the barrel end
- Never point the tool at anyone
- Avoid improper fastening that may lead to penetration, spalling, edge failure, and ricochets

Applicable Standards

- OSHA General Industry
  - 1910 Subpart P, Hand and Portable Power Tools and Other Hand-Held Equipment
- OSHA Construction
  - 1926 Subpart I, Tools – Hands and Power

Summary

- Hand and power tools range from simple to complex and are of various types
- Hand and power tools pose various hazards
- Injury prevention techniques include
  - Use of safe operating practices
  - Maintaining safe working conditions
- Understanding the hazards associated with hand and power tools and their injury prevention techniques are critical to improve worker safety